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THE TiO_2-Pt AND TiO_2-Ag NANOCOMPOSITES EFFECT ON THE MITOTIC DIVISION

MIHAELA CORNEANU, GABRIEL C. CORNEANU, CARMEN LAZĂU

Abstract. In paper the effect of a UV irradiation and of the TiO_2-Pt or TiO_2-Ag nanocomposites, applied alone or together, on the mitotic division in *Nigella damascena* L. (a tester radiobiological species). The investigations results, point out as the UV rays applied alone or together with TiO_2-Pt or TiO_2-Ag nanocomposites, affected the compaction degree of the chromatin fibers, the mitotic spindle division as well as the chromosomes integrity, induced diverse chromosome aberrations types. In the same time, the bimetallic TiO_2 nanocompozites presented a preferentiality of action on the NOR part of the chromosomes as well as on the heterochromatin regions, the both situated at the nucleus periphery. The BR index values, suggest as the TiO_2 bimetallic nanocomposites are not implicate in the reunion process of the broken end of the chromosomes.

Keywords: TiO_2-Pt or TiO_2-Ag nanocomposites; UV rays; chromosome aberration, *Nigella damascena.*

Rezumat. **Efectul nanocompozitelor TiO_2-Pt** şi TiO_2-Ag **asupra diviziunii mitotice.** In lucrare este prezentat efectul unei iradieri UV şi al nanocompozitelor TiO_2-Pt sau TiO_2-Ag aplicate singular sau împreună, asupra diviziunii mitotice la *Nigella damascena* L. (specie tester radiobiologic). Rezultatele investigaţiilor arată că radiaţii UV aplicate singular sau împreună cu nanocompozitele TiO_2-Pt, sau TiO_2-Ag au afectat gradul de compactare al fibrelor de cromatină, fusul de diviziune şi integritatea cromosomilor, inducând diferite tipuri de aberaţii cromosomiale. In acelaşi timp, nanocompozitele bimetalice TiO_2 au prezentat o preferenţialitate de acţiune asupra regiunii NOR a cromosomilor şi asupra regiunilor cu heterocromatina, ambele situate la periferia nucleului. Valoarea indicelui BR sugerează ca nanocompozitele bimetalice TiO_2 nu sunt implicate în reunirea capetelor rupte ale cromosomului.

Cuvinte cheie: nanocompozite TiO_2-Pt si TiO_2-Ag , radiaţii UV, aberaţii cromosomiale, *Nigella damascena.*

INTRODUCTION

Titanium was discovered with two hundred years ago, by William Gregor, in the ***ilmenit*** mineral rock. In environment it is a common element, his abundance being of 0.63% on Terra. Titanium posses a very good biocompatibility, being use initially in medicine as implant material (in dental and ostelogy), cardiac pacemaker, cardiac valves, a/o. Titanium formed at his surface a layer of about 2-10 nm TiO_2, which induce the resistance at corrosion. Under action of ***UV rays***, titanium can produce free radicals. For this rations, the recent researches are concerned for his use in the carcinogen tissues. His efficiency is depending on the size and nanoparticles, chemistry features of the surface, a/o. Also, titanium was doped with other metals (Au, Ag, Pt, a/o), their properties being enhanced. Also were obtained a new material, ***nanodevices***, hybrid between TiO_2 nanoparticles or TiO_2-Metal nanocomposites, with oligonucleotide (WOLOSCHAK et al., 2006).

LU et al. (1998), in experiments performed on Chinese hamster ovary-K1 cells, reported as TiO_2 induced sister chromatin exchanges and micronuclei, being affected the chromosome integrity. RAHMAN et al. (2002), in experiments performed on hamster fibroblasts, remarked that the ultra fine particles of TiO_2 induced the chromosome aberrations, as well as the apoptosis process. There are different results, regarding to the cytotoxicity of the TiO_2 (FERRIN et al., 1992; DONALDSON ET AL., 1998; OBERSDORFER, 2001, a/o.). The scientific literature is very poor with references about the TiO_2 effect on the vegetal cells ZHENG et al., 2005; CORNEANU et al., 2007).

MATERIALS AND METHOD

Nigella damascena L. (Fam. *Ranunculaceae*) is a tester species, used for cytogenetic and radiobiological investigations (MOUTSCHEN-DAHMEN (1966, 1968), GILLOT-DELHALE J. (1966), CORNEANU C.G., 1974, a/o). This species present a small chromosome number (2n=6), big and differentiate morphological between them and the synchronized mitotic divisions.

The titanium dioxide from atanase form, was doped with silver or platinum (1%), obtaining the nanocomposites of the TiO_2-Pt and TiO_2-Ag, atanase type. These were prepared at I.N.C.-D. Electrochemistry and Condensed Mater Timisoara after two protocols.

Radices of about 10 mm length, treated with an aqueous suspension of TiO_2-Pt nanocomposite particles (2 or 4 mg nanocomposites, with the particles of about 25-30 nm in diameter, suspended in 5 ml aqueous solution). After two hours from the treatment beginning, half of experimental variants were exposed at UV radiations emitted by a UV lamp (BLA-12 type, MEDICOR Budapest at the parameters: U=220 W, I=0.2 A, 50 Hz, 44 VA), and other half variant at solar light. The biological material was harvested at different stages in the first cell cycle (2 hours) and in the second

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cell cycle after treatment (26 hours). Were analyzed the chromosome aberration in the meristematic cells (squash preparations, Carr stained).

RESULTS AND DISCUSSIONS

1. The percentage of the cell in division and of the phases of mitosis

In the meristem tops, were analyzed the all cells in mitotic division or in interphase: the chromatin fibers aspects, the spindle division and the chromosomes in different mitotic phases. In Table 1 is presented the percentage of the normal cells in mitosis, as well as the cells percentage in different mitotic division stages, under action of the UV rays, or solar light, at 2 hours after the treatment begin.

Table 1. The normal percentage cells in mitose and the percentage cells in different mitotic stages in the first mitotic cycle (at 2 hours after the treatment begin).
Table 1. Procentajul de celule normale în mitoza şi procentajul de celule în diferite stadii ale mitozei, în timpul primului ciclului mitotic (la 2 ore după începerea tratamentului).

Variant	Normal cells in mitosis (%)	Percentage cells in:				
		Prophase	Prometa-phase	Metaphase	Anaphase	Telophase
Solar light (2 hours)						
Control	99.4	41.7	2.5	19.7	16.7	19.4
TiO_2-Ag-1	76.2	43.0	5.2	24.3	17.4	10.1
TiO_2-Ag-S	87.7	38.7	1.6	17.6	16.2	25.9
TiO_2-Pt-1	93.9	40.5	3.3	21.7	14.5	20.0
TiO_2-Pt-S	92.0	46.0	1.7	25.0	16.1	11.2
UV rays (2 hours)						
Control	92.6	33.2	4.7	27.4	22.1	12.6
TiO_2-Ag-1	86.2	44.4	2.1	22.0	18.8	12.7
TiO_2-Ag-S	99.1	41.9	2.3	23.0	16.2	16.6
TiO_2-Pt-1	99.3	36.7	1.8	24.4	17.7	22.4
TiO_2-Pt-S	99.4	36.8	2.9	24.0	19.5	26.7

The UV rays alone reduced the cells number in mitotic division, instead the UV rays applied together with nanocomposites with TiO_2, enhanced the cell number in division. The presence of the TiO_2-Pt nanocomposite in the time of the UV irradiation (2 hours, at the parameters from experiment), enhanced the cells number in mitotic division, manifested a protecting effect against the UV rays action.

The analysis of the nanocomposites effect alone and together UV rays (2 hours), on the different mitotic phases, revealed a different action, depending on the mitotic phase and the metal component (Table 2). Thus, the nanocomposites of the TiO_2-Pt type manifest a protecting effect against the UV rays, in the all division stages.

Table 2. The percentage of normal cells in different mitosis phases (first mitotic cycle).
Table 2. Procentajul de celule normale în diferite faze ale mitozei (primul ciclu mitotic).

Variant	Prophase	Prometaphase	Metaphase	Anaphase	Telophase
Solar lighr (2 hours)					
Control	98.8	100.0	97.9	99.3	99.7
TiO_2-Ag-1	61.9	54.3	80.9	98.0	98.9
TiO_2-Ag-S	76.5	87.5	89.9	95.1	98.5
TiO_2-Pt-1	89.5	78.3	94.7	100.0	100.0
TiO_2-Pt-S	98.3	87.5	98.3	99.3	100.0
UV rays (2 hours)					
Control	90.0	85.1	90.5	98.4	100.0
TiO_2-Ag-1	81.8	61.5	80.9	96.6	100.0
TiO_2-Ag-S	99.7	93.8	98.1	100.0	99.1
TiO_2-Pt-1	98.6	100.0	100.0	98.7	100.0
TiO_2-Pt-S	98.8	100.0	100.0	99.2	100.0

In percentage normal cells in mitosis and the percentage cells in different mitoses phase in the second cell cycle, is presented in the Table 3. The values recorded in the solar light, are better in the second cell cycle, in comparison with the values recorded in the first cell cycle. Because UV rays presence, the normal cells in mitosis, recorded lower values.

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Table 3. The normal percentage cells in mitosis and the percentage cells in different mitotic stages in the second mitotic cycle (at 26 hours after the treatment begin).
Table 3. Procentajul de celule normale în mitoza şi procentajul de celule în diferite stadii ale mitozei, în timpul celui de al doilea ciclu mitotic (la 26 ore după începerea tratamentului).

Variant	Normal cells in mitosis (%)	Percentage cells in:				
		Prophase	Prometa-phase	Mataphase	Anaphase	Telophase
Solar light (2 hours)						
Control	98.9	39.6	2.0	22.6	17.6	18.2
TiO_2-Ag-1	98.9	44.5	1.6	22.5	14.4	17.0
TiO_2-Ag-S	99.3	33.4	13.0	24.9	21.6	17.1
TiO_2-Pt-1	99.3	36.9	1.1	21.5	17.1	18.9
TiO_2-Pt-S	95.9	39.0	1.6		19.5	12.4
UV light (2 hours)						
Control	98.2	38.8	2.0	22.7	18.7	17.8
TiO_2-Ag-1	97.7	37.9	2.5	25.7	15.8	18.1
TiO_2-Ag-S	95.1	46.4	2.3	19.0	14.9	17.4
TiO_2-Pt-1	98.0	42.6	1.8	25.6	14.0	16.0
TiO_2-Pt-S	97.6	37.1	2.6	25.8	17.7	16.8

Also, between different experimental variants, were recorded a small differences in comparison with the values recorded in the first cell cycle. The nanocomposites, especially the TiO_2-Pt nanocomposites, were diminished the UV rays effect.

The percentage of the normal cells in different mitotic division stages, in the second mitotic cell cycle, reveal the protecting effect of the TiO_2-Pt nanocomposites, against the UV light (Table 4).

Table 4. The percentage of the normal cells in different mitosis phase (second mitotic cycle).
Table 4. Procentajul de celule normale în diferite faze ale mitozei (al doilea ciclu mitotic).

Variant	Prophase	Prometaphase	Matephase	Anaphase	Telophase
Solar light (2 hours)					
Control	98.7	100.0	97.7	99.0	99.5
TiO_2-Ag-1	99.4	88.2	98.9	100.0	98.9
TiO_2-Ag-S	99.0	100.0	100.0	98.5	100.0
TiO_2-Pt-1	98.7	100.0	99.4	100.0	100.0
TiO_2-Pt-S	93.2	87.5	98.1	96.9	98.9
UV light (2 hours)					
Control	97.6	100.0	99.1	97.8	98.8
TiO_2-Ag-1	94.9	100.0	98.9	100.0	99.5
TiO_2-Ag-S	94.4	96.3	91.6	97.2	99.0
TiO_2-Pt-1	99.2	80.0	97.2	97.5	98.5
TiO_2-Pt-S	97.8	100.0	99.7	97.7	99.0

The percentage chromosome aberrations in anaphase and telophase induced in the first cell cycle (Table 5) and in the second cell cycle (Table 6), recorded a small values, slightly in the second cell cycle.

In the second mitotic cycle, the percentage of the fragments and bridges recorded small values, but slightly upper in comparison with values recorded in the first mitotic cycle. The nanocomposites alone induced some chromosome aberrations, especially in the second cell cycle (a long time of action).

Table 5. The chromosome aberrations in *Nigella damascena* in the first mitotic cycle (after 2 hours)
Table 5. Aberaţiile cromosomiale la *Nigella damascena* în timpul primului ciclu mitotic (dupa 2 ore)

Variant	Fragments at 100 cells		Bridges at 100 cells		BR index	
	Anaphase	Telophase	Anaphase	Telophase	Anaphase	Telophase
Solar light (2 hours)						
Control	0.3	0.0	0.0	0.0	0.0	0.0
TiO_2-Ag-1	2.6	1.1	0.0	1.5	0.0	0.74
TiO_2-Ag-S	3.7	2.3	0.0	0.0	0.0	0.0
TiO_2-Pt-1	0.0	0.0	0.0	0.0	0.0	0.0
TiO_2-Pt-S	1.4	0.0	0.0	0.0	0.0	0.0

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UV light (2 hours)						
Control	3.5	0.0	1.5	0.0	2.26	0.0
TiO_2-Ag-1	0.0	0.0	0.0	0.0	0.0	0.0
TiO_2-Ag-S	0.0	1.7	0.0	0.85	0.0	2.0
TiO_2-Pt-1	2.7	0.0	0.0	0.0	0.0	0.0
TiO_2-Pt-S	0.8	0.0	0.0	0.0	0.0	0.0

The analysis of the RB index values, not suggest that nanocomposites of TiO_2 (indifferent of the second metal, platinum or silver), present a role in the linked of the broken end of the chromosomes (Table 5, 6).

Table 6. The chromosome aberrations in *Nigella damascena* in the second mitotic cycle (after 26 hours)
Table 6. Aberațiile cromosomiale la *Nigella damascena* în timpul celui de al doilea ciclu mitotic (dupa 26 ore)

Variant	Fragments at 100 cells		Bridges at 100 cells		BR index	
	Anaphase	Telophase	Anaphase	Telophase	Anaphase	Telophase
Solar light (2 hours)						
Control	0.5	0.5	0.0	0.55	0.0	0.0
TiO_2-Ag-1	0.0	0.5	0.0	0.0	0.0	0.9
TiO_2-Ag-S	3.0	0.0	1.5	0.0	0.5	0.0
TiO_2-Pt-1	0.0	0.0	0.0	0.0	0.0	0.0
TiO_2-Pt-S	5.2	1.1	2.1	0.0	2.47	0.0
UV light (2 hours)						
Control	2.5	1.1	0.36	0.0	6.94	0.0
TiO_2-Ag-1	0.0	1.0	0.0	0.0	0.0	0.0
TiO_2-Ag-S	4.5	1.4	0.0	0.0	0.0	0.0
TiO_2-Pt-1	4.2	1.5	0.0	0.73	0.0	2.05
TiO_2-Pt-S	8.8	3.1	0.0	0.0	0.0	0.0

2. The types of chromosome aberrations and metabolic modifications

The used nanocomposites (especially TiO_2-Pt), affected the compaction degree of the chromatin fibers, inducting a particular aspect similar with the chromosome banding, as well as their integrity. As result of the cells analyzed in mitotic division, were evidenced two types of chromosome modifications: (a) metabolic modifications and (b) proper chromosome aberrations.

A. Metabolic modifications of the chromosomes:

The chromosome banding, determined by a different compaction degree in the eu- and heterochromatic regions of the chromosome; visible in prophase, prometaphase, metaphase and anaphase. Are affected especially the chromosomes with satellite;

Spindle mitotic inactivation, resulting figures similar with those from the colchicines action (C-mitosis); visible in the all mitotic division stages (from prophase to telophase); as result of this process, result autopolyploid cells;

Parallel disposed of the chromatin fibers, probably as result of some surface electrical phenomenon; visible in prophase, prometaphase and metaphase.

PCC (premature chromatin condensation), visible in prophase, prometaphase and metaphase;

DCC (delay chromatin condensation), visible in prophase, prometaphase and metaphase.

B. Proper chromosome aberrations

The nanocomposites of TiO_2-Pt and TiO_2-Ag type, induced chromosome aberrations: **minutes** and **acentric fragments** (visible from metaphase to telophase); **centric rings** and **acentric rings** (visible in anaphase and telophase), **bridges** and **arch** (in anaphase and telophase). All of this genetic material in not included in the nuclei in telophase is visible, in the next interphase as **micronuclei** (Fig. 4/16).

The chromosome aberrations of **minutes** or **acentric fragments** type, are produced by a one-hit, and affected a single chromosome. The chromosome aberrations of **centric rings** or **acentric rings** types, are produced by two-hit, which affectd the same chromosome (Casarett, 1968; Corneanu, 1971).

The chromosome aberrations of **bridges** and **arch** types, derivate from a dicentric chromosome. The dicentric chromosomes is obtained as result of the reunion of the end broken of two different chromosomes. When the two centromeres of the same chromosome, migrate toward oposide cells pole, result a chromosome aberration of **bridge** type. If the two centromeres of a dicentric, migrate to the same pole, result an aberration of **arch** type. The presence of these aberrations type was theoretical presented by Casarett (1968). Corneanu (1974, 1979) described this aberration type in *Nigella sativa* species, with long chromosomes, after the dry seeds exposed at a dose of 35 Gy, X-rays. In the Fig. 1, is visible a chromosome aberration of **arch** type (arrow).

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In the Figs 1-4 are presented: ***acentric fragments*** and a aberration of ***arch type*** in anaphase (Fig. 1), ***bridge*** in anaphase (Fig. 2), ***acentric fragments*** and ***broken bridge*** in telophase (Fig. 3), ***micronucleus*** in the next interphase (Fig. 4).

CONCLUSIONS

The titanium dioxide from atanase form was doped with silver or platinum (1%), obtaining the nanocomposites of the TiO_2-Pt and TiO_2-Ag, atanase type.

The bimetallic nanocomposites (TiO_2-Pt and TiO_2-Ag, atanase type), were applied alone or together with UV irradiation at radicular meristem tissue of *Nigella damascena* (a radiobiological and cytogenetically tester specie), time of 2 hours. The cytogenetic effect was analyzed in the first cell cycle and in the second mitotic cycle (the normal cells in different mitotic stages, as well as the chromosome aberrations or metabolic modifications of the chromosomes.

The bimetallic nanocomposites (TiO_2-Pt or TiO_2-Ag), enhanced the cells number in mitotic activity in.

The UV rays, applied time of 2 hours (at the parameters from experiment), manifest a relative protecting effect over action of the nanocomposites (especially the nanocomposites of the TiO_2-Pt type) over the cell mitotic activity.

Thus, the nanocomposites of the TiO_2-Pt type, in variant of 2 hours treatment, manifest a protecting effect against the UV rays, in the all division stages.

In the second cell cycle after the treatment begin, the values recorded in the solar light are better, in comparison with the values recorded in the first cell cycle. In the UV rays presence, the number of the normal cells present in mitosis, recorded lower values. Between the different experimental variants, were recorded small differences, in comparison with the values recorded in the first mitotic cycle. The nanocomposites (especially TiO_2-Pt) were diminished the UV rays effect.

The percentage of the normal cells (presented in different mitotic division stages), in the second mitotic cell cycle, reveal the protecting effect of the TiO_2-Pt nanocomposites, against the UV light action.

UV rays applied alone or together with bimetallic nanocomposites affect: (a) compacting degree of the chromatin fiber; (b) spindle division activity; (c) chromosome integrity.

Bimetallic nanocomposites and /or UV-rays, manifest a preferential action at some chromosome level, especially on the chromosomes with NOR region (chromosomes with satellite), and at the heterochromatic regions level.

The fragments and bridges percentage recorded small values, but slightly upper in the second mitotic cycle. The nanocomposites alone induced some chromosome aberrations, especially in the second cell cycle (a long time of action).

The BR index value, suggest that TiO_2 nanocomposites are not implied in the reunion process of the broken end of the chromosomes.

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Figure 1. Acentric fragments and arch (arrow) in anaphase (*Nigella damascena* L.).
Figura. 1. Fragmente acentrice şi arch (sageata) în anafază (*Nigella damascena* L.).

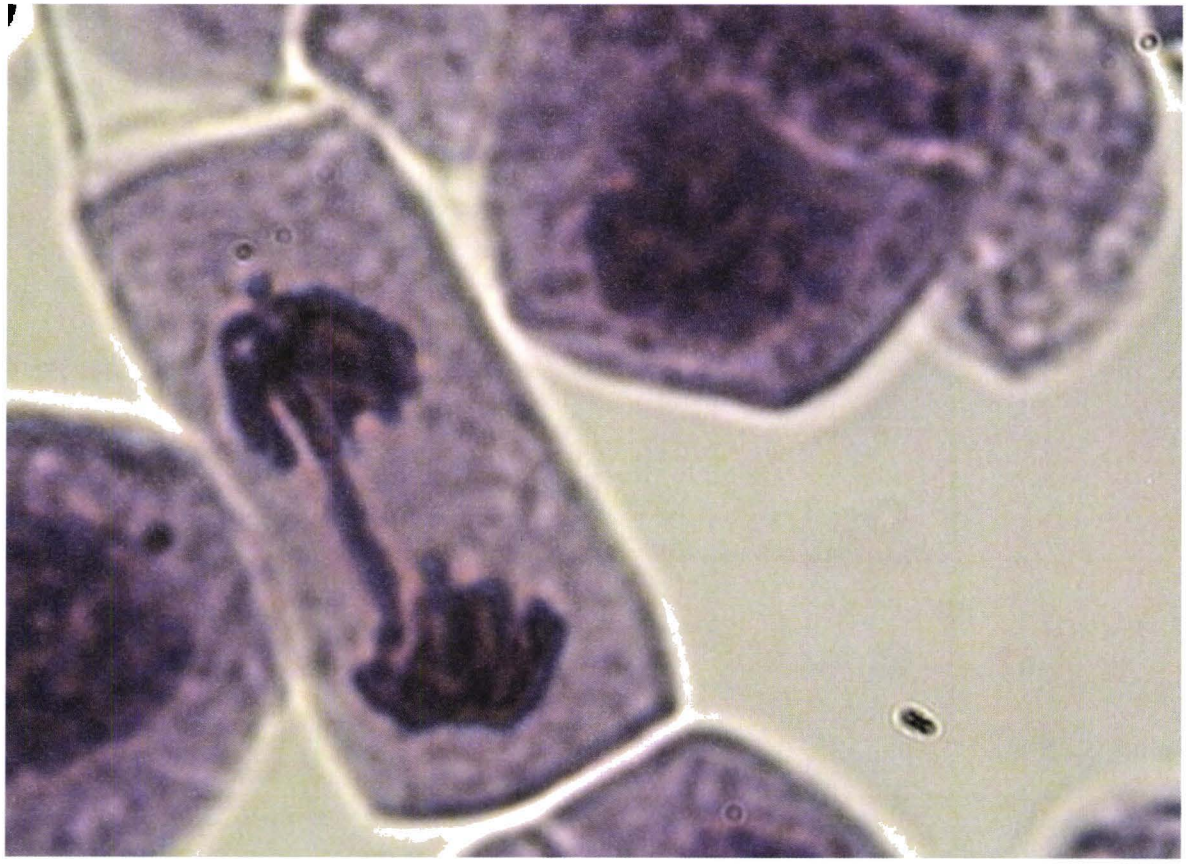

Figure 2. Bridge in anaphase (*Nigella damascena* L.).
Figura 2. Punte în anafază (*Nigella damascena* L.).

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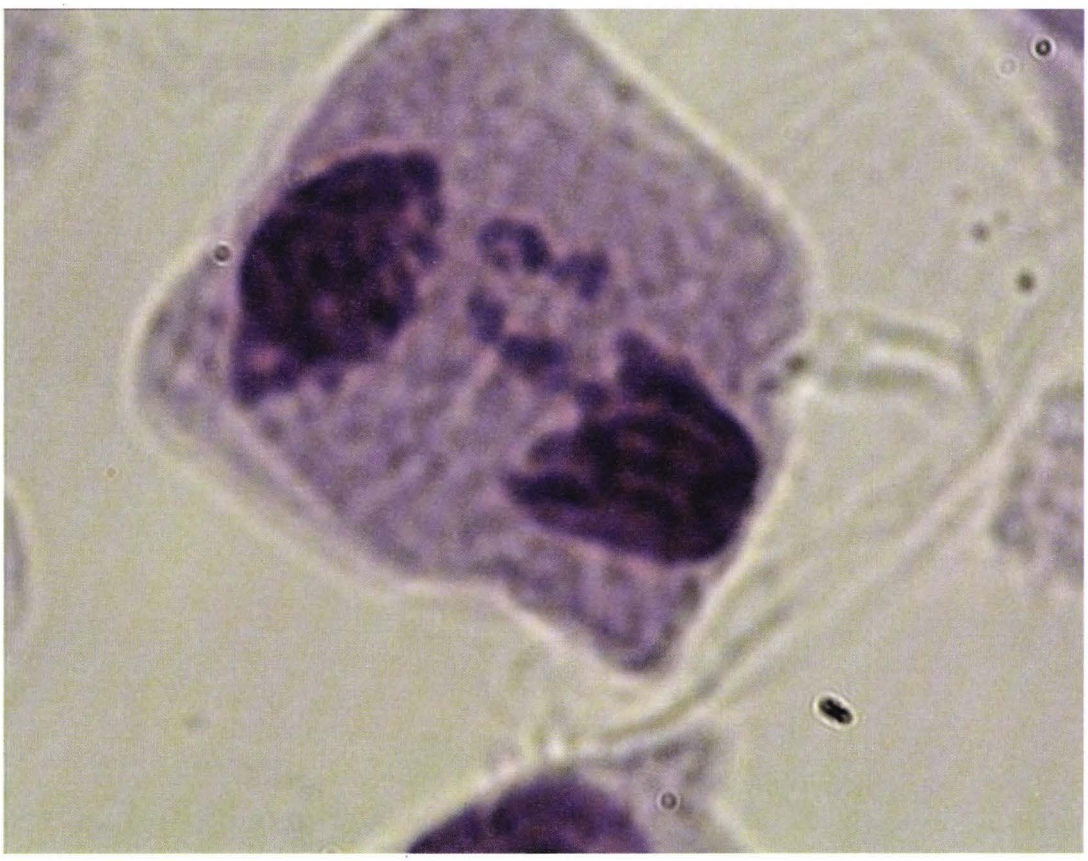

Figure 3. Broken bridge and acentric fragments in telophase (*Nigella damascena* L.).
Figura 3. Punte ruptă şi fragmente acentrice în telofază (*Nigella damascena* L.).

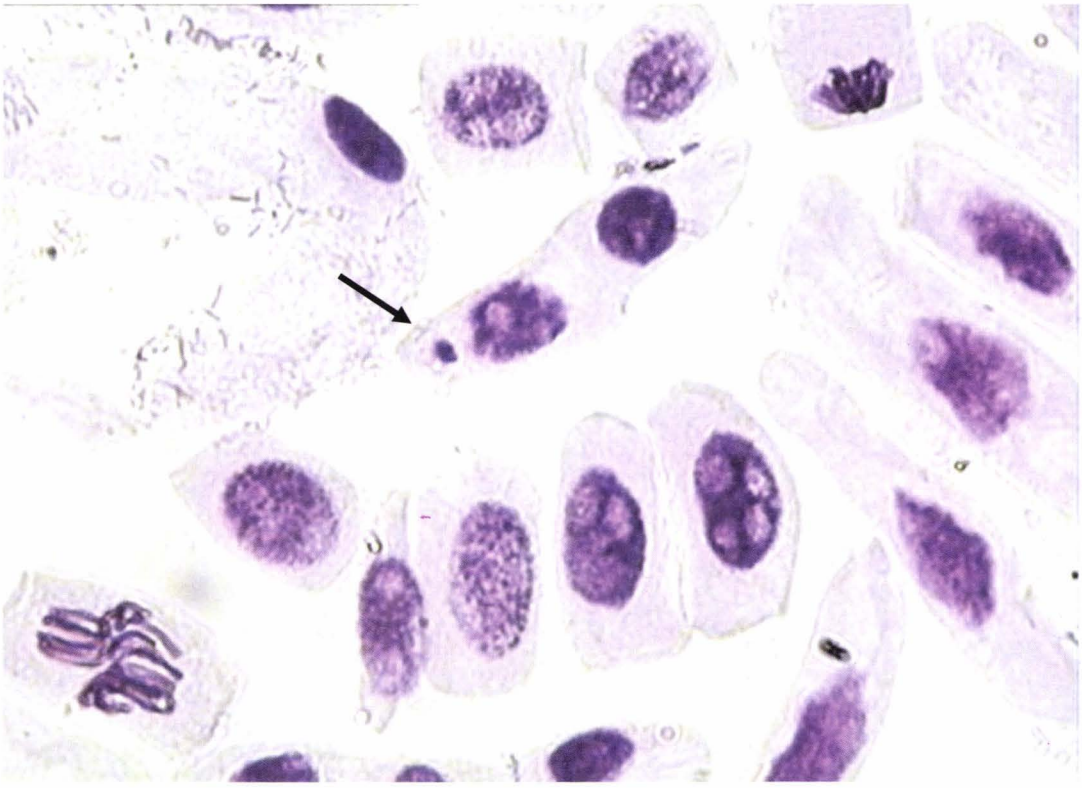

Figure 4. Micronucleus (arrow) in the next interphase (*Nigella damascena* L.).
Figura 4. Micronucleu (sageata) în interfaza următoare (*Nigella damascena* L.)

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THE TAXONOMIC DIVERSITY OF CLADONIACEAE, STEREOCAULACEAE AND BAEOMYCETACEAE FROM THE SUBMOUNTAINOUS AND MOUNTAINS LEVELS IN IEZER-PAPUSA MOUNTAINS

MARIA BORCILĂ

Abstract. The totally sporadic feature of the lichenology research in this area (FUSS M, 1857, LOITLESBERGER K, 1897, MORUZI CONSTANŢA, MANTU ELENA 1962, 1963, ALEXIU V., 1998) turns the quasi total information into something original. The data presented stand for the research output related to the taxonomic diversity of the families mentioned above in this massif. In compliance with the new taxonomy (PURWIS O. W et al., 1992, CIURCHEA MARIA 2004,) the species identified as 38 in amount, are classified as follows: the Order **Lecanorales,** NAMF 1923 Fam. **Cladoniaceae** ZENKER (1827) genus **Cladonia** HILL & BROWNE 1756 – 31 species, **Pycnothelia** (ACH.) DUF -1821, Fam.**Stereocaulaceae** CHEV (1826) genus **Stereocaulon** HOFFM. 1796 – 3 species and the Order **Leotiales** CARPENTER Fam. **Baeomycetaceae** DUMORT (1829), genus ***Baeomyces*** PERS 1794 – 2 species and ***Dibaeis*** CLEMENTS – 1 species. The quasi total amount of the taxons found, are described, for the first time, in this area. The preponderant biological form is that of type ChCl (89,7%) compared to H Ba (7.6%). By comparing these data to those published in the literature of specialty there has been an occurrence of great similarities in virtue of the taxonomic diversity of these families to other mountainous areas in the Southern and Eastern Carpathians. Whether qualitative variations may be unimportant the quantitative ones are significant in favor of the area explored, which proves the presence of some conditions favorable to t140
he development of lichens in the sub alpine and alpine areas of the Iezer-Păpuşa Mountains, the influence of the anthropogenic factors being insignificant.

Key words: The Iezer Mountains, lichens, Cladoniaceae, Stereocaulaceae Baeomycetaceae.

Rezumat. Diversitatea taxonomică a familiilor Cladoniaceae, Stereocaulaceae şi Baeomycetaceae în etajele subalpin şi montan din Masivul Iezer-Păpuşa. Munţii Iezer-Păpuşa fac parte din Carpaţii Meridionali dintre bazinul superior al râului Argeş şi cel al râului Dâmboviţa, la vest fiind despărţiţi de Masivul Ghiţu (1622 m. alt.) prin afluenţi ai râului Argeş (Vâlsan şi Râul Doamnei) şi la est de masivul calcaros Piatra Craiului de către pârâul Văsălat (afluent al Râului Doamnei); se învecinează spre Nord cu Munţii Făgăraşului şi la Sud cu Muscelele Argeşului (Subcarpaţii Getici). In partea nordică a Munţilor Iezerului se formează bazinul superior al râului Dâmboviţa care după ce parcurge lacul Pecineagu face un cot delimitând la est Munţii Iezerului de Munţii Piatra Craiului. Munţii Iezer - Păpuşa se încadrează ca tip de relief în tipul Sebeş, caracterizat prin munţi cu înălţimi mari şi mijlocii, alcătuiţi din şisturi cristaline, cu relief glaciar redus şi cu întinse suprafeţe de denudaţie dispuse în trepte. Se deosebesc de Munţii Cozia, Ghiţu, Frunţi cu tip de relief Cozia caracterizat prin munţi joşi, cristalini, cu aspect insular, care apar ca iviri ale fundamentului, înecate în depozite terţiare. Munţii Iezer-Păpuşa sunt temeinic cercetaţi din punct de vedere al diversităţii floristice, ecologiei şi fitocenologiei fanerogamelor publicându-se monografii:(ALEXIU V., 1994-1998) şi studii despre păşunile alpine şi metode de îmbunătăţire a lor, BĂRBULESCU C., 1961, BĂRBULESCU & BURCEL, 1962 şi BOŞCAIU N., 1973, însă din domeniul lichenologiei avem numai date răzleţe despre existenţa a 35 specii publicate. CRETZOIU P.,1933, la începutul secolului XX ZAHLBR A., 1904, STAMATIN M.,(1904), 1907, şi lipsesc cu desăvârşire cele asupra corologiei, ecologiei şi cenologiei lor.
Datele prezentate reprezintă, rezultatele investigaţiilor vizând diversitatea taxonomică a familiilor mai sus menţionate din acest masiv. După noua taxonomie (PURWIS O. W et al., 1992, CIURCHEA MARIA 2004, Checklistul 2005) speciile identificate în număr de 38 specii sunt încadrate după cum urmează: Ordinul Lecanorales NAMF 1923 Fam. Cladoniaceae ZENKER (1827) gen *Cladonia* HILL & BROWNE 1756 - 31 specii, Pycnothelia (ACH.) DUF -1821, Fam .Stereocaulaceae CHEV (1826) gen *Stereocaulon* HOFFM. 1796-3specii şi Ordinul Leotiales CARPENTER Fam. Baeomycetaceae DUMORT (1829), gen *Baeomyces* PERS 1794-2 specii şi Dibaeis Clements –specie. Cvasitotalitatea taxonilor identificaţi sunt descrişi pentru prima dată din acest teritoriu. Forma biologică preponderentă este de tipul ChCl (89, 7%) faţă de H Ba (7,6%). Raportarea datelor la cele publicate în literatura de specialitate relevă existenţa unei mari similitudini în privinţa diversităţii taxonomice a acestor familii, cu alte masive muntoase ale Carpaţilor Meridionali şi Orientali. Dacă variaţiile calitative sunt nesemnificative cele cantitative sunt considerabile în favoarea teritoriul investigat, ceea ce reflectă existenţa unor condiţii propice dezvoltării lichenilor în etajele subalpin şi alpin al munţilor Iezer, influenţa factorilor antropici fiind nesemnificativă.

Cuvinte cheie: Munţii Iezer, licheni Cladoniaceae, Stereocaulaceae, Baeomycetaceae

INTRODUCTION

Because of a wrong evaluation the taxonomic research were marginalized in the last decades both on a national and international level. The over evaluation of the studies of molecular biology correlated with the underestimation of the taxonomic ones led to a real crisis of taxonomy (COURTECUISE R. 1995; WOESE C.R. and DOOLITTLE R.F. 2001). For Romania the taxonomic crisis was and continues to be acute: thus the studies regarding the biodiversity on Romania's territory constitutes one of the major priorities for the Romanian biological researches.

Our investigations are on this trajectory having as fundamental objective the taxonomic, chorological, enological and ecological identification and characterization for all the taxons and elotaxons of lichens that are in the Iezer Mountains-Papusa. The data to be registered will amplify the degree of knowledge of the biodiversity of this mountain thus being created favourable conditions for a more corrective evaluation and implicitly for the elaboration of some efficient methods to preserve it.

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The note given represents our contribution to the complex knowledge of the lichens on this mountain giving an essay for the Cladoniaceae and Stereocaulaceae on the sub mountainous and mountainous levels of the Iezer Mountains. sub mountainous and mountainous levels of the Iezer Mountains

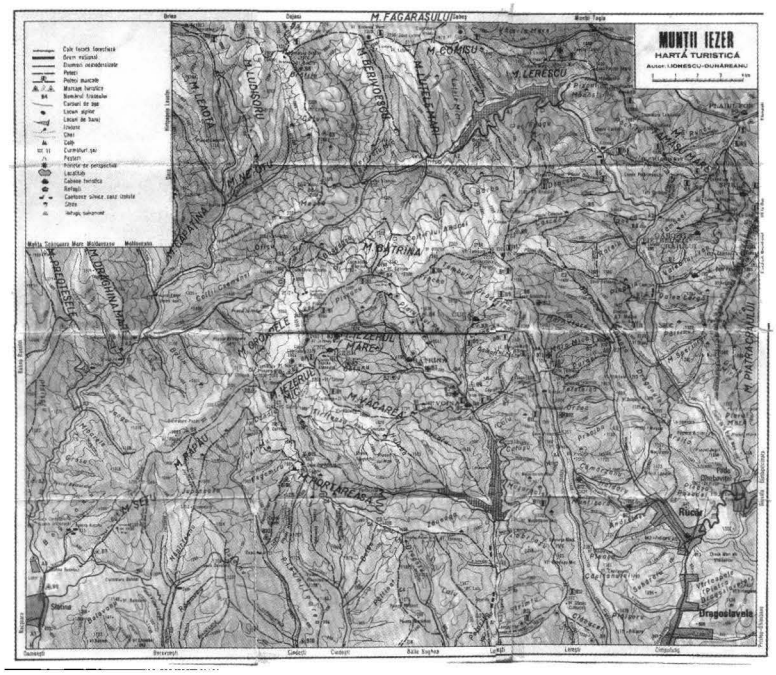

Figure 1. Iezer Mountains (. IONESCU-DUNĂREANU, 1984)
Figura 1. Munții Iezer (IONESCU-DUNĂREANU, 1984)

MATERIALS AND METHODS

In order to achieve the proposed objectives there were elaborated specific protocols for the taxonomic research in which the classical methods mix with the modern ones validated by the international scientific community. The research activities were developed both in the field and the laboratory.

The activities in the field were materialized by: establishing the transects, crossing them in order to collect biological evidence, and writing down some data that refer to the: type of substrate, the value of ecological factors (exposition, height, temperature and humidity of the air and soil, the light's intensity), the family of plants to which belongs the lichenological evidence, the morph-physiological parameters of the lichens in different microhabitats; determing the geographical coordinates (by the help of GPS) in order to establish the distribution of the species in the territory; creating sketches and photos. For each collected evidence a chart was done in which there were written all these data fundamental not only for the taxonomic and chorological research but also for the enological and ecological ones.

The lab activities consisted of: the identification of the lichenological taxons, the chemical analysis of the substrate evidence (soil, rock, cortex, wood) and the statistical processing of data representing the results in graphics and synthetical diagrams. To identify the lichenological taxons the classical procedures were done according to the ones promoted by the specialty literature. The species' nomenclature was updated after SANTENSON R. (1993) and PURVIS O.W. et al. (1994) and the chorological elements were established after BARKMAN J.J. (1964), SMITH A.J.E. (1978), WIRTH V. (1995), CIURCHEA M. (2004.).

RESULTS AND DISCUSSIONS

The study of taxonomic, enological and ecological diversity of the lichens in the Iezer-Papusa massif represents the theme of our doctorate thesis. The data presented in this note constitute a contribution in order to achieve the above objectives. Taking into consideration the taxonomic diversity, the vigor and length of the classes/families and the phytocenotic significance of Cladoniaceae, Baemycetaceae, Stereocaulaceae on the submountainous and mountainous levels of the Iezer Mountains, we considered useful their presentation in other paper. Thus there are created favourable conditions to integrate the lichenological taxons in the phytocenotical studies by evaluating correctly their position regarding different phytocenotaxoni. The association of these 3 families had on the basis the inclusion of the type *Stereocaulon* HOFFM., 1976 and the type *Baeomyces* PERS. 1784 after the old classification (The Catalogue of Lichens in Romania, MORUZI, 1967) in the class of Cladoniaceae, their separation in distinctive families according to the new classification (The Catalogue of Lichens in Romania 1998 and The Determinator of Lichens in Romania, CIURCHEA M. 2004), Stereocaulaceae Chev., 1826 and Baemycetaceae, Dumort (1829) being quite recent (PURVIS O.W. et al., 1992, 1994).

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The taxonomic summary

We present below the summary of the species that are on the investigated territory in a taxonomic and alphabetical order. For each species we have mentioned the following data: the substrate, the station, the altitude, the geo element, some sociological and chorological data.

Fam. Cladoniaceae ZENKER, 1827

According to the actual structure the family has 2 types: *Cladonia* Hill ex Browne, 1756 and *Pycnothelia* (ACH.) DUF., 1821. On the sub mountainous and mountainous levels of the Iezer Mountains the first type is represented by 33 species and the second one by 1. Our summary is according to the current nomenclature promoted by the specialty literature, giving up the subdivision of the type *Cladonia* in 2 sub types: *Cladina* (NYL.), LEIGHTON, 1871 and *Cladonia* HILL ES BROWNE, 1756.

Type *Cladonia* Hill ex Browne, 1756

1. ***Cladonia amaurocraea*** (FLK.). SCHAER, 1823 sporadic in detritus and on the sub mountainous and mountainous meadows on acid soils; Culmea Iezeru Mare (The Top of the Iezerul Mare), on the eastern and southern slope (2100-2400 m), Iezerul Mic, the northern and southern slope (2000-2350 m); moderate extremely acid; the northern tundra area and the boreal coniferous forest, the middle area of central Europe (the leafy forest and the resinous), characteristic of *Cladonietum stellaris* DU RIETZ, 1925; frequently on high altitudes (over 2000 m) in the cold areas, circumpolar; Europe, North and South America, Asia and Antarctic.

2. ***Cladonia arbuscula*** (WALLR.) FLOTOW., 1839, tericol, on acid, sandy soils; sporadic in sub mountainous and mountainous meadows (2100-2400 m), regularly on the northern and eastern slopes peak. Iezerul Mic, 2400 m, peak Iezerul mare, 2408 m, peak Rosu, 2386 m; moderate extremely acid; the northern tundra area and the boreal coniferous forest, the middle area of central Europe (the leafy forest and the resinous),moderate sub mediterrenean (the dry leafy forest and the steppe bushes in the north mediterrenean area); characteristic of *Cladonion arbusculae* KLEM., 1950; Europe (especially in the northern parts), North and South America, Asia.

3. ***Cladonia bellidiflora*** (ACH.) SCHAERER, 1823, tericol, acid spodosoils, among the edges of the fixed soil in the rocks of the detritus; frequently Caldarea Iezerului Mare and Mic, 2100-2344 m, Culmea Iezer Mare, the northern slope, 2089-2300 m; the northern tundra area and the boreal coniferous forest, the middle area of central Europe (the leafy forest and the resinous), moderate sub mediterrenean (the dry leafy forest and the steppe bushes in the north mediterrenean area); alpine; characteristic of *Empetro-Cladonietum stellaris* DU RIETZ, 1925; spread in Europe, North and South America, Asia, New Zeeland, Antarctic.

4. ***Cladonia cenotea*** (ACH.) SCHAER, 1823, tericol, on brown acid soils, moss and lichens (on rotten branches) of Mountain Pines caldarea Iezerului Mare, 2100-2300 m; caldarea Iezerului Mic, 2000-2280 m; the northern tundra area and the boreal coniferous forest, the middle area of central Europe (the leafy forest and the resinous), moderate sub mediterrenean (the dry leafy forest and the steppe bushes in the north mediterrenean area); moderate mediterrenean (the green forest area, the coniferous forest, the steppes and semi desserts); characteristic of *Cladonietum cenoteae* FREY, 1927; Europe, North and South America, Asia.

5. ***Cladonia chlorophea*** (FLK.ex.SOMMERF.) SPRENGEL, 1827 on rotten branches of Mountain Pines on moraines and the soil between the detritus, in dry and often humid places, swampy; Caldarea Iezerului Mare and Mic, 1868-2200 m; moderate basophile on a sub neutral substrate, moderate dry air; the northern tundra area and the boreal coniferous forest, the middle area of central Europe (the leafy forest); in *Cladonietum arbusculae* KLEM., 1950, *Toninion sedifoliae* HADAC, 1984 Europe, North and South America, Asia, New Zeeland, Antarctic.

6. ***Cladonia coccifera*** (L) WILLD., 1787 tericol, on siliceous, swampy soil rarely on the rocks covered with moss or on rotten branches of Mountain Pines frequently on a sub mountainous level; Caldarea Iezerului Mare (850-2200 m); moderate medium acidophil, a very high air humidity; the south boreal part (the sub atlantic-the leafy forest area in central and western Europe) moderate mediterrenean (the green forest area, the coniferous forest, the steppes and semi desserts); in *Cladonietum arbusculae* KLEM., 1950; spread in all Europe, North and South America, Asia, New Zeeland, Antarctic.

7. ***Cladonia coniocraea*** (FLK.) SPRENGEL, 1827 frequently on, Mountain Pines on green branches or about to rotten, rarely on acidophil soils with an excess of humidity or mossy; Caldarea Iezerului Mare and Mic round the lakes (1850-2200), Culmea Iezer-peak Rosu (2280-2400 m) moderate acidophil-on a sub neutral substrate; the boreal coniferous forest, (the dry leafy forest and the steppe bushes in the north mediterrenean area); characteristic of Europe, North and South America, Asia, New Zeeland, Africa, Antarctica.

8. ***Cladonia convoluta*** (LAM.) COUT., 1913 tericol on limestone soil on the sub mountainous meadows on the Culmea Iezerand Piciorul Iezer (2100-2300 m) and on the mountainous meadows on the peak Iezerul Mare and Mic peak Rosu (2380-2470 m); on a sub neutral substrate-basophile, dry moderate air, the middle area of central Europe (the leafy forest and the resinous; sub continental (steppes and semi desserts in the east of Europe and Asia) mediterrenean (the green forest area, the coniferous forest, the steppes and semi desserts); characteristic of *Cladonietum convolutae* KAISER, 1926, *Toninion sedifoliae* HADAC, 1948; rarely and very strictly localized: Europe, The north of Africa, South-West Asia.

9. ***Cladonia crispata*** (DELISE) VAINIO, 1887- tericol, on siliceous acidophil soil in the detritus; sporadic; Caldarea Iezerului Mare 2140-1200 m; on a medium-extremely acidophil substrate; - the northern tundra area and the boreal coniferous forest, the middle area of central Europe (the leafy forest and the resinous); *Cladonietum mitis* KRIEGER, 1937; characteristic of *Cladonietum arbusculae* KLEM., 1950; rare in Europe, North and South America, Asia, New Zeeland, Africa.

10. ***Cladonia deformis*** (L) HOFFM., 1976 sporadic; tericol on soils rich in humus, damp or swampy and on humid wood like Mountain Pines in the valley of the Iezerul Mare (1750-2100 m) extremely-medium acidophil

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substrate, on humid substrate; *Cladonion stellaris* DU RIETZ,1925, subsequently *Cladonietum cenoteae* FREY 1927 ex Frey 1959; rare; Europe, North America, Asia, New Zeeland.

11. ***Cladonia digitata*** (L) HOFFM., 1796-sporadic on rot ness from the sub mountainous, Mountain Pines the valley of Iezerul mare 1985 m; Caldarea Iezer Mare 2060; extremely-moderate acidophil, medium humid substrate; characteristic of *Cladonion convolutae* Kaiser, 1926; Europe, North America, Africa, Asia.

12. ***Cladonia ecmocyna*** (GRAY) LEIGHT., 1871, tericol on the sub mountainous and mountainous meadows on the peak Iezerul Mare, Iezerul Mic and Rosu, 2380-2440, rarely lichenological in a *Rhodoretum*, Caldarea Iezer Mare, 2200 m; extremely-moderate acidophil; the boreal coniferous forest, the green forest area, the coniferous forest, the steppes and semi desserts; characteristic of : *Cladonion convolutae* Kaiser, 1926; sporadic in Europe, North America and Asia.

13. ***Cladonia fimbriata*** (L) FR. EM SANDST., 1831, lichenological, tericol and mossy from Mountain Pines, 1800-2169 m; medium-very acidophil ; (the northern tundra area)- the green forest area, the coniferous forest, the steppes and semi desserts; characteristic of *Cladonietum cenoteae* FREY 1927 ex Frey 1959; Europe, North and South America, Asia, Australia, New Zeeland, Antarctic.

14. ***Cladonia floeckeana*** (Fr.) Flk., 1828 - tericol, lichenological and mossy; frequently on Mountain Pines, sporadic on the alpine meadows; the valley of the Iezer Mic, 1993 m, Culmea Iezer Mare, 2340 m; extremely-medium (moderate) acidophil; south boreal – (the dry leafy forest and the steppe bushes in the north mediterrenean area); characteristic of *Cladonietum coniocaeae*; frequently in Europe, North America, Asia, Australia.

15. ***Cladonia furcata*** (Huds) Schrader, 1794 frequently in acidophil habitats: tericol, lichenological and mossy; the Valley of Caltunului, 1983 m, the Valley of Iezer Mare, Mountain Pines, 1980 m; Caldarea Iezer Mare, 2240 m; on the rocks by the lake, 2142 m; the northern slope of the Iezer Mare, 2318 m; moderate-extremely acidophil; the boreal coniferous forest - the green forest area, the coniferous forest, the steppes and semi desserts; *Cladonion arbusculae*; Europe, North and South America, Asia, Australia, New Zeeland.

16. ***Cladonia gracilis*** (L) WILLD, 1797 - frequently on soil and acidophil rocks on the alpine level (1980-2400); frequently tericol, on the soil under the Mountain Pines and between the rocks, rarely on rottenness of Mountain Pines, often together with other species of lichens (ex. *Cetraria islandica*, C. *cuculata*) and edges (ex. *Dicranium scoparium*); Caldarea Iezer mare, 2174m, Culmile Iezer Mare and Mic (1800-2380), peak Iezer mare, 2400 m and peak Rosu 2400m; extremely-moderate acidophil; the northern tundra area - moderate the dry leafy forest and the steppe bushes in the north mediterrenean area; *Cladonietum mitis* Krieger, 1937; characteristic *Empetro-Cladonietum stellaris* DU RIETZ, 1925; Europe, North and South America, Asia, Australia, New Zeeland, Antarctic.

17. ***Cladonia macilenta*** HOFFM., 1796 tericol and mossy: Coama Iezer Mare, close to the peak Iezer Mare, 2400m; extremely-medium (moderate) acidophil; the boreal south part- the dry leafy forest and the steppe bushes in the north mediterrenean area; characteristic of *Cladonietum coniocraeae* DUVIGN., 1942 ex JAMES and al., 1977; *Cladonietum mitis* KRIEGER,1937; in : Europe, North and South America, Asia, Australia, New Zeeland, Australia.

18. ***Cladonia macrophilla*** (SCHAER.) STENH., 1865 - tericol and on alpine meadows and in detritus, Caldarea Iezer mare, Caldarea Iezer Mic, Piciorul si Culmea Iezer, peak Rosu from 1900-2400 m; extremely-medium acidophil; the northern tundra area-alpine; characteristic *Stereocaulon alpinii* FREY, 1937; Europe (Scotland), North America, Asia.

19. ***Cladonia mitis*** (SANDST.) HUSTICH., 1951 - tericol, sporadic on the sub mountainous and mountainous meadows and the bushes of *Rhododendron*; Culmea Iezer Mare, eastern slope, 2204; Culmea Iezer Mic, eastern and northern slope 2230m; moderate-extremely acidophil; (the northern tundra area), the boreal coniferous forest- the middle area of central Europe (the leafy forest and the resinous) (the dry leafy forest and the steppe bushes in the north mediterrenean area-moderate); characteristic of *Cladonion arbusculae* KLEM., 1950; circumpolar: Europe, North and South America, Asia, Antarctica.

20. ***Cladonia ochrochlora*** Flk, 1828, frequently on rotten branches of Mountain Pines in places with a high degree of humidity: the Valley of the Iezer Mare and Mic, 1900-2220m; moderate acidophil; neotrophil; the boreal coniferous forest- the green forest area, the coniferous forest, the steppes and semi desserts; ***Cladonietum cenoteae*** FREY 1927; in Europe, North and South America, Asia, Australia, New Zeeland.

21. ***Cladonia phyllophora*** HOFFM., 1796 - tericol, on sandy, acid soil often among edges or other species of lichens; the Valley of Iezer Mare, 1800-1950m, Culmea Iezer Mic, the northern and eastern slope, 1780-2200m; moderate-medium acidophil; the boreal coniferous forest - the middle area of central Europe (the leafy forest and the resinous); *Cladonietum mitis*; frequently in Europe, North America and Asia; sporadic in South America and Australia.

22. ***Cladonia pleurota*** (FLK.) SCHAERER, 1850 frequently saxicol, on acid, soil rocks, on sandy soil, mossy and lichenological; peak Rosu, 2405m, peak Caltunu, 2398m, Coama Iezer Mare, close to peak Iezer Mare, 2400m; moderate-medium acidophil, moderate air humidity to the dry air-medium substrathygrophical; the northern tundra area-the middle area of central Europe (the leafy forest and the resinous); *Cladonion arbusculae* KLEM., 1950; characteristic of *Cladonietum mitis* KRIEGER, 1937; Europe, North and South America, Asia, Australia.

23. ***Cladonia polydactyla*** (FLK) SPRENG., 1827 - rare lichenological on rotten wood on Mountain Pines; on soil and edges in the alpine meadows, 2200-2300 m, Caldarea Iezerului Mare and Mic, 1984m, peak Catunul, 2340m; characteristic of *Cladonietum cenoteae* FREY,1927 ex FREY,1959; sporadic in: Europe, North America and Asia.

24. ***Cladonia portentosa*** (DUFOUR) COEM., 1865- tericol, sporadic on the sub mountainous and mountainous meadows and among the bushes of *Rhododendron*; Culmea Iezer Mare, eastern slope 2204 m; Culmea Iezer Mic, eastern and northern slope 2230m; moderate-medium acidophil; (the northern tundra area) - the boreal coniferous forest - the middle area of central Europe (the leafy forest and the resinous) (moderate the dry leafy forest and the steppe bushes in the north mediterrenean area); characteristic of *Cladonietum mitis* KRIEGER, 1937; circumpolar: Europe, North and South America, Asia, Antarctic.

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25. ***Cladonia pyxidata*** (L) HOFFM., 1796- tericol, lichenological, cortical (on thick branches of Mountain Pines) and saxicol (on siliceous rocks and metamorphic lime stones); frequently on the sub alpine level, sporadic on the alpine one; moderate basophile-moderate (medium) acidophil; the northern tundra area-medium; *Cladonion arbusculae* KLEM., 1950, *Cladonietum arbusculae* KLEM,1950; in: Europe, North and South America, Asia, Australia, New Zeeland.

26. ***Cladonia rangiferina*** (L) WEBER ex WIGG., 1780- tericol, frequently on the sub mountainous and mountainous meadows and among the bushes of *Rhododendron;* Culmea Iezer Mare, eastern slope, 2204-2387 m; Culmea Iezer Mic, northern and eastern slope, 2000-2230 m; Caldarea Iezer Mare on soil on detritus, 2140m, peak Rosu, 2400m; moderate-extremely acidophil; - (the northern tundra area) the boreal coniferous forest - the middle area of central Europe (the leafy forest and the resinous) (the dry leafy forest and the steppe bushes in the north mediterrenean area. moderate); *Cladonietum mitis* KRIEGER, 1937; *Cetrarion nivalis* KLEM., 1955, *Empetro-Cladonietum stellaris* DU RIETZ 1925; circumpolar: Europe, North and South America, Asia, Australia, New Zeeland, Antarctic.

27. ***Cladonia squamosa*** (SCOP.) HOFFM., 1796 - tericol on rottenness, on rocks' edges and fallen trunks, in the sub alpine level; Caldarea Iezer mare, Caldarea Iezer Mic, Piciorul Iezer Mare 1920-2260m; medium-extremely acidophil, extremely-hygrophfil; the northern tundra area - the green forest area, the coniferous forest, the steppes and semi desserts: *Cladonietum mitis* KRIEGER, 1937 and *Cladonietum cenoteae* FREY 1959; characteristic of *Cladonion arbusculae* KLEM., 1950, *Empetro-Cladonietum stellaris* DU RIETZ, 1925; spread in all Europe, North and South America, Africa, Asia, Australia, New Zeeland.

28. ***Cladonia subulata*** (L.) WEBER ex. WIGG., 1780 - tericol on the soil among the detritus, Caldarea Iezer Mare, 2230m; Caldarea Iezer Mic, 2211m; moderate-medium acidophil; - the boreal coniferous forest - the green forest area, the coniferous forest, the steppes and semi desserts; *Lecideetum uliginosae* LANGER ex KLEM., 1955; Europe, North and South America, Asia.

29. ***Cladonia uncialis*** (L.) WEBER ex WIGG., 1780- tericol and saxicol on acid soils and rocks; frequently on both levels of vegetation, in places with a higher degree of humidity; moderate-extremely acidophil; the northern tundra area- the middle area of central Europe (the leafy forest and the resinous); characteristic of *Cladonion arbusculae*; only in Europe , North America and Asia.

Type ***Pycnothelia*** (ACH.) DUF., 1821 (monotypic type)

Pycnothelia papillaria (EHRH.) DUF., 1821, sporadic; tericol, on sandy soil on plain rocks, humid places and acid peat bogs; peak Iezer Mare, peak Rosu, Culmea Iezer Mic, 2358m, Caldarea Iezer Mare 2174 m; moderate-medium acidophil; substrate and rather high air humidity; the boreal coniferous forest - the middle area of central Europe (the leafy forest and the resinous) (the dry leafy forest and the steppe bushes in the north mediterrenean area); ***Baeomycion roseis*** KLEM., 1950; rarely in Europe, North America and Asia.

Fam. Stereocaulaceae CHEV., 1826 (monotypic family)

Type ***Stereocaulon*** HOFFM., 1796

1. ***Stereocaulon alpinum*** LAURER, 1827 tericol, frequently on the soil of the siliceous rocks, on the sub mountainous and mountainous meadows of the eastern and southern slopes of the Culmea Iezer Mare and Mic 1978-2430 m; medium-very acidophil, extremely-very much light; the northern tundra area - the middle area of central Europe (the leafy forest and the resinous) - alpine; characteristic of *Stereocauletum alpinii* FREY,1923, *Solorion croceae* KLEM., 1955; the northern tundra area - the middle area of central Europe (the leafy forest and the resinous)- alpine; rarely in Europe, North and South America, Asia (China and India), Antarctic.

2. ***Stereocaulon dactylophyllum*** FLK., 1819 - tericol, on the sub mountainous and mountainous meadow Caldarea Iezer Mare, 2173 m, Culmea Iezer Mic, southern slope, 2248 m; medium acidophil, medium with rather high air humidity, humidity due to rain, poor in nutritious substances; the boreal coniferous forest- the middle area of central Europe (the leafy forest and the resinous); *Porpidion tuberculosae* Wirth., 1972;sporadic in Europe. North America(Canada), Asia.

3. ***Stereocaulon tomentosum*** Fr. Saxicol, on the detritus from Caldarea Iezer Mare and Mic 2170-2340 m; medium-extremely acidophil., medium-very much light; the boreal coniferous forest- the middle area of central Europe (the leafy forest and the resinous) *Baeomycion rosei* Klem., 1925; sporadic in Europe (Islanda, Groenland, Scotland), Asia (Russia, China), North and South America.

Fam. Baeomycetaceae DUMORT. (1829)

Type ***Baeomyces*** PERS. (1794)

Baeomyces rufus (HUDS.) RABHN.- tericol on acid soil, moss and old woods on Culmea Iezer Mic,2217 m; moderate-very acidophil, very much light, humid substrate the boreal coniferous forest- the dry leafy forest and the steppe bushes in the north mediterrenean area(medium-moderate) in *Stereocauletum condensati* LANGERF ex KLEM. 1955 sporadic; circumpolar, in the temperate areas of Europe and North America.Col.

Type ***Dibaeis*** CLEMENTS

Dibaeis baeomyces (L) RAMBOLD and HERTEL – tericol on the rocks' soil especially in the forests around the Iezer lake and shelter over 2000m moderate-medium acidophil, medium-very much light; (the northern tundra area) the boreal coniferous forest(the leafy forests area in central and western Europe)- the middle area of central Europe (the leafy forest and the resinous) (the dry leafy forest and the steppe bushes in the north mediterrenean area-moderate) characteristic of *Baeomycion roseis* KLEM. 1955, *Stereocauletum alpini* Frey 1923 circumpolar in Europe, North and South America, Asia ,Antarctic.

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CONCLUSIONS

The numerous white spots on our country's map and the absence of some consistent studies on some taxonomic groups of organisms lead to the fact that the taxonomic, chorological, ecological and sociological researches in general and especially those on algae, mushrooms, lichens and Bryophyta constitute one of the major priorities of the Romanian biological researches.

The complex study of the lichens in the Iezer-Papusa massif welcomes this desideratum being the first of this type.

The 76 specific taxoni identified only on the sub mountainous and mountainous levels in the Iezer massif show a pronounced diversity of *Cladoniaceae* and *Stereocaulaceae* on this altitude.

If the taxonomic diversity of *Cladoniaceae* and *Stereocaulaceae* is similar to the one reported in other mountains, the quantitative differences are considerable this reflecting the existence of some ecological conditions favourable to the development of lichens on the sub mountainous and mountainous levels in the Iezer Mountains due to some minor anthropic influences.

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LICHEN RECORDS FROM SOUTH-EAST ANATOLIA (BINGÖL AND ŞIRNAK)

GÜLŞAH ÇOBANOĞLU, MUSTAFA YAVUZ

Abstract. A list of 13 lichen taxa is reported from two provinces, Şırnak and Bingöl. 7 taxa from Şırnak and 11 taxa from Bingöl are all new records for these provinces.

Key words: Lichenized fungi, diversity, South-East Anatolia.

Rezumat. Prezentarea lichenilor din sud-estul Anatoliei (Bingöl şi Şırnak). Lista prezintă 13 taxoni de licheni din două provincii, Şırnak şi Bingöl. 7 taxoni din Şırnak şi 11 taxoni din Bingöl, toţi fiind noi pentru aceste provincii.

Cuvinte cheie: licheni, diversitate, Sud-Estul Anatolia

Özet Şırnak ve Bingöl'den Liken Kayıtları. Şırnak ili Cizre ilçesi ve Bingöl ilinden toplam 13 liken taksonu listesi rapor edilmiştir. Şırnak için 7, Bingöl için 11 taksonun tümü bu iller için yeni kayıttır.

Anahtar Sözcükler: Likenleşmiş mantarlar, biyoçeşitlilik, Doğu Anadolu.

INTRODUCTION

Lichen records from many provinces of Turkey have been in an increase in recent years. However, there are still a high number of lacking records for lichen species. In only one paper, there is only one lichen species recorded from Şırnak province (MAYRHOFER & LEUCKERT 1895), but no records from Bingöl. This study aims at a contribution to the first lichen records in these two provinces.

The study areas in both provinces (Şırnak and Bingöl) are situated in the Southeastern Region of Turkey (Figure 1).

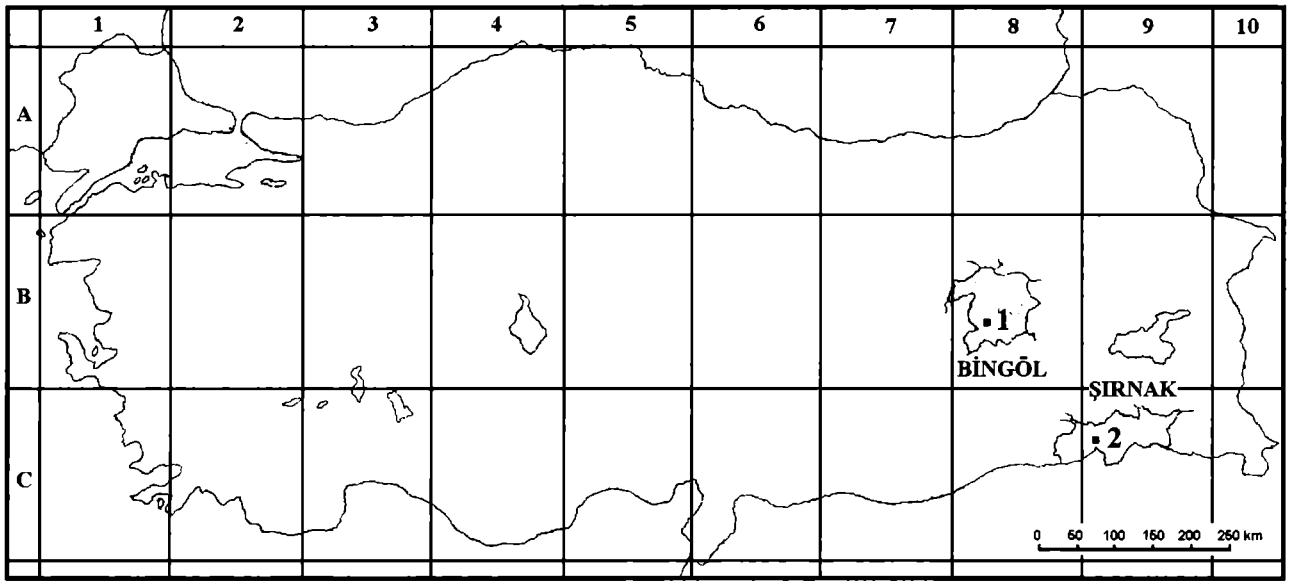

Figure 1. The Collecting Sites
Figura 1. Localizarea provinciilor de unde s-a colectat materialul

The general climatic features of Şırnak, Cizre and Bingöl are presented in a diagram in Figure 2.

Cizre is a city in Şırnak province, closer to Iraq – Syria border and the study area in Cizre represents similar aspects of Arid Mediterranean Maquis Vegetation although Şırnak and Bingöl represent Continental Steppe Vegetation. Cizre district (400 m) has a lower altitude than Şırnak (1380 m) and than that of Bingöl (770).

According to data from Cizre meteorological station, the climate is generally Arid Mediterranean with low values of humidity in the south. The average annual mean temperature is 19.8 C°. The annual precipitation is about 696.6 mm. (SÜZGEÇ et al., 2002, EM et al., 2007 and TASKESEN et al. 2005).

Şırnak Province has a continental climate with hot summers and cold winters. The average annual mean temperature is 14.5C°. The annual precipitation is about 770.

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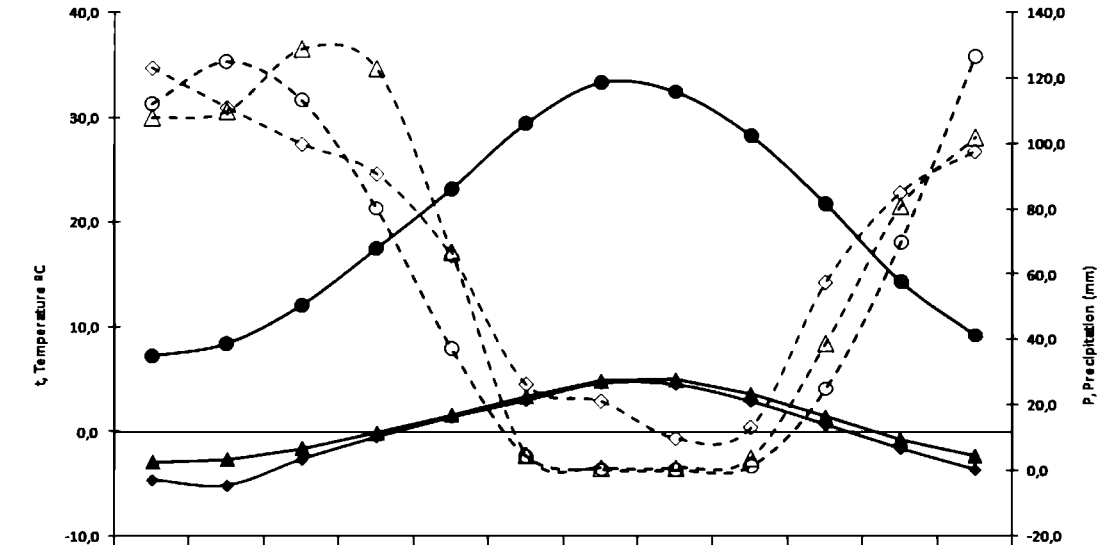
Bingöl also has a continental climate with hot summers and cold winters. The average annual mean temperature is 11.7 C°. The annual precipitation is about 802.3 mm.



	1	2	3	4	5	6	7	8	9	10	11	12
MtCZR	7,3	8,5	12,2	17,6	23,3	29,5	33,4	32,5	28,3	21,8	14,4	9,2
MpCZR	112,3	125,2	113,4	80,3	37,3	4,5	0,5	0,2	1,4	25,0	69,9	126,8
MtŞRN	2,7	3,6	7,0	11,7	17,1	22,8	27,5	27,9	23,5	16,5	9,5	4,5
MpŞRN	108,0	110,0	129,0	123,0	67,0	5,0	1,0	1,0	4,0	39,0	81,0	102,0
MtBNG	-2,70	-4,40	3,60	10,40	16,40	21,50	26,80	26,40	21,20	14,10	6,80	0,30
MpBNG	123,25	111,10	99,95	90,85	65,75	26,45	21,30	9,95	13,25	57,60	85,10	97,70

Figure 2. Climatic Diagram of Şırnak, Cizre and Bingöl
Figura 2. Climadiagrama provinciilor Şırnak, Cizre şi Bingöl

MATERIALS AND METHODS

The lichen material was collected from one site in Bingöl and from Cizre in Şırnak province, in the years 2003 and 2004. The geographic coordinates and elevations were recorded as well as the substrate types. The taxa were identified with the aid of flora books and identification keys (CLAUZADE & ROUX, 1985; PURVIS et al., 1992; WIRTH, 1995). The lichen specimens are preserved in the Herbarium of the Faculty of Science and Arts, Marmara University, Istanbul (MUFE) with numbers given by GÜLŞAH ÇOBANOĞLU, (G.Ç.).

RESULTS

13 lichen taxa from two provinces, Bingöl (11 taxa) and Şırnak (7 taxa), are listed alphabetically. Six taxa are new records for Bingöl, 2 taxa are new for Şırnak and 5 taxa are new for the both provinces. An asterisk (*) indicates a new record for the province of Bingöl and a number sign (#) indicates a new record for the province of Şırnak.

The names of authors are abbreviated according to BRUMMITT & POWELL (1992). The nomenclature follows the recent literature (BLANCO et al., 2004A, B; SANTESSON et al., 2004).

List of Taxa

#* ***Acarospora rufescens*** (ACH.) BAUSCH

Bingöl: Kültür Mahallesi Kız Meslek Lisesi Bahçesi, 1150 m, on siliceous rock, 38° 53' 05.64" N, 40° 29' 47.15" E, 24.VI.2004, (G.Ç. 1690). Şırnak: Cizre, Cafer-i Sadık Hill, 540 m, on siliceous rock, 37° 19' 01.74" N, 40° 10' 16.90" E, 04.V.2003, (G.Ç. 1683).

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#* ***Aspicilia caesiocinerea*** (NYL. ex MALBR.) ARNOLD

Bingöl: Kültür Mahallesi Kız Meslek Lisesi Bahçesi, 1150 m, on siliceous rock, 38° 53' 05.64" N, 40° 29' 47.15" E, 24.VI.2004, (G.Ç. 1691). Şırnak: Cizre, Cafer-i Sadık Hill, 540 m, on siliceous rock, 37° 19' 01.74" N, 40° 10' 16.90" E, 04.V.2003, (G.Ç. 1684).

#* ***Aspicilia cinerea*** (L.) KÖRB.

Bingöl: Kültür Mahallesi Kız Meslek Lisesi Bahçesi, 1150 m, on siliceous rock, 38° 53' 05.64" N, 40° 29' 47.15" E, 24.VI.2004, (G.Ç. 1692). Şırnak: Cizre, Cafer-i Sadık Hill, 540 m, on siliceous rock, 37° 19' 01.74" N, 40° 10' 16.90" E, 04.V.2003, (G.Ç. 1685).

* ***Aspicilia contorta*** (HOFFM.) KREMP.

Bingöl: Kültür Mahallesi Kız Meslek Lisesi Bahçesi, 1150 m, on siliceous rock, 38° 53' 05.64" N, 40° 29' 47.15" E, 24.VI.2004, (G.Ç. 1693).

Caloplaca crenularia (WITH.) J.R. LAUNDON

Şırnak: Cizre, Cafer-i Sadık Hill, 540 m, on siliceous rock, 37° 19' 01.74" N, 40° 10' 16.90" E, 04.V.2003, (G.Ç. 1686).

* ***Caloplaca lactea*** (A. MASSAL.) ZAHLBR.

Bingöl: Kültür Mahallesi Kız Meslek Lisesi Bahçesi, 1150 m, on siliceous rock, 38° 53' 05.64" N, 40° 29' 47.15" E, 24.VI.2004, (G.Ç. 1694).

Caloplaca thallincola (WEDD.) DU RIETZ

Şırnak: Cizre, Cafer-i Sadık Hill, 540 m, on siliceous rock, 37° 19' 01.74" N, 40° 10' 16.90" E, 04.V.2003, (G.Ç. 1687).

#* ***Candelariella vitellina*** (HOFFM.) MÜLL. Arg. Bingöl: Kültür Mahallesi Kız Meslek Lisesi Bahçesi, 1150 m, on siliceous rock, 38° 53' 05.64" N, 40° 29' 47.15" E, 24.VI.2004, (G.Ç. 1695). Şırnak: Cizre, Cafer-i Sadık Hill, 540 m, on siliceous rock, 37° 19' 01.74" N, 40° 10' 16.90" E, 04.V.2003, (G.Ç. 1688).

* ***Lecanora horiza*** (ACH.) LINDS.

Bingöl: Kültür Mahallesi Kız Meslek Lisesi Bahçesi, 1150 m, on *Quercus* sp., 38° 53' 05.64" N, 40° 29' 47.15" E, 24.VI.2004, (G.Ç. 1696).

* ***Physcia stellaris*** (L.) NYL.

Bingöl: Kültür Mahallesi Kız Meslek Lisesi Bahçesi, 1150 m, on *Quercus* sp., 38° 53' 05.64" N, 40° 29' 47.15" E, 24.VI.2004, (G.Ç. 1697).

* ***Physconia grisea*** (LAM.) POELT

Bingöl: Kültür Mahallesi Kız Meslek Lisesi Bahçesi, 1150 m, on *Quercus* sp., 38° 53' 05.64" N, 40° 29' 47.15" E, 24.VI.2004, (G.Ç. 1698).

#* ***Protoparmeliopsis muralis*** (SCHREB.) M. CHOISY

Bingöl: Kültür Mahallesi Kız Meslek Lisesi Bahçesi, 1150 m, on siliceous rock, 38° 53' 05.64" N, 40° 29' 47.15" E, 24.VI.2004, (G.Ç. 1699). Şırnak: Cizre, Cafer-i Sadık Hill, 540 m, on siliceous rock, 37° 19' 01.74" N, 40° 10' 16.90" E, 04.V.2003, (G.Ç. 1689).

* ***Xanthoria candelaria*** (L.) TH.FR.

Bingöl: Kültür Mahallesi Kız Meslek Lisesi Bahçesi, 1150 m, on *Quercus* sp., 38° 53' 05.64" N, 40° 29' 47.15" E, 24.VI.2004, (G.Ç. 1700).

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THE ROSACEAE FAMILY FROM THE LOWER BASIN OF THE MOTRU RIVER

IULIAN COSTACHE, MARINELA ELENA COSTACHE

Abstract. The paper presents the species from Rosaceae Family, which were identified in the Lower Basin of the Motru River. Their identification was performed short before the defence of the Ph.D. thesis.

Key words: Basin, flora, Motru, Rosaceae

Rezumat Rosaceele din Bazinului inferior al Motrului. Lucrarea prezintă speciile din familia Rosaceae identificate în Bazinul inferior al râului Motru. Identificarea a fost realizată înainte de susţinerea tezei de doctorat.

Cuvinte cheie: Bazin, flora, Motru, Rosaceae

INTRODUCTION

From the geographical point of view, the Lower Basin of the Motru River lies in the western part of the Getic Piedmont, with the coordinates: 44^0 55' north latitude and 23^0 45' east longitudes. The studied area is 691 Km^2. From the administrative-territorial point of view, the territory under research is located at the borderline between the counties of Gorj and Mehedinţi – the borderline starts in the eastern part of the Negoieşti Hills (Comăneşti-Mehedinţi, altitude 388 m) and reaches Valea Jiului near Gura Motrului (altitude 110 m). Being situated in the south-western part of the country and of the Getic Piedmont, the studied area has a Central-European climate with sub-Mediterranean influences.

In the territory under research, there have been made floristic and phytosociological studies between 1997 and 2005, within the PhD thesis (COSTACHE I., 2005).

Besides the scientific side of the research, it had been wanted the applicant approach too, instructive-ecological. In this way, through collaborations with pupils, children under school age (for example through the collaboration with the Kindergarten N. Romanescu from Craiova) it had been realised activities of information about the importance of the species from the family Rosaceae. It had been presented the plants with economical and decorative importance, it had been planted saplings, in this way the children being involved in a directly way in the cognition of the importance of the plants for the man and for the nature, in this way understanding the necessity to protect them.

MATERIALS AND METHODS

The first stage in the research of the Lower Basin of the Motru River was represented by looking into the bibliographic material. Against the background of this bibliographic information there were carried out, several times, personal studies in the field, in order to identify and inventories all the species, to watch all their vegetation stages, to notice the biotope characteristics, to take photos, to collect and preserve the species for a thorough checking in the laboratory, as well as to enrich the Herbarium of the University of Craiova. The collected and preserved material was determined by using specialty literature: Romanian Flora, Flora Europaea, The Illustrated Flora of Romania (BELDIE AL., 1977; CIOCÂRLAN V., 2000 etc.) and others. The critical taxa were checked by Prof Dr. Vasile Ciocârlan and compared to other materials found in the great herbariums of the country (Bucharest, Cluj and Craiova). The terminology of the taxa was adopted according to ROTHMALER W., 2002; we have taken into consideration the International Botanical Terminology Index (Code de Tokyo, 1993). For the synonymies, we have taken into account the index worked out by KERGUÉLEN M., 1993.

The species were defined within the following systematical units: Phylum, Subphylum, Class, Order, Family and Genus (here, the species are alphabetically presented).

The description of the species includes: scientific name, author (authors), equivalent names, popular names, life expectancy, biological form, average height, time of blossoming or of spore maturing (ferns), number of chromosomes, spreading, ecology, territories for rare species (for frequently met species there is no indication of locality), geoelement and coenotaxonomic belonging.

The coenotaxonomic belonging of the species, as well as their affiliation to high-leveled coenotaxonomic units, were made according to RODWELL & al. 2002 etc.

Abbreviations and conventional signs used in our paper:

Systematic units (taxa): Sp. - species; subsp.- underspecies; var. - variety.

Life expectancy: ⊙ - yearly; **e,** - perennial.

Bioforms (biological forms, life forms): T. - terrophytes (annual plants which go over unfavorable conditions during winter or summer under the form of seeds); H. - hemicriptophytes (perennial plants whose regeneration organs are located at the soil level and are protected, during winter, by vegetal remains or snow).

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Species description: 20-50 cm - height of the plant I-XII - blossoming or spore maturing period in ferns; 2n = number of chromosomes in the somatic cells; x = genom (basic set) in genra.

Frequency (spreading level): Freq. - frequent (numerous specimens with an odd spreading on large areas); Spor. - sporadic (few specimens spread in few stations); R. - rare (very few specimens spread in 1-2 stations).

Ecologic characterization: significance of the indexes U T R used in the paper in order to simplify the carrying out of the spectra when studying vegetation (according to POPESCU A. & SANDA V., 1998).

Soil humidity level (U_{1-6}): U_1 - xerophytes (they grow in dry soils and they can stand the prolonged dryness of the soil); U_2 - xeromesophyte; U_3 - mesophytes (in soils with average humidity, they cannot stand prolonged dryness); U_4 - mesohygrophyte; U_5 - hygrophyte (they grow in wet soils, and their roots are under water or in swampy areas); U_6 - hydrophyte (according to the author - ultrahydrophyte), (plants which grow in water, the regeneration organs are found under water); $U_{3(5)}$ - alternately hygrophyte (with oscillations of the humidity level during the plants' vegetation period); U_{1-5}, (includes U_{1-3}, U_{2-5} etc.) - eurip. = euriphyte (with large amplitude against the soil humidity).

Heat level (T): T_1 - hechistothermic; T_2 - microthermic; T_3 - mesothermic; T_4 - subthermophytes (moderately thermophytes); T_5 - thermophytes; T_{1-5} (include T_{1-4}, T_{2-4}, T_{2-5}, T_{3-5}) - euriterm. = euriterms.

Acidity level (R): R_1 - high acidophilus species; R_2 - acidophilus; R_3 - acido-neutrophyle; R_4 - low acid-neutrophyle; R_5 - neutral-basophile; R_{1-5} - (includes R_{1-4}, R_{1-3}, R_{2-5} etc.) - euriionic.

Geoelement (phytogeographical elements, origin of the species): Adv.- adventive (species which appeared because of man's inconstant activity); Am. - America; As. - Asia; Atl.- Atlantic; Balc. - Balkan; Circ. - Circumpolar (spread in the northern part of Eurasia and North America); Cosm. - Cosmopolite (large spreading all over the world); Euras. - Eurasian; Euras. cont.- Eurasian continental; Eur. - European; Eur. centr. - Central European; Eur. cont. - European continental; Medit. - Mediterranean; Pont. - pontic (North of the Black Sea); Pan. - Panonic (In the Panonic Plain); Submedit. - SubMediterranean; Subatl. - Subatlantic.

Other abbreviations: * - cultivated; cult. - cultures; E. - east; GJ. - Gorj; MH. - Mehedinți; N. - north; Sol.- soils; S. - south; V. - west.

RESULTS AND DISCUSSIONS

The conspectus of the flora in the Lower Basin of the Motru River includes about 1.120 vascular taxa (COSTACHE I., 2005), among which, Rosaceae family have 60 taxa .

SPERMATÓPHÝTA
MAGNOLIOPHÝTINA (Angiospérmae)
MAGNOLIÓPSIDA (Dicotyledónatae)
RÓSIDAE
ROSÁLES
Rosáceae

Agrimónia Willd x = 7

1. *Agrimónia eupatória* L. subsp. *grándis* (ANDRZ.) BORNM. [var. *májor* BOISS.] - Turiță mare - **e,,** H., 15-150 cm. VI-VIII. 2n = 28. Frecv. $U_2T_3R_4$. **MH**: Argineşti-Gura Motrului. Submedit. *Trifolio-Geranietea sanguinei, Prunetalia spinosae, Trifolion medii.*
2. *A. répens* L. [*A. procéra* WALLR., *A. odoráta* auct. non MILL.] - **e,,** H., 40-120 cm. VI-VIII. Spor. $U_3T_{2-4}R_4$. **MH**: Argineşti-Gura Motrului. Eur. centr. *Prunetalia spinosae, Trifolion medii.*

Áphanes L. x = 8

3. *Áphanes arvénsis* L. [*Alchemílla arvénsis* (L.) SCOP.] - Creţişoare - ⊙, T., 2-30 cm. V-VIII. 2n = 48. Spor. $U_3T_4R_4$. **MH**: Bala (Comăneşti, Pestriţa, Molani, Crainici, Butoieşti, Buiceşti). Eur. *Aphanion.*

Aremónia NECKER ex NESTL. x = ?

4. *Aremónia agrimonoides* (L.) DC. - **e,,** H., 5-40 cm. V-VI. Spor. $U_3T_4R_4$. **MH**: Strehaia, Cerângani, Lunca Banului. Centr. eur.-medit. *Querco-Fagetea, Aremonio-Fagion, Carpinion betuli.*

Cérasus JUSS. x = 8

5. *Cérasus ávium* (L.) MOENCH [*Prunus avium* L. var. *avium* (var. *sylvestris* SER.)] - Hare Sweet cherry tree - MPh., 10-20 m. IV-V. 2n =16, 24, 32. Spor. $U_3T_3R_4$. Submedit. *Rhamno-Prunetea, Carpinion betuli.*
6. * *C. vulgáris* MILL. [*Prúnus cérasus* L.] - Cherry tree - MPh., 8 (10) m. IV-V. 2n =32. Frecv. cult. and subspontaneous. Eur. SE and As. by V. *Prunetalia spinosae.*

Cratægus L. x = 17

7. *Cratægus laevigáta* (POIR.) DC. [*C. oxyacántha* auct., non L.] - Hawthorn, Hawthorn- MmPh., 2-5 m, V-VI. 2n = 34. Spor. $U_3T_3R_{3-4}$. **MH**: Lunca Banului, Gura Motrului. Eur. centr. *Querco-Fagetea, Prunetalia spinosae.*
8. ***C.*** *monógyna* JACQ. subsp. *monógyna* - MmPh., 2-5 (-10) m. V-VI. 2n = 34. Frecv. $U_3T_{3-4}R_4$. **MH:** Argineşti-Gura Motrului (BUIA AL. & al., 1961). Euras. *Rhamno-Prunetea, Prunetalia spinosae.*
   - subsp. *azarélla* (GRISEB.) FRANCO [*C. azarélla* GRISEB.] - **MH**: Bala (Comăneşti, Molani, Valea Mare, Pestriţa, Crainici). Medit. *Prunetalia spinosae.*
9. *C. pentágyna* WALDST. & KIT. - mMPh., 1-5 m. V-VI. 2n = ... Spor. $U_3T_4R_4$. **MH**: Comăneşti, Broşteni, Imoasa, Corcova, Strehaia (Stănceşti), Lunca Banului, Butoieşti (Buiceşti, Mitulani), Argineşti; **GJ**: Glogova. Pont.-pan.-balc. *Querco-Fagetea, Prunetalia spinosae.*

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10. *C. rhipidophýlla* GAND. [*C. oxyacántha* L., *C. calýcina* auct. non PETERM., s.l., *C. curvisépala* LINDM., nom illegit, s.l., *C. rosifórmis* auct. non JANKA, s.l., *C. dunénsis* CINOVSCHIS] - mMPh., 2-5 (-10) m. V-VI. 2n = Spor. $U_3T_{3-4}R_4$. **MH**: Imoasa, Corcova, Lunca Banului, Argineşti; **GJ**: Văgiuleşti. Centr. eur. *Querco-Fagetea, Prunetalia spinosae.*

Cydónia Mill. x = 17

11. * *Cydónia oblónga* MILL. [*C. vulgáris* DELARBRE] - Quince tree - MmPh., 1,5-6 m. V. 2n =34. Frecv. cult. fruit and subspontaneous. As. by SV.

Filipéndula Mill. x = 7,8

12. *Filipéndula vulgáris* MOENCH [*Spiræa filipéndula* L., *F. hexapétala* GILIB.] - Dropwort - **e„** H., 30-60 cm. V-VI. 2n = 14, 16. Frecv. $U_{2-3}T_3R_{3-4}$. Euras. *Festuco-Brometea, Molinietalia, Prunetalia spinosae.*

Fragária L. x = 7

13. *Fragária moscháta* (DUCHESNE) Weston [*F. elátior* EHRH.] - Strawberry from field - **e„** H., -40 cm. V-VII. 2n = 42. Spor. $U_{2-3}T_3R_{2-4}$. **MH** : Strehaia, Argineşti. Centr. eur. *Trifolio-Geranietea sanguinei, Carpinion betuli, Alno-Ulmion.*

14. *F. vésca* L. - Strawberry from forest- **e„** H., 5-20 (30) cm. V-VI. 2n = 14. Frecv. $U_3T_3R_{2-4}$. Euras. *Epilobietea angustifolii, Carpinion betuli, Trifolion medii.*

15. *F. víridis* DUCHESNE [*F. collína* EHRH.] subsp. *víridis* - Strawberry from field - **e„** H., 8-15 cm. V-VI. 2n = 14. Frecv. $U_2T_4R_3$. **MH**: Strehaia (BUIA AL., 1956). Euras. *Festuco-Brometea, Origanetalia vulgaris.*

- subsp. *campéstris* (STEVEN) PAWL. - $U_{2-3}T_4R_3$. **GJ**: Glogova. Pont. *Geranion sanguinei.*

Géum L. x = 7

16. *Géum urbánum* L. - Cerenţel - **e„** H., 20-60 cm. V-IX. 2n = 42. Frecv. $U_3T_3R_4$. Circ. *Galio-Urticetea, Galio-Alliarion, Prunetalia spinosae, Fagetalia sylvaticae.*

Málus MILL. x = 17

17. * *Málus doméstica* BORKH. - Apple tree - MPh., - 10(15) m. IV-V. 2n =34. Cult. fruit.

18. *M. sylvéstris* MILL. [*Pýrus málus* L.] - Crab tree - MPh., - 12 m. IV-V. 2n =34. Frecv. $U_3T_3R_4$. Eur. *Quercetea pubescentis, Alno-Ulmion, Carpinion betuli, Prunetalia spinosae.*

Potentílla L. x = 7

19. *Potentílla anserína* L.- Crawfish tail - **e„** H., 15-50 cm. V-VIII. 2n=28, 35, 42. Frecv. $U_{4-5}T_3R_{3-5}$. Cosm. *Molinio-Arrhenatheretea, Potentillion anserinae.*

20. *P. argéntea* L. - Scrântitoare - **e„** H., 10-50 cm. VI-VII. 2n = 14. Frecv. $U_{1-2}T_4R_{3-4}$. Euras. *Festuco-Brometea, Quercetea pubescentis, Sedo-Scleranthetalia.*

21. *P. erécta* (L.) RAUSCH. [*P. tormentílla* NECK., *Tormentílla erécta* L.] - Cinquefoil - **e„** H., 10-*30* cm. V-VIII. 2n = 28. Spor. $U_{3-4}T_4R_{2-4}$. **MH**: Comăneşti, Floreşti. **GJ**: Glogova. Euras. *Molinietalia.*

22. *P. heptaphýlla* L. [*P. rúbens* (CRANTZ) ZIMMETER] - Închegăţică - **e„** H., 10-20 cm. IV-VI. 2n = 14, 28, 30, 35. Spor. $U_2T_{3-4}R_5$. **MH**: Breznita de Motru. Eur. cont. *Festuco-Brometea.*

23. *P. micrántha* RAMOND. ex DC. - Frăgurel - **e„** H., 1-5 (-15) cm. III-V. 2n = 14. Frecv. $U_2T_{3-4}R_3$. **MH**: Breznita (GUSULEAC M., 1956). Centr. eur.-submedit. *Quercetea pubescentis.*

24. *P. pedáta* WILLD. - [*P. hírta* L. var. *pedáta* KOCH] - **e„** H., 20-40 cm. VI-VII. 2n = 28. **R.,** $U_{1-2}T_4R_4$. **MH**: Stângăceaua. Medit. *Festuco-Brometea, Festuco-Sedetalia.*

25. *P. récta* L. - Weed by five fingers - **e„** H., 30-70 cm. V-VII. 2n = 28, 42. Frecv. $U_2T_4R_3$. Euras. cont. *Festuco-Brometea, Sisymbrion officinalis.*

26. *P. réptans* L. - Five fingers - **e„** H., 30-100 cm. VI-VIII. 2n = 28. Frecv. $U_{3-4}T_4R_{3-4}$. Euras. *Calthion palustris, Agrostion stoloniferae, Potentillion anserinae, Bidentetalia tripartiti.*

27. *P. supína* L. - ⊙-**e„** T.-H., 10-40 cm. VI-IX. 2n = 28. Spor. $U_4T_3R_{2-5}$. **MH**: Meriş, Argineşti. Euras.-submedit. *Molinio-Arrhenatheretea, Bidentetea tripartiti, Potentillion anserinae, Nanocyperion.*

Prúnus L. x = 8

28. * *Prúnus cerasífera* EHRH. [incl. *P. divaricata* LEDEB.] var. *cerasífera* - Wax cherry tree - MPh., -8 m. IV-V. 2n =16. Frecv. cult. şi subspontaneous. $U_2T_4R_{3-5}$. Pont.-balc. *Prunion spinosae.*

29. **P. doméstica* L. [*P. doméstica* L. subsp. *doméstica*, *P. doméstica* subsp. *oeconomica* (BORKH.) C. K. SCHNEID.) - Plum tree - MPh., -8 m. IV-V. 2n = 34. Frecv. cult. As. by V.

30. *P. spinosá* L. [*P. spinosá* subsp. *dasyphýlla* (SCHUR) DOMIN] - Sloe - mPh., 1-3 m. IV-V. 2n =32. Frecv. $U_{2-3}T_3R_4$. **MH:** Argineşti-Gura Motrului (BUIA AL. & al., 1961). Eur. *Prunetalia spinosae, Alno-Ulmion, Carpinion betuli.*

Pýrus L. x = 17

31. * *Pýrus communis* L. em. GAERTN. [*P. doméstica* MEDIK., *P. satíva* DC. in LAM. & DC.] - Pear tree - MPh., - 20 m. IV-V. 2n =34, 51, 68. Cult. fruit.

32. *P. pyráster* (L.) BURGSD. [*P. áchras* GAERTN.] - Shadberry - MPh., - 20 m. IV-V. 2n =34. Frecv. $U_2T_3R_4$. **MH:** Argineşti-Gura Motrului (BUIA AL. & al., 1961). Eur. *Quercetea pubescentis, Carpinion betuli.*

Rósa L. x = 7

33. *Rósa agréstis* SAVI [*R. sépium* THUILL., *R. pubéscens* RAPIN, *R. gizéllae* BORBÁS] - mPh., - 2 m. VI-VII. 2n = 35. Spor. $U_2T_4R_{3-4}$. **MH**: Breznita, Butoieşti (Buiceşti, Mitulani), Gura Motrului. Eur. *Rhamno-Prunetea, Prunetalia spinosae.*

34. *R. árvensis* HUDS. [*R. répens* SCOP.] - mPh., -1 m. VI-VII. 2n = 14. Frecv. $U_3T_4R_3$. **MH**: Strehaia (BUIA AL., 1956), Breznita, Argineşti. Eur. centr. and by SV. *Querco-Fagetea, Carpinion betuli, Tilio-Acerion, Prunetalia spinosae.*

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35. *R. canina* L. [*R. lutetiána* LÉMAN, *R. touranginiána* DÉSÉGL. & RIPART] - Sweet briar - mPh., -3 (5) m. VI-VII. 2n = 35. Frecv. $U_{1-2}T_3R_3$. **MH**: Strehaia (BUIA AL., 1956), Comanda, Broşteni, Breznița (Priporu Hills), Cerângani. **GJ**: Iormăneşti, Văgiuleşti (Cârciu, Fundu Văii Hill). Eur. *Rhamno-Prunetea, Prunetalia spinosae.*

36. *R. caryophyllácea* BESSER - mPh., -2 m. V-VI. **R.,** brawn eu-mesobasic soils. Sp. oligotr. $U_2T_{3-4}R_4$. **MH**: Argineşti, Gura Motrului (BUIA AL., 1956, ZANOSCHI V. & al. 2000, COSTACHE I., 2004). Pont.-pan. *Prunetalia spinosae.*

37. *R. corymbífera* BORKH. [*R. dumetórum* THUILL., ? *R. obtusifólia* DESV.] - mPh., -3 m. V-VII. 2n = 35. Frecv. $U_{2-3}T_4R_{3-4}$. **MH**: Strehaia, Gura Motrului, Broşteni, Strehaia, Stângăceaua, Slătinicul Mare, Butoieşti (Ştefanu Hill), Argineşti ; **GJ**: Glogova. Eur. *Rhamno-Prunetea, Prunetalia spinosae.*

38. *R. dumális* BECHST. [*R. verticillacántha* MÉRAT, *R. glaúca* VILL. ex LOISEL. non POURR., *R. afzeliána* FR. ex LILJ., *R. reúteri* (GODET) REUT.] - Sweet briar - mPh., -3 (5) m. VI-VII. 2n = 35. Frecv. $U_{1-2}T_3R_3$. **MH**: Strehaia (BUIA AL., 1956), Cerângani, Stângăceaua, Butoieşti, Argineşti; **GJ**: Iormăneşti, Văgiuleşti (Cârciu, Fundu Văii Hill). Eur. *Rhamno-Prunetea, Prunetalia spinosae.*

39. *R. elliptica* TAUSCH [*R. gravéolens* GREN. & GODR.] - mPh., -2 m. V-VI. **R.,** brawn eu-mesobasic soils. $U_2T_4R_4$. **MH**: Butoieşti (Ştefanu Hill). Eur. centr. *Prunion spinosae.*

40. *R. gállica* L. [*R. austríaca* CRANTZ] - Eglantine - mPh., 40-80 cm. VI-VII. 2n = 21, 28. Frecv. $U_{1-2}T_4R_4$. Pont.-medit. *Trifolio-Geranietea sanguinei.*

- var. *subglandulósa* (BORBAS) H. BRAUN [*R. austríaca* var. *subglandulósa* BORBAS] - **MH**: between Strehaia and Cerângani.

41. *R. micrántha* BORRER ex Sm. - mPh., -3 m. VI-VII. 2n = 21, 35. Spor. $U_2T_4R_4$. **MH**: Comăneşti (Pietricica Hill), Cerângani, Argineşti, Gura Motrului. Eur. centr. and by S. *Rhamno-Prunetea.*

42. *R. subcanina* (H. CHRIST) KELLER [*R. dumális* subsp. *subcanina* (H. CHRIST) SOO] - Sweet briar - mPh., -3 (5) m. VI-VII. 2n = 35. Frecv. brawn eu-mesobasic soils. $U_{2-3}T_{3-4}R_4$. Eur. *Prunetalia spinosae.*

? *R. tomentósa* SM. - I don't find. Mentioned by BUIA AL., 1956, in Strehaia zone (**MH**), without herbarium materil.

Rúbus L. x = 7

43. *Rúbus apiculátus* WEIHE & NESS. - mPh., 50-200 cm. (IV) VI-VII. 2n = 28. **R.,** brawn eu-mesobasic soils.. $U_3T_4R_4$. **MH**: Comăneşti, între Strehaia şi Cerângani (Cerângani Hill), Butoieşti (Buiceşti, Mitulani). Eur. centr. and by V. *Querco-Fagetea, Prunetalia spinosae.*

44. *R. caésius* L. - Bramble by stubble field - mPh., 30-80 cm. V-VI (IX). 2n =... Frecv. $U_4T_4R_{4-5}$. Eur. *Galio-Urticetea, Salicetea purpureae, Alnetea glutinosae, Fagetalia sylvaticae, Stellarietea mediae.*

- var. *arvális* RCHB. - **MH**: Comăneşti, between Strehaia and Cerângani (Cerângani Hill), Butoieşti (Buiceşti, Mitulani), Argineşti; **GJ**: Glogova, Văgiuleşti.

- var. *glandulósus* FOCKE - **MH**: Butoieşti (Buiceşti, Mitulani), Argineşti.

45. *R. cándicans* WEIHE ex RCHB. subsp. *cándicans* - mPh., 50-200 cm. VI-VII (IX). 2n = 21. Frecv. $U_{2-3}T_{3-4}R_4$. **MH**: Comăneşti, Strehaia, Cerângani; **GJ**: Glogova, Iormăneşti Eur. centr. and by SV. *Querco-Fagetea, Prunetalia spinosae.*

- subsp. *arduennénsis* (LIBERT ex LEJ.) CIOCARLAN - **MH**: Comăneşti, Breznişa de Motru (Priporu Hill), Butoieşti (Buiceşti, Mitulani, Popeşti) ; **GJ**: Glogova, Iormăneşti. *Quercetea pubescentis, Prunetalia spinosae.*

- subsp. *constrictus* (P. J. MÜLL. & LEFEVRE) JANCH. [*R. cándicans* var. *menyházensis* (SIMONK.) E. I. NYARADY] - **MH**: Comăneşti, Butoieşti (Viilor Hill); **GJ**: Glogova, Iormăneşti. *Alno-Ulmion.*

46. *R. canéscens* DC. [*R. tomentósus* BORKH. p.p.] - mPh., 50-200 cm. VI. 2n = 14. Frecv. $U_3T_4R_4$. Centr. eur.-medit. *Rhamno-Prunetea.*

47. *R. discólor* WEIHE & NEES [*R. procérus* P. J. MÜLL.] - mPh., VII-VIII. 2n = 28. Frecv. $U_{2-3}T_{3-4}R_4$. **MH**: Strehaia, Breznița, Butoieşti (Buiceşti, Mitulani, Viilor Hill, Ştefanu), Argineşti. Eur. centr. and by SV. *Prunetalia spinosae.*

- var. *robústus* P. J. MÜELL. - **MH**: between Meriş and Broşteni (NYÁRÁDY E. I., 1956)

48. *R. scàber* WEIHE & NEES in BLUFF & FINGERH - mPh., VII. Spor. $U_{2-3}T_3R_4$. **MH**: Argineşti. Centr. eur. *Prunetalia spinosae, Luzulo-Fagion.*

49. *R. schleícheri* WEIHE ex TRATT. - mPh., 50-200 cm. (IV) VI-VII. 2n = 28. Frecv. $U_3T_3R_{3-4}$. **MH**: Comăneşti, Strehaia-Cerângani, Argineşti; **GJ**: Glogova (Iormăneşti). Centr. eur. *Fagetalia sylvaticae.*

Sanguisórba Willd. x = 7

50. *Sanguisórba minor* SCOP. subsp. *polýgama* (WALDST. & KIT.) HOLUB. [*S. muricáta* (SPACH) GREMLI, *S. m.* subsp. *muricáta* (SPACH) ASCH. & GRAEBN., *Potérium polýgamum* WALDST. & KIT.] - Burnet, Bloodwort - **e,,** H., 20-60 cm. V-VII. 2n = 28, 56. Frecv. $U_{2-3}T_{3-4}R_4$. **MH**: Strehaia (BUIA AL., 1956). Medit. *Festuco-Brometea, Festucetalia valesiacae, Koelerio-Corynephoretea, Sisymbrion officinalis.*

? *S. officinális* L. - I don't find. Mentioned by BUIA AL., 1956, in Strehaia zone (**MH**) and by MALOŞ C., 1977, in Baia de Aramă zone, without herbarium materil.

Sórbus L. x = 17

51. *Sórbus doméstica* L. [*Córnus doméstica* (L.) SPACH, *Pýrus doméstica* SM.] - Fowler's pear - MPh., 10-15 m. V-VI. 2n =34. Frecv. $U_2T_{3-4}R_4$. Cult. forest and subspontaneous. **MH**: Gura Motrului (BUIA AL., 1956). Atl.-medit. *Quercetea pubescentis, Quercetalia pubescenti-petraeae, Carpinion betuli.*

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52. *S. torminális* (L.) CRANTZ [*Cratægus torminális* L., *Pýrus torminális* EHRH.] - Chess apple - MPh., 10-15 (-20) m. V-VI. 2n =34. Frecv. $U_{2-3}T_3R_4$. Centr. eur. *Quercetea pubescentis, Carpinion betuli.*

CONCLUSIONS

In the Lower Basin of the Motru River have been identified 60 taxa on the Rosaceae family (48 species, 6 subspecies and 6 varieties), among which, *Cratægus monógyna* JACQ. subsp. *azarélla* (GRISEB.) FRANCO, *Potentílla pedáta* WILLD., *Rósa caryophyllácea* BESSER, *R. ellíptica* TAUSCH, *Rúbus apiculátus* WEIHE & NESS., they are rare in the Lower Basin of the Motru, some have been included in the National Red List.

Also, 2 species (*Rósa tomentósa* SM. and *Sanguisórba officinális* L.), mentioned by BUIA AL., 1956, in Strehaia zone (MH), without herbarium materil, don't have been find.

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CONTRIBUTIONS CONCERNANT L'ORDRE *FAGETALIA SYLVATICAE* PAWLOWSKI IN PAWLOWSKI ET AL. 1928 DANS LE TERRITOIRE DU PARC NATUREL DES PORTES DE FER

SORINA ŞTEFANIA MATACĂ

Abstract. The growth study of Danube Defile has taken a special largeness after the development of the Iron Gates complex research activities built in 1965, in the same time with the preliminary construction of the Hydroenergetic and Navigation System of Iron Gates. The arrangement of causeway and railroader effectuated concerning the Iron Gates Hydroelectric Power Plant and also the Iron Gates navigation power-reservoir after that it was submerged a 3562 ha on the Romania stand of the Danube, shall create the possibility of the access into biotypes inaccessible before. So one of the growth associations shall be reconsidered and others shall be analysed in perspective of the new progress of taxonomy and phytogeography but especially of phytohistorical information.

Key words: vegetable association, Fagetalia sylvaticae order, Iron Gates Natural Park

Rezumat. Contribuţii privind ordinul Fagetalia sylvaticae Pawlowski in Pawlowski et al. 1928 în arealul Parcului Natural Porţile de Fier. Studiul vegetaţiei Defileului Dunării a luat o amploare deosebită în urma desfăşurării activităţii Grupului de cercetări complexe „Porţile de Fier", constituit în 1965, o dată cu lucrările pregătitoare pentru amenajările necesitate de construirea Sistemului Hidroenergetic şi de Navigaţie de la Porţile de Fier I. Amenajările rutiere şi feroviare efectuate în vederea construcţiei Hidrocentralei de la Porţile de Fier I, cât şi amenajarea lacului de acumulare Porţile de Fier I, în urma căreia a fost imersată o suprafaţă de 3562 ha pe malul românesc al Dunării, ne-au creat posibilitatea accesului în biotopuri în prealabil inaccesibile. Astfel, unele asociaţii vegetale au fost reconsiderate, iar altele au fost analizate în perspectiva noilor progrese ale taxonomiei şi fitogeografiei, dar mai ales a informaţiilor fitoistorice.

Cuvinte cheie: asociaţii vegetale, ordinul Fagetalia sylvaticae, Parcul Natural Porţile de Fier

L'INTRODUCTION

La constitution du Parc Naturel des Portes de Fer comme aire protégée inter états exige l'intensification des mesures concernant l'environnement et le déroulement d'un programme unitaire, destiné à intégrer les activités de protection à échelle européenne. Cette démarche nécessite l'élaboration d'un programme unitaire cohérent avec l'obtention d'informations pertinentes concernant les caractéristiques des écosystèmes naturels et semi naturels sur le territoire du Parc Naturel des Portes de Fer. Ces informations exigent une relation aux standards établis par la Communauté Européenne, Là-dessus nous avons rapporté l'ensemble des associations identifiées à la Nomenclature des biotopes établie par la Communauté Européenne au cadre du Programme Corine.

LES MATERIAUX ET METHODES

Le concept des biotopes a été exprimé au cadre de ce programme par le terme „sites", défini comme „aire terrestre ou aquatique, à extensions variables, laquelle forme une unité écologique importante pour la conservation de la nature dans le cadre de la Communauté Européenne, sans égard à l'occurrence que cette aire soit formellement protégée par des dispositions législatives". Les sites nécessitant la protection au niveau communautaire sont caractérises par la présence des espèces de plantes et d'animaux périclitées, ainsi que par la présence d'un habitat sensible aux divers impactes. La classification des habitats au cadre du projet Corine est basée par le système syntaxonomique de la phytosociologie centrale - européenne. Durant la dernière décennie, les activités du programme Corine ont pu être appliquées aussi dans les territoires des pays d'Europe Centrale et Orientale.

L'adaptation du programme Corine aux particularités biogéographiques et écologiques du continent considéré dans sont entier, se réalise au cadre du programme Emerald une extension des programmes Corine et Natura 2000.

En vue de constituer une base de données nécessaire à la gestion du Parc Naturel des Portes de Fer, au cadre de chaque syntaxon, a été précisé le code Corine et, le cas échéant, le code Emerald. La version 1995 du code Corine comprend une classification des habitats paléarctiques (Pal. Class.).

Pour établir les codes Corine des associations végétales du territoire du Parc Naturel des Portes de Fer, nous avons utilisé *Le Manuel Corine*, diffusé par le Comité de l'Union Européenne [4], *Le livre rouge des associations de plantes* [1], publié par A. BORHIDI & A. SANTA en Hongrie (1999), et la Monographie *Flora şi vegetaţia Văii Gurghiului*, élaborée par MIHAELA SAMARGHITAN [3].

LES RESULTES ET DISCUTIONS

Conspectus des associations:

QUERCO-FAGETEA Br.-Bl. et Vlieger in Vlieger 1937

FAGETALIA SYLVATICAE Pawlowski in Pawlowski et al. 1928

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ALNO-ULMION Br.-Bl. et R. Tx. ex Tchou 1948 em. T. Müller et Görs 1958
Telekio speciosae-Alnetum incanae Coldea (1986) 1990
alnetosum glutinosae Oroian 1998
Stellario nemorum-Alnetum glutinosae (Kästner 1938) Lohmeyer 1957
SYMPHYTO-FAGION Vida 1959
LATHYRO HALLERSTEINII-CARPINENION (Boşcaiu 1979) Boşcaiu et al. 1982
Carpino-Fagetum Paucă 1941
MOEHRINGIO MUSCOSAE-ACERENION Boşcaiu et al. 1982
Phyllitidi-Fagetum Vida (1959) 1963

La classe *Querco-Fagetea* contient les plus importants syntaxons de la végétation naturelle européenne. Elle comprend autant des types forestiers zonaux, comme les hêtraies, que des types azonaux comme les bocages (*Alno-Ulmion*) et les forêts des vallées très escarpées.
COD CORINE (PAL. CLASS.): 41.

Fagetalia sylvaticae Pawlowski in Pawlowski et al. 1928

Les espèces d'identification des l'ordre sont: *Acer campestre* ssp. *campestre*, *Acer pseudoplatanus*, *Fagus sylvatica, Tilia cordata, Ulmus minor*, auxquelles s'ajoute un grand nombre d'espèces némorales herbacées: *Anemone nemorosa, Anemone ranunculoides, Arum alpinum, Campanula rapunculoides, Festuca drymeia, Galium odoratum, Hedera helix, Hepatica nobilis.*
Code CORINE (PAL. CLASS.): 41.

Alno-Ulmion Br.-Bl. et R. Tx. ex Tchou 1948 em. T. Müller et Görs 1958

Au cadre de la végétation forestière de la vallée du Danube, les aunaies occupaient dans le temps de larges extensions dans les prés des affluents du Danube (Valea Mraconiei, Valea Eşelniţei, Valea Crivitei, Valea Bahnei, Valea Voditei). L'aire de ces aunaies s'est réduite considérablement, simultanément à la croissance de la population humaine.

Le genre *Alnus* est représenté dans le territoire recherché seulement par *A. glutinosa.*

L'existence des bocages *d'Alnus glutinosa* est explicable par la vitesse réduite d'écoulement de ces vallées où s'amassent des dépôts de limons pelitiques. La présence des nodosités sur les racines formées par l'actinomiceta *Frankia alni*, enrichissant les alluvions avec des composants azotés, constitue une caractéristique de ces aunaies.

L'abondance des composants azotés, accumulés comme suite des activités des nodosités sur les racines, cause une grande susceptibilité pour l'invasion de certaines espèces nitrophiles, lesquelles ruderalisent la composition des aunaies. Dans le territoire recherché, ces aunaies sont représentées par une sous association et par un association: *Telekio speciosae-Alnetum incanae alnetosum glutinosae* et *Stellario nemorum-Alnetum glutinosae.*
Code CORINE (PAL. CLASS.): 44.3; Cod EMERALD: 44.3
Code NATURA 2000: *91E0

Telekio speciosae-Alnetum incanae Coldea (1986) 1990 *alnetosum glutinosae* Oroian 1998

Dans la composition floristique des cette sous association est présente l'espèce carpatique – balkanique – anatolienne - caucasienne *Telekia speciosa*, laquelle provient d'anciennes forêts *d'Alnus incana*, édifiées dans les stades de jeunesse du fleuve (Tableau 1).

Le spectre des bio formes (Fig. 1) a prépondérance des hémi cryptophytes (48%), des terophytes (19%) et des fanerophytes (18%). Concernant les principaux indices écologiques (Fig. 2) phytocénoses sont généralement mésophiles (44,44%), micro - méso thermes (74,07%) et faiblement acidifié - neutrophiles (33,33%). L'analyse cariologique (Fig. 3) relève une participation en proportion de 51,85% des espèces polyploïdes, de 44,44% des espèces diploïdes et 3,7% pour les espèces diplo - polyploïdes. La valeur sous unitaire de l'indice de diploïdie (I.D.=0,86) s'explique par les processus de ruderalisation, déterminés par les impactes anthropiques. La composition floristique de ces aunaies (Fig. 4) présente les caractéristiques des prés du cours supérieur des vallées. En examinant le spectre des éléments floristiques on constate une participation plus accentuée des espèces eurasiatiques (37%), cosmopolites (16%) et européennes (15%), suivies par les espèces pontiques (8%), circumboréales (8%), méditerranéennes (6%).
Code CORINE (PAL. CLASS.): 44.32

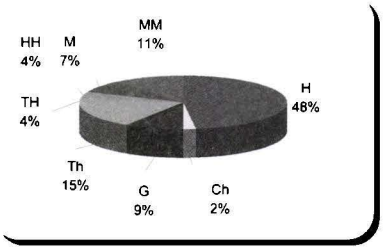

Figure 1. Spectre des bio formes de la sous association *Telekio speciosae-Alnetum incanae alnetosumglutinosae*

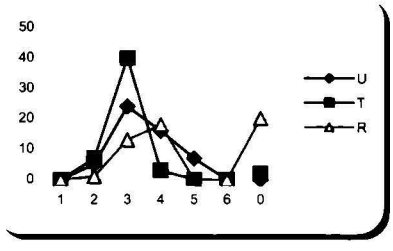

Figure 2. Indices des écologiques de la sous association *Telekio speciosae-Alnetum incanae alnetosum glutinosae*

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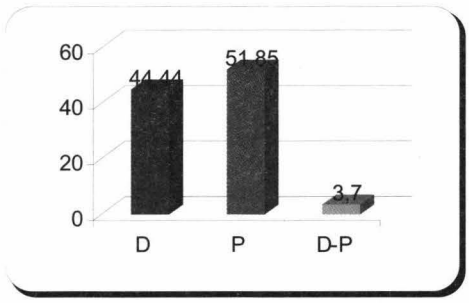

Figure 3. Spectre cariologique de la sous association *Telekio speciosae-Alnetum incanae alnetosum glutinosae*

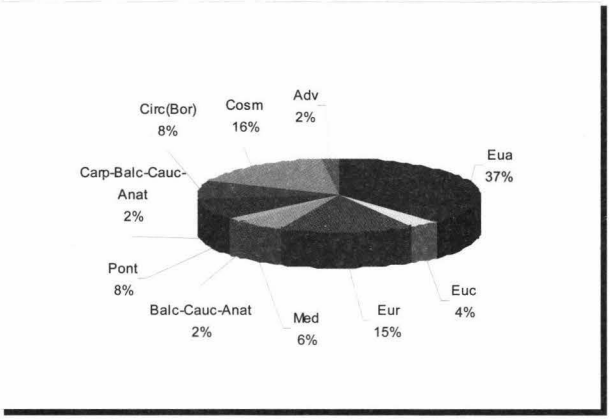

Figure 4. Eléments floristique de la sous association *Telekio speciosae-Alnetum incanae alnetosum glutinosae*

Tableau 1. *Telekio speciosae-Alnetum incanae* Coldea (1986) 1990 *alnetosum glutinosae* Oroian 1998

F.b.	E.f.	Cyt.	**Relevé** **Exposition** **Pante (^{0})** **Recouvrement (%)** **Surface (m^2)**	**1** **NE** **-** **100** **400**	**2** **SV** **-** **100** **400**	**3** **SV** **-** **100** **400**	**4** **SV** **-** **70** **400**	**5** **SV** **-** **60** **400**	**K**
			Alno-Ulmion s. l.						
MM(M)	Eua	P	*Alnus glutinosa*	3	4	4	4	4	V
H	Carp-Balc-Cauc-Anat	D	*Telekia speciosa*	+	+	1	+	+	V
H-Ch	Eua	D-P	*Glechoma hederacea*	+	2	1	+	+	V
H	Med	D	*Parietaria officinalis*	+	-	+	+	+	IV
H-HH	Eua	D	*Lycopus europaeus*	+	+	+	+	-	IV
Th	Eua	D	*Polygonum hydropiper*	-	+	+	+	+	IV
H-N	Eua(Med)	P	*Rubus caesius*	2	2	+	1	-	IV
G-H	Eua	P	*Petasites hybridus*	+	-	-	+	+	III
G	Eua(Med)	D	*Circaea lutetiana*	+	-	-	+	+	III
H-HH	Cosm	P	*Lythrum salicaria*	-	-	+	-	+	II
H	Circ(Bor)	D	*Carex remota*	+	-	-	+	-	II
H	Eua	P	*Stachys sylvatica*	+	-	-	+	-	II
H	Eua	P	*Scrophularia umbrosa*	+	-	-	+	-	II
HH-G	Circ(Bor)	P	*Scirpus sylvaticus*	-	-	+	-	+	II
H	Eua(Med)	P	*Ranunculus repens*	-	-	+	+	-	II
			Fagetalia s. l.						
H	Pont-Med	D	*Scrophularia scopolii*	+	+	+	-	-	III
Th-TH	Cosm	P	*Geranium robertianum*	+	-	-	-	-	I
			Querco-Fagetea s. l.						
MM-M	Eur	D	*Acer campestre*	+	+	-	+	+	IV
MM(M)	Eur	P	*Carpinus betulus*	1	+	-	-	-	II
M	Eur	D	*Corylus avellana*	+	+	-	-	-	II
MM	Pont-Pan	D	*Fraxinus angustifolia*	+	-	-	-	+	II
M	Euc	D	*Cornus sanguinea*	+	+	-	-	-	II
H	Eua(Med)	D	*Brachypodium sylvaticum*	+	+	-	+	-	III
H	Eur	D	*Pulmonaria officinalis*	+	+	-	-	+	III
H	Circ(Bor)	P	*Poa nemoralis*	-	-	+	+	+	III
			Salicetalia						
M	Eua	D	*Salix triandra*	2	-	-	-	-	I
			Alliarion						
H	Eua(Med)	P	*Geum urbanum*	+	+	+	+	+	I
			Variae Syntaxa						
H(G)	Cosm	P	*Urtica dioica*	2	2	2	1	+	V
H	Cosm	P	*Athyrium filix-femina*	1	1	1	+	+	V
M	Eur	D	*Crataegus monogyna*	-	1	+	+	+	IV

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Ch	Eur	P	*Lysimachia nummularia*	+	-	1	+	+	IV
H	Adv	P	*Phytolacca americana*	+	+	+	-	-	III
Th(TH)	Eua(Circ)	P	*Cardamine flexuosa*	+	+	+	-	-	III
G	Pont-Pan-Balc	D	*Polygonatum latifolium*	-	+	+	-	-	II
H	Med-Atl	P	*Mentha spicata*	+	-	1	-	-	II

Espèces présentées dans un seul relèvement: *Pulmonaria obscura* (1): H, Eur, D; *Sambucus nigra* (1): MM-M, Eur, P; *Galeopsis ladanum* (1): Th, Eua, D; *Galium aparine* (1): Th, Circ(Bor), P; *Equisetum arvense* (2): G, Cosm, P; *Veronica beccabunga* (2): HH-H, Eua, D; *Tamus communis* (2): G, Med-Atl, P; *Juglans regia* (3): MM, Balc-Cauc-Anat, P; *Holcus lanatus* (3): H, Cosm, D; *Juncus effusus* (3): H, Cosm, P; *Rorippa austriaca* (3): H(G), Pont, D; *Cirsium vulgare* (3): TH, Eua, P; *Rumex crispus* (3): H, Eua, P; *Bellis perennis* (3): H, Eur(Med), D; *Bromus sterilis* (3): Th, Eua(Med), D; *Viola tricolor* ssp. *tricolor* (3): TH-Th-H, Eua, D; *Cardaminopsis arenosa* (3): Th-(TH-H), Euc, D-P; *Polygonum persicaria* (3): Th, Cosm, P; *Prunella vulgaris* (3): H, Cosm, P.

Lieu et date des relèvements: 1-Valea Crivitei (4.07.2002); 2,3-Valea Eşelniţei (4.07.2002); 4,5-Valea Mraconiei (19.08.2000).

Stellario nemorum-Alnetum glutinosae (Kästner 1938) Lohmeyer 1957

Le contact de ces aunaies avec les hêtraies, d'où provient un grand nombre de leurs composants, justifie leur inclusion dans l'alliance *Alno-Ulmion,* appartenante à l'ordre *Fagetalia sylvaticae.* Néanmoins on remarque que récemment, S. Wallnöfer, L. Mucina şi V. Grass (1993) ont montré que la dénomination d'*Alnion incanae* Pawowski proposée en 1928 est prioritaire tant par rapport à *Alno-Padion* Knapp ex Medwecka-Kornás in Matuszkiewicz et Borowik 1957, qu'à *Alno-Ulmion,* proposée en 1948, lesquelles restent ainsi dans le statut de synonymie. Le rangement correct de cette association au cadre de l'alliance demeure difficile à cause de la disparition de la plupart des espèces diagnostiquées. Néanmoins le rangement syntaxonomique le plus plausible suppose la référence des cénoses à l'association *Stellario nemorum-Alnetum glutinosae* (Kästner 1938) Lohmeyer 1957 (Tableau 2).

Les bio formes dominantes sont hémi cryptophytes (49%) et les fanerophytes (23%) (Fig. 5). Suivant les principaux facteurs écologiques (Fig. 6), les phytocénoses sont avec prédominance mésophiles (56,17%), micro – mésothermes (76,4%), faiblement acidifié – neutrophiles (34,83%). Le spectre cariologique met en évidence (Fig. 7) la prédominance des espèces polyploïdes (52,8%), par rapport aux diploïdes (42,69%) et aux diplo – polyploïdes (3,37%). La valeur de l'indice de diploïdie (I.D. =0,95) este sous unitaire. Au point de vue chorologique (Fig. 8) les espèces eurasiatiques (45%) et européennes (16%) sont prépondérantes. Le pourcentage des espèces méditerranéennes (6%), circumboréales (6%), pontiques – méditerranéennes (3%) s'avère être plus réduit.

Code CORINE (PAL. CLASS.): 44.323

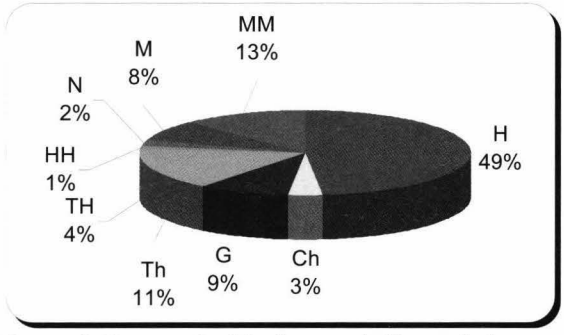

Figure 5. Spectre des bio formes de l'association *Stellario nemorum-Alnetum glutinosae*

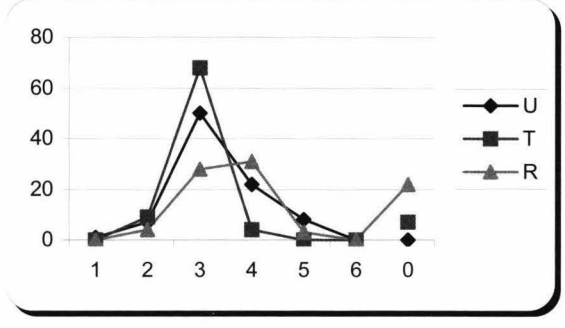

Figure 6. Indices des écologiques de l'association *Stellario nemorum-Alnetum glutinosae*

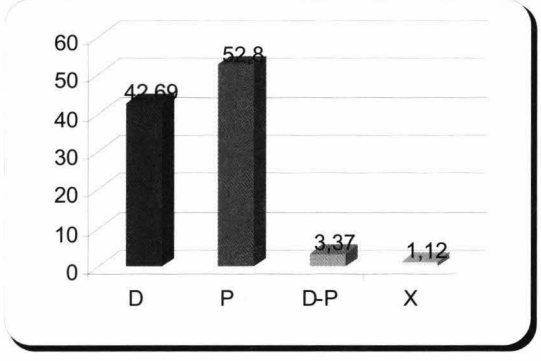

Figure 7. Spectre cariologique de l'association *Stellario nemorum-Alnetum glutinosae*

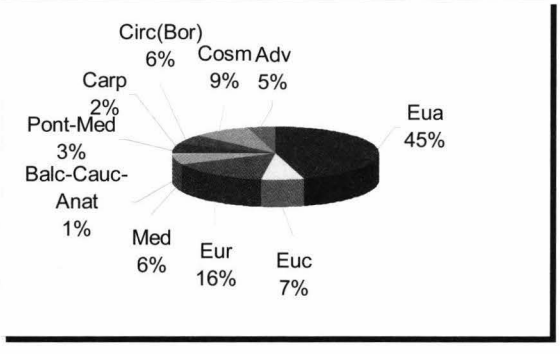

Figure 8. Eléments floristique de l'association *Stellario nemorum-Alnetum glutinosae*

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Tableau 2 . *Stellario nemorum-Alnetum glutinosae* (Kästner 1938) Lohmeyer 1957

F.b.	E.f.	Cyt	Relevé Exposition Pante (^{0}) Recouvrement (%) Surface (m^2)	1 SE - 60 400	2 S 45 100 400	3 SE - 100 400	4 S 45 90 400	5 NV - 100 400	K
			Alno-Ulmion						
MM(M)	Eua	P	*Alnus glutinosa*	3	4	4	4	4	V
H	Eua(Med)	D	*Brachypodium sylvaticum*	+	1	+	+	1	V
H-N	Eua(Med)	P	*Rubus caesius*	+	1	2	-	+	IV
H	Circ(Bor)	D	*Carex remota*	1	+	-	-	+	III
H	Eua	D	*Eupatorium cannabinum*	+	+	-	-	-	II
H	Euc	D-P	*Geranium phaeum*	-	+	-	+	-	II
Ch	Eur	P	*Lysimachia nummularia*	-	1	-	-	-	I
H-G	Eua	D-P	*Aegopodium podagraria*	+	-	-	-	-	I
H	Eur	D	*Stellaria nemorum*	+	-	-	-	-	I
MM(M)	Eur	P	*Ulmus laevis*	-	+	-	-	-	I
HH-G	Circ(Bor)	P	*Scirpus sylvaticus*	-	+	-	-	-	I
Th	Eua	D	*Galeopsis speciosa*	-	+	-	-	-	I
			Querco-Fagetea (incl. Fagetalia)						
G	Eua(Med)	D	*Circaea lutetiana*	+	+	+	+	1	V
M	Eur	D	*Corylus avellana*	+	-	2	+	-	III
H	Circ(Bor)	P	*Poa nemoralis*	+	-	+	-	-	II
MM(M)	Eur	P	*Carpinus betulus*	-	+	+	-	-	II
H	Eua(Mont)	D	*Salvia glutinosa*	-	+	-	+	-	II
N-E	Med-Atl	P	*Hedera helix*	-	-	+	+	-	II
H	Eur	D	*Pulmonaria officinalis*	-	-	+	+	-	II
H	Eua	P	*Stachys sylvatica*	-	-	+	+	-	II
Th(TH)	Eua(Circ)	P	*Cardamine flexuosa*	-	-	-	+	+	II
H	Cosm	P	*Athyrium filix-femina*	-	-	1	-	-	I
Ch	Eur(Med)	D	*Euphorbia amygdaloides*	-	-	+	-	-	I
MM	Euc	P	*Acer pseudoplatanus*	-	-	-	+	-	I
G	Euc	P	*Arum alpinum*	-	-	-	+	-	I
			Galio-Alliarion						
H	Eua(Med)	P	*Geum urbanum*	+	+	-	+	-	III
Th(TH)	Eua(Med)	P	*Alliaria petiolata*	+	-	+	-	-	II
TH	Med-Atl-Euc	D	*Dipsacus pilosus*	-	+	-	-	-	I
			Variae Syntaxa						
H	Med	D	*Parietaria officinalis*	1	2	3	2	4	V
H(G)	Cosm	P	*Urtica dioica*	+	1	+	1	+	V
TH(TH)	Eua(Med)	D	*Lapsana communis*	+	+	-	-	+	III
H-Ch	Eua	D-P	*Glechoma hederacea*	+	+	-	-	2	III
H-HH	Eua	D	*Lycopus europaeus*	+	+	+	-	-	III
MM-M	Eur	D	*Acer campestre* ssp. *campestre*	+	+	-	+	-	III
Th-TH	Cosm	P	*Geranium robertianum*	+	+	-	-	-	II
Th	Circ(Bor)	P	*Galium aparine*	1	+	-	-	-	II
H	Eur	D	*Mycelis muralis*	+	-	+	-	-	II
H	Euc	D	*Dactylis glomerata* ssp. *aschersoniana*	+	-	-	-	+	II
MM-M	Eur	P	*Sambucus nigra*	-	+	+	-	-	II
G-H	Eua	P	*Petasites hybridus*	-	+	+	-	-	II
H	Eua(Med)	D	*Campanula trachelium*	-	+	-	-	+	II
N	Eur	P	*Rubus hirtus*	-	-	-	1	+	II

Espèces présentées dans un seul relèvement: *Salix fragilis* (1): M(MM), Eua, P; *Salix purpurea* ssp. *purpurea* (1): M, Eua, D; *Salix triandra* (1): M, Eua, D; *Cardamine impatiens* (1): Th(TH), Eua(Med), D; *Lamium maculatum* ssp. *maculatum* (1): H-Ch, Eua, D; *Ulmus minor* (1): MM, Eua, P; *Cornus sanguinea* ssp. *sanguinea* (1): M, Euc, D; *Tamus communis* (1): G, Med-Atl, P; *Poa sylvicola* (1): H, Eua(Med); *Equisetum arvense* (1): G, Cosm, P; *Myosotis scorpioides* (1): Th, Eua, P; *Arctium lappa* (1): TH, Eua(Med), P; *Ranunculus repens* (1): H, Eua(Med), P; *Crataegus monogyna* (1): M, Eur, D; *Chelidonium majus* (1): H, Eua, D; *Calystegia sepium* (1): H, Eua, D; *Scrophularia nodosa*

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(1): H, P; *Vitis sylvestris* (1): M-E, Pont-Med, P; *Fraxinus ornus* (1): MM, Med, D; *Saponaria officinalis* (1): H, Eua(Med), P; *Fagus sylvatica* ssp. *sylvatica* (2): MM(M), Eur, D; *Ranunculus acris* (2): H, Eua(Med), D; *Lysimachia punctata* (2): H, Pont-Med, P; *Solanum dulcamara* (2): Ch-N, Eua(Med), P; *Chaerophyllum aromaticum* (2): H, Euc(Cont), D; *Scutellaria altissima* (3): H, Pont-Med, D; *Mentha longifolia* (3): H-G, Eua(Med), P; *Lysimachia vulgaris* (3): H-HH, Eua, P; *Telekia speciosa* (3): H, Carp-Balc-Cauc-Anat, D; *Elymus caninus* (3): H, Eua(Med), P; *Polystichum setiferum* (3): H, Cosm, D; *Tanacetum parthenium* (3): Th-H(Ch), Adv, D; *Juglans regia* (4): MM, Balc-Cauc-Anat, P; *Dryopteris filix-mas* (4): H, Cosm, P; *Scopolia carniolica* (4): G, Carp-Balc-Cauc, P; *Asplenium scolopendrium* (4): G, Circ(Bor), P; *Asperula taurina* ssp. *taurina* (4): H, Eua, D; *Polystichum aculeatum* (4): H, Eur(Mont), P; *Galium odoratum* (4): G, Eua, P; *Populus nigra* (5): MM, Eua, D; *Holcus lanatus* (5): H, Cosm, D; *Ambrosia artemisiifolia* (5): Th, Adv, P; *Prunella vulgaris* (5): H, Cosm, P; *Cruciata glabra* (5): H, Eua(Med), P; *Cirsium palustre* (5): TH, Eua(Med), D; *Erigeron annuus* ssp. *annuus* (5): Th-TH, Adv, P; *Oxalis fontana* (5): H, Adv, P.

Lieu et date des relèvements: 1,3-Valea Mraconiei (19.08.2000); 2,4-Valea Vodiţei (10.07.1999); 5-Valea Bahnei (10.07.1999).

Symphyto-Fagion Vida 1959

Code CORINE (PAL. CLASS.): 41.31; Cod EMERALD: 41.1

Lathyro hallersteinii-Carpinenion (Boşcaiu 1979) Boşcaiu et al. 1982

Contient les associations de charme et ses mélanges avec des espèces de *Quercus* ou *Fagus*. Espèces d'identification: *Carpinus betulus, Tilia cordata, Stellaria holostea, Dactylis glomerata, Helleborus odorus*.

Code CORINE (PAL. CLASS.): 41.2; Cod EMERALD: 41.2

Code NATURA 2000: 9170

Carpino-Fagetum Paucă 1941

Les forêts de hêtre avec charme, en diverses proportions quantitatives, représentent dans la plupart des cas, des stades secondaires de régénération de certaines hêtraies défrichées. Néanmoins Ana Paucă [2] a décrit cette association des Monts Apuseni où les mélanges de charme avec hêtre représentent une association stabilisée déjà durant la période sous boréale, lorsque l'immigration de l'hêtre a réduit l'aire d'extension du charme.

Dans le territoire étudié les mélanges de hêtre avec charme présentent beaucoup d'infiltrations de la classe *Quercetea pubescenti-petraeae*, qui leur confère un accent chromatique méridional. Dans les vallées humides et ombreuses, les forêts secondaires de charme avec hêtre présentent des tendances sindynamiques accentuées de reconstitution de certaines cénoses forestières où le hêtre devient dominant. Dans la Valea Mare a été identifiée une population remarquable de *Daphne laureola* (relèvement 3), laquelle forme un faciès local (Tableau 3).

La couche herbacée est formée surtout par les hémi cryptophytes (44%), suivies par les géophytes (15%), les térophytes (6%), les camephytes (3%). Parmi les fanerophytes, les megafanerophytes (17%), l'emportent sur la mésofanerophytes (11%) et les nanofanerophytes (4%) (Fig. 9). Confrontées à l'humidité, les espèces se comportent en mésophiles (58,41%) avec tendances vers xeromésophiles (26,73%), confrontées à la température, leur comportement est prépondérant micromésotherme (77,22%) et quant à la réaction du sol, les espèces sont faiblement acidifiées neutrophiles (48,51%), acidifiées neutrophiles (37,62%) (Fig. 10). Les espèces diploïdes (48,51%) sont plus nombreuses que les polyploïdes (43,56%) (Fig. 11). La valeur de l'indice de diploïdie (I.D.=1,13) démontre le caractère de relique de cette association. Sur le fond dominant des espèces européennes (27%), s'affirment les espèces eurasiatiques (19%), méditerranéennes (17%), centrales – européennes (12%), pontiques – méditerranéennes (7%), circumboréales (6%), balkaniques (3%), daciques (2%) (Fig. 12).

Code CORINE (PAL. CLASS.): 41.2

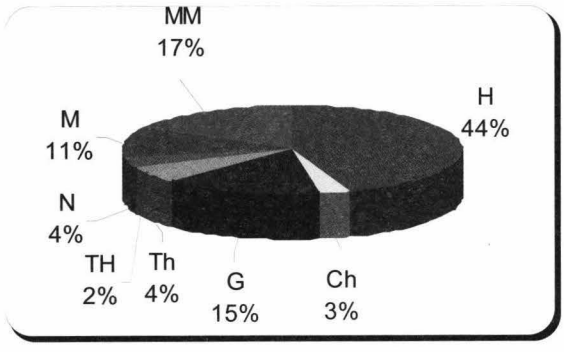

Figure 9. Spectre des bio formes de l'association *Carpino-Fagetum*

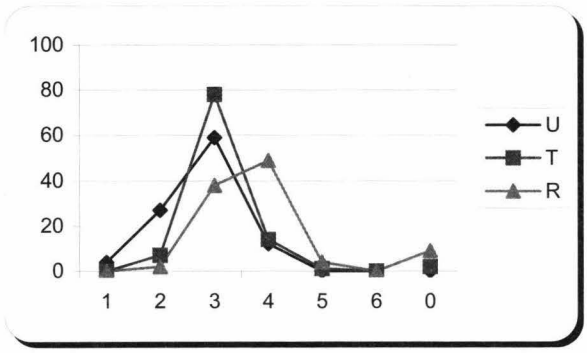

Figure 10. Indices des écologiques de l'association *Carpino-Fagetum*

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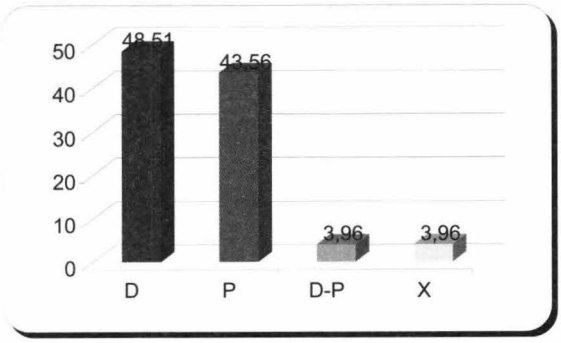

Figure 11. Spectre cariologique de l'association *Carpino-Fagetum*

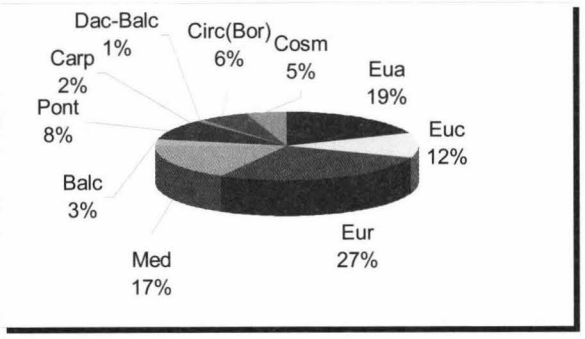

Figure 12. Eléments floristique de l'association *Carpino-Fagetum*

Tableau 3. *Carpino-Fagetum* Paucă 1941

			Relevé	**1**	**2**	**3**	**4**	**5**	**6**	
			Exposition	**NE**	**NV**	**N**	**NE**	**NV**	**NE**	
			Pante (^{0})	**20**	**30**	**45**	**40**	**30**	**20**	
			Recouvrement (%)	**100**	**100**	**100**	**100**	**100**	**80**	
F.b.	**E.f.**	**Cyt.**	**Surface (m^2)**	**400**	**400**	**400**	**400**	**400**	**400**	**K**
			Carpinion							
MM(M)	Eur	P	*Carpinus betulus*	4	4	3	1	4	2	V
MM	Eur	D	*Tilia cordata*	-	+	2	-	-	-	II
			Fagetalia							
MM(M)	Eur	D	*Fagus sylvatica* ssp. *sylvatica*	2	2	+	4	2	3	V
N	Med-Atl	D	*Daphne laureola*	-	-	2	-	-	-	I
N-E	Med-Atl	P	*Hedera helix*	2	2	3	2	1	+	V
H	Eua	D	*Asperula taurina* ssp. *taurina*	+	+	-	2	+	-	IV
Ch	Euc	D	*Lamium galeobdolon*	+	+	+	+	-	-	IV
N	Eur	P	*Rubus hirtus*	+	-	-	-	+	+	III
G-H	Eur(Med)	D	*Festuca drymeia*	+	2	-	-	-	-	II
G	Euc	P	*Arum alpinum*	+	+	-	-	-	-	II
G	Eur	D	*Allium ursinum* ssp. *ursinum*	-	1	2	-	-	-	II
H	Eua(Cont)	P	*Ranunculus cassubicus*	+	-	-	+	-	-	II
MM	Eua	P	*Ulmus minor*	+	-	-	-	-	+	II
G	Circ(Bor)	P	*Asplenium scolopendrium*	1	-	+	-	-	-	II
H	Cosm	D	*Polystichum setiferum*	-	-	+	1	-	-	II
Ch	Eur(Med)	D	*Euphorbia amygdaloides*	-	-	+	-	+	-	II
MM	Euc	D	*Tilia platyphyllos*	-	-	-	+	+	-	II
H	Euc	D-P	*Geranium phaeum*	2	-	-	-	-	-	I
H	Med-Eur	D	*Primula elatior* ssp. *elatior*	+	-	-	-	-	-	I
H	Euc	D	*Salvia nemorosa* ssp. *nemorosa*	+	-	-	-	-	-	I
MM	Eur	D	*Fraxinus excelsior*	+	-	-	-	-	-	I
G	Carp	D	*Hepatica nobilis*	-	-	+	-	-	-	I
H	Med-Atl-Euc	P	*Atropa belladona*	-	-	+	-	-	-	I
H	Eur	P	*Hordelymus europaeus*	-	-	+	-	-	-	I
H-G	Eur	P	*Mercurialis perennis*	-	-	+	-	-	-	I
H(G)	Eua	D	*Asarum europaeum*	+	-	-	-	-	-	I
MM	Pont-Pan	D	*Fraxinus angustifolia*	-	-	-	+	-	-	I
H	Med-Atl	D	*Primula vulgaris*	-	-	-	1	-	-	I
MM(M)	Eur	P	*Ulmus laevis*	+	-	-	-	-	-	I
H-G	Euc	P	*Symphytum tuberosum*	-	-	-	+	-	-	I
G	Carp-Balc-Cauc	P	*Scopolia carniolica*	-	-	-	-	3	-	I
H	Eur(Mont)	P	*Polystichum aculeatum*	-	-	-	-	+	-	I
MM	Euc	P	*Acer pseudoplatanus*	-	-	-	-	+	-	I
			Querco-Fagetea							
MM	Eur	D-P	*Acer platanoides*	-	+	+	1	+	-	IV

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MM-M	Eur	D	*Acer campestre* ssp. *campestre*	+	+	-	-	+	+	IV
H	Eur	D	*Pulmonaria officinalis*	+	-	-	+	+	+	IV
H	Eur	D	*Mycelis muralis*	+	-	-	+	+	+	IV
H-G	Eur	D	*Melica uniflora*	+	-	-	+	-	+	III
M	Pont-Med-Euc	D-P	*Cornus mas*	-	2	-	-	+	+	III
Th-TH	Cosm	P	*Geranium robertianum*	+	-	-	+	+	-	III
M	Eur(Med)	D	*Staphylea pinnata*	-	+	+	+	-	-	III
M	Eur	D	*Crataegus monogyna*	-	+	+	+	-	-	III
H(G)	Eua(Med)	P	*Sedum maximum*	+	-	+	-	-	+	III
G	Euc	P	*Dentaria bulbifera*	+	+	-	-	-	-	II
H	Cosm	P	*Asplenium trichomanes*	+	-	1	-	-	-	II
M	Med-Euc	D	*Viburnum lantana*	+	-	+	-	-	-	II
N-E	Euc(Med)	D	*Clematis vitalba*	+	-	+	-	-	-	II
M	Eur(Med)	-	*Euonymus latifolia*	-	+	+	-	-	-	II
G	Eua(Med)	D	*Polygonatum odoratum*	-	+	+	-	-	-	II
M	Eur	-	*Euonymus verrucosa*	-	+	+	-	-	-	II
H	Circ(Bor)	P	*Poa nemoralis*	+	-	-	-	+	-	II
H	Eua(Med)	D	*Brachypodium sylvaticum*	-	-	-	+	-	+	II
M	Eur	P	*Euonymus europaea*	+	-	-	-	-	-	I
H	Eur	D	*Pulmonaria obscura*	-	+	-	-	-	-	I
M	Euc	D	*Cornus sanguinea*	-	-	+	-	-	-	I
G	Circ(Bor)	P	*Polypodium vulgare*	-	-	+	-	-	-	I
H-Ch	Eua	D-P	*Glechoma hederacea*	-	-	+	-	-	-	I
MM	Med	D	*Quercus dalechampii*	-	-	-	1	-	-	I
G	Pont-Pan-Balc	D	*Polygonatum latifolium*	-	-	-	+	-	-	I
H	Med-Atl	P	*Viola odorata*	-	-	-	+	-	-	I
H	Cosm	P	*Dryopteris filix-mas*	-	-	-	-	-	2	I
M	Eur	D	*Corylus avellana*	-	-	-	-	-	+	I
H	Eua(Med)	D	*Campanula trachelium*	-	-	-	-	-	+	I
			Quercetea pubescenti-petraeae (incl. Orno-Cotinetalia)							
MM	Med	D	*Fraxinus ornus*	+	1	1	+	+	+	V
G-Ch	Pont-Med	P	*Ruscus aculeatus*	-	3	1	+	-	-	III
MM	Balc-Cauc	D	*Carpinus orientalis*	-	2	+	1	-	-	III
G	Med-Atl	P	*Tamus communis* (incl. f. *triloba*)	-	+	1	-	-	+	III
H	Med-Atl	P	*Asplenium ceterach*	+	+	1	-	-	-	III
Ch-G	Med	P	*Ruscus hypoglossum*	-	3	3	-	-	-	II
H	Balc	P	*Helleborus odorus*	+	-	-	-	-	-	I
H	Med	-	*Calystegia sylvatica*	+	-	-	-	-	-	I
G	Pont-Med	D	*Allium flavum* ssp. *flavum*	+	-	-	-	-	-	I
H	Pont-Med	D	*Lathyrus venetus*	-	+	-	-	-	-	I
H	Med	P	*Piptatherum virescens*	-	+	-	-	-	-	I
H-G	Euc-Med	D	*Lithospermum purpurocaeruleum*	-	+	-	-	-	-	I
H	Pont-Med	D	*Scutellaria altissima*	-	+	-	-	-	-	I
M	Dac-Balc	D	*Syringa vulgaris*	-	-	+	-	-	-	I
H	Balc	-	*Campanula grossekii*	-	-	+	-	-	-	I
H-N	Med	D	*Rubus canescens*	-	-	-	-	-	+	I
			Variae Syntaxa							
H	Eua(Med)	P	*Geum urbanum*	+	+	-	-	-	+	III
Th(TH)	Eua(Med)	P	*Alliaria petiolata*	+	-	+	-	-	+	III
H	Eua	D	*Eupatorium cannabinum*	+	-	-	+	-	-	II
MM-M	Eur	P	*Sambucus nigra*	+	-	-	+	-	-	II
H	Euc	D	*Dactylis glomerata* ssp. *aschersoniana*	+	-	-	-	-	+	II
H	Med	D	*Parietaria officinalis*	-	-	-	+	-	1	II

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Espèces présentées dans un seul relèvement: *Polystichum braunii* (1): H, Circ(Bor), P; *Urtica dioica* (1): H(G), Cosm, P; *Rubus caesius* (1): H-N, Eua(Med), P; *Galium aparine* (1): Th, Circ(Bor), P; *Festuca gigantea* (1): H, Eua P; *Verbascum nigrum* ssp. *nigrum* (1): TH-H, Eua, D; *Sorbus torminalis* (2): MM, Eur(Med), D; *Glechoma hirsuta* (2): H-Ch, Pont-Med, P; *Smyrnium perfoliatum* (2): TH, Med, D; *Berberis vulgaris* (3): M, Eur, P; *Chelidonium majus* (4): H, Eua, D; *Equisetum telmateja* (4): G, Circ(Bor), P; *Ulmus laevis* (4): MM(M), Eur, P; *Viola reichenbachiana* (4): H, Eua, P; *Circaea lutetiana* (5): G, Eua(Med), D; *Cardamine flexuosa* (6): Th(TH), Eua(Circ), P.

Lieu et date des relèvements: 1-Valea Ponicovei (9.06.2001); 2,3-Valea Mare (8.06.2001); 4-Valea Slătinicului Mic (10.07.1999); 5-Valea Vodiţei (10.07.1999); 6-Valea Mraconiei (3.07.2002).

CONCLUSIONS

Au cadre de l'ordre *Fagetalia sylvaticae* Pawlowski in Pawlowski et al. 1928, nos recherches ont eu comme résultat l'analyse de la sous association *Telekio speciosae-Alnetum incanae* Coldea (1986) 1990 alnetosum glutinosae Oroian 1998, de l'association *Stellario nemorum-Alnetum glutinosae* (Kästner 1938) Lohmeyer 1957, placées dans l'alliance *Alno-Ulmion* Br.-Bl. et R. Tx. ex Tchou 1948 em. T. Müller et Görs 1958, considérée comme habitat d'intérêt conservatif prioritaire (Code Natura 2000 de l'habitat: *91E0) et de l'association *Carpino-Fagetum* Paucă 1941, placée dans la sous alliance *Lathyro hallersteinii-Carpinenion* (Boşcaiu 1979) Boşcaiu et al. 1982 (Code Natura 2000 de l'habitat: 9170).

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LA FLORE ET LA VÉGÉTATION DU MONT COZIA (I)

ADRIAN NĂSTASE, MELANIA NĂSTASE

Abstract: The paper present the main speciesof vascular plants met in the Cozia Mountains.

Résumé. Cette oeuvre presente les principaux espèces de plantes vasculares rencontré dans le mont Cozia.

Mots cles: mont, Cozia, flora

Rezumat. Flora şi vegetaţia Muntelui Cozia (I). Lucrarea prezintă principalele specii de plante vasculare întâlnite în munţii Cozia.

Cuvinte cheie: munte, Cozia, flora

INTRODUCTION

Dans les Carpathes méridionales, sur la rive gauche de l'Olt, le mont Cozia est situé dans une position isolée. Il s'élève du niveau de l'Olt jusqu'à une altitude de 1668 m. Au point de vue géologique, il est constitué par les gneiss de Cozia qui appartiennent aux schistes cristallins des Carpathes méridionales. Les pentes à forte inclinaison, de 50° à 70°, sont caractéristiques pour le mont Cozia. Sur ces pentes abruptes, la formation du sol est déficiente. Il y a toutefois, grâce à la désagrégation de la montagne, de nombreuses crevasses dans lesquelles les plantes ligneuses ont pu prendre racine. Ces pentes rocheuses sont presqu'uniformément recouvertes par de rares plantes ligneuses. Les pentes inférieures du mont Cozia ont des étendues appréciables, formées de roches tertiaires, sur lesquelles des quantités d'humus suffisantes se sont déposées et qui sont actuellement recouvertes d'épaisses forêts. Le fait que l'on rencontre sur les pentes du mont Cozia des plantes sous-alpines, aplines et même à caractères méditérranéens, permet de conclure que le mont Cozia a un climat varié, composé de microclimats à caractères différents.

Sur le mont Cozia on relève deux types de végétation physiognomique: ligneux et herbacé. Une grande partie de la forêt consiste en plantes ligneuses, feuillues espèces de: *Quercus, Fagus* et d'autres genres, qui sont énumérées dans le liste des plantes. Parmi ces espèces, on en trouve de plus thermophiles, telles les *Fraxinus ornus, Tilia tomentosa* et *Juglans regia.* Plus haut, et surtout sur les pentes du nord, se trouve un *Piceetum* dense, parmi les espèces duquel on trouve l'*Alnus viridis.* On peut rappeler, en tant que spécialité ligneuse, un vaste *Rosetum,* à une altitude de 1300 m. On mentionne, en tant que plantes ligneuses naines, une association de *Bruckenthalieto-Vaccinietum* et *Juniperetum.*

Le type herbacé este représenté par de plantes rares et intéressantes. On trouve, dans les forêts, les *Galium bailonii* et *G. kitaibelianum, Asperula taurica, Primula veris* subsp. *columnae, Achillea chrithmifolia* etc. On trouve un merveilleux *herbosum* dans les endroits découverts, sous les roches, au-dessous de Stănişoara, à 1100-1400 m. L'association la plus caractéristique de cette formation est un *Iridetum* qui consiste en prairies entières recouvertes d'*Iris aphylla.*

A partir de 1400 m d'altitude, ces champs d'*Iris aphylla* alternent avec d'autres, d'*Iris ruthenica,* où d'autres espèces ne sont pas tolérées. Les prairies y sont émaillées, parmi d'autres espèces, de *Bromus riparius* subsp. *barcensis, Achillea distans, Daphne blagayana, Centaurea degeniana, Saxifraga stellaris, Hypericum humifusum* etc. Passée cette hauteur, des éléments alpins se mèlent à la végétation, tels *Cerastium alpinum* subsp. *lanatum, Luzula spicata, Lycopodium selago, Genista tinctoria* subsp. *oligosperma* etc.

Pendant que ces côtés méridionaux jouissent d'une flore riche et variée, les côtés situés vers l'ouest et vers le nord ne sont pas si bien pourvus. On peut détacher de la liste des plantes, les *Malva sylvestris, Linaria dalmatica* subsp. *transsilvanica, Dianthus henteri, Pedicularis comosa* et, particulièrement, la multitude extraordinaire de *Viola tricolor.*

Les *Cormobiontes* du mont Cozia sont extrêmement variées. Jusqu'a 800 m, on trouve dans la fôret les *Alyssoides utriculata* var. *graeca, Genista januensis* var. *spathulata, Arabis procurrens, Hieracium* sp., *Symphyandra wanneri, Jovibarba heuffelii.* Plus haut que 1200 m, autour du *Rosetum* célèbre, brillent les *Centaurea stoebe* var. *coziensis, Dianthus petraeus* subsp. *petraeus, Erysimum comatum, Potentilla rupestris, Silene lerchenfeldiana, Allium ochroleucum, Thymus jankae* et *T. balcanus,* à variétaux intéressantes telles que: *Leontopodium alpinum, Hieracium alpicola* subsp. *ullepitschii, Saxifraga pedemontana* subsp. *cymosa, Anthemis carpatica, Lilium carniolicum* subsp. *jankae.*

Du point de vue édaphique, le mont Cozia abrite non seulement les plantes calcifuges, mais encore des éléments calcicoles *(Leontopodium alpinum, Arabis procurrens);* ce qui prouve que les plantes calcicoles trouvent sur la roche de gneiss de Cozia le minimum nécessaire des conditions chimique et physiques propres aux sols calcaires.

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MATERIAUX ET METHODES

L'oeuvre présente une étude préliminaire de la flore des montagnes de Cozia.
Les espèces ont été determineés selon la literature roumaine et étrangere.
La description des espèces contient: la dénomination scientifique, l'auteur, des synonymies.

RESULTES ET DISCUTIONS

Les recherches réalisées dans les montagnes de Cozia ont relevé une flore riche et diversifiée dont nous presentons les principales espèces:

Phylum PTERIDOPHYTA, Cls. Lycopodiopsida: Fam Lycopodiaceae: *Lycopodium selago* L. (*Huperzia selago* (L.) BERNH. ex. SCHRANK et C.F.P. Mart);

Cls. Equisetopsida: Fam. Equisetaceae: *Equisetum arvense* L., *E. telemateia* EHRH., *E. hyemale* L.;

Cls. Polypodiopsida, Fam. Ophioglossaceae: *Botrychium lunaria* (L.) SWARTZ;

Fam. Polypodiaceae: *Polypodium vulgare* L.;

Fam. Dennstaedtiaceae: *Pteridium aquilinum* (L.) KUHN.;

Fam. Aspleniaceae: *Asplenium trichomanes* L., *Athyrium filix-femina* (L.) ROTH, *(Dryopteris thelypteris* (L.) A. GRAY) *Cystopteris, Polystichum, Dryopteris, Thelypteris palustris* SCHOTT.

Phylum SPERMATOPHYTA, Subphylum Pinophytina, Cls. Pinopsida (Coniferopsida), Fam. Pinaceae (Abietaceae): *Abies alba* MILLER, *Picea abies* (L.) KARSTEN, *Pinus sylvestris* L.;

Fam. Cupressaceae: *Juniperus communis* L. var. *intermedia* (SCHUR) SANIO;

Subphylum MAGNOLIOPHYTINA (ANGIOsPERMAE), Cls. Magnoliopsida (Dicotyledonatae), Subcls. Magnoliidae, Fam. Aristolochiaceae: *Asarum europaeum* L., *Aristolochia clematitis* L.;

Fam. Ranunculaceae: *Helleborus purpurascens* W. et K., *Aconitum anthora* L., *A.tauricum* WULF., subsp. *tauricum* şi subsp. *hunyadense* (DEG.), *Thalictrum aquilegifolium* L., *Anemone ranunculoides* L., *A.nemorosa* L., *Hepatica nobilis* MILL., *Clematis vitalba* L., *Ranunculus ficaria* L., *R. bulbosus* L., subsp. *aleae* (WILLK.) ROUY et FOUC., *R.polyanthemos* L.;

Fam. Papaveraceae: *Chelidonium majus* L., *Corydalis solida* (L.) CLAIRV.;

Fam. Ulmaceae: *Ulmus glabra* HUDS;

Fam. Cannabaceae (Cannabinaceae): *Humulus lupulus* L., *Cannabis sativa* L.;

Fam. Urticaceae: *Urtica urens* L., *U. dioica* L., *Parietaria officinalis* L.;

Fam. Fagaceae: *Fagus sylvatica* L., subsp. *moesiaca* (MALY) HJELMQUIST, *F. orientalis* LIPSKY, *Castanea sativa* MILL., *Quercus petraea* (MATT.) LIEBL., *Q. polycarpa* SCHUR., *Q. dalechampii* TEN.;

Fam. Betulaceae: *Betula pendula* ROTH, *Alnus viridis* (CHAIX) DC., *Corylus avellana*, *Carpinus betulus* L.;

Fam. Juglandaceae: *Juglans regia* L.;

Fam. Caryophyllaceae: *Scleranthus perennis* L., *S. annuus* L., *Arenaria serpyllifolia* L., *Moehringia trinervia* (L.) CLAIRV., *Stellaria nemorum* L., *S. media* (L.) VILL., subsp. *neglecta* (WEIHE) GREMLI, *S. holostea* L., *Cerastium pumillum* CURT., subsp. *glutinosum* (FRIES) BORZA, *C. holosteoides* FRIES, *C. alpinum* L., subsp. *lanatum* (LAM.) A.et G., *Saponaria officinalis* L., *Dianthus petraeus* W. et K., *D. henteri* HEUFF., *Silene armeria* L., *S. saxifraga* L., *S. lerchenfeldiana* BAUMG., *S. nutans,* subsp. *dubia* (HERB.) ZAPAL., *Lychnis coronaria* (L.) DESR., *L. viscaria* L., *Herniaria glabra* L., *Spergularia rubra* (L.) J. et C.PRESL.;

Fam. Chenopodiaceae: *Chenopodium bonus-henricus* L.;

Fam. Polygonaceae: *Polygonum aviculare* L., *Rumex acetosella* L., *R. arifolius* ALL., *R. alpinus* L., *R. obtusifolius* L., subsp. *obtusifolius;*

Fam.Crassulaceae: *Jovibarba heuffelii* (SCHOTT) A. et D. LOWE, *Sedum hispanicum* JUSL., *S. annuum* L.;

Fam. Rosaceae: *Spiraea ulmifolia* SCOP., *Crataegus monogyna* JACQ., *Sorbus aucuparia* L., *S. umbellata* (DESF.) FRITSCH., *Pyrus pyraster* BURGSD., *Malus sylvestris* (L.) MILL., *Rubus idaeus* L., *R. canescens* DC., *R. schleicheri* WEIHE, *R. serpens* WEIHE, subsp. *rivularis* (WIRTGEN et P.J. MUELLER), *R. hirtus* W. et K., subsp. *hirtus, R. vestii* FOCKE, *Fragaria vesca* L., *Potentilla rupestris* L., *P. supina* L., *P. micrantha* RAMOND, *P. erecta* (L.) RAUSCH, *P. argentea* L., *P. ternata* C. KOCH, *P. chrysantha* TREV., subsp. *thuringiaca* (BERNH.) A. GR., *Geum urbanum* L., *Aremonia agrimonoides* (L.) DC., *Agrimonia eupatoria* L., *Rosa dumalis* BECHST., *R. canina* L., *R. tomentosa* SM., *R. villosa* L., subsp. *coziae* (NYAR.) CIOCÂRLAN, *Prunus spinosa* L., *Cerasus avium* (L.) MOENCH;

Fam. Saxifragaceae: *Saxifraga rotundifolia* L., *S. aizoides* L., *S. pedemontana* ALL., subsp. *cymosa* (W. et K.) ENGL., *S. cuneifolia* L., *S. stellaris* L.;

Fam. Fabaceae (Leguminosae, Papilionaceae): *Genista januensis* VIV., *G. ovata* W. et K., *G. tinctoria* L., subsp. *oligosperma* (ANDRAE) PROD., *Cytisus nigricans* L., *C. hirsutus* L., subsp. *leucotrichus* (SCHUR) A. et G., *C. ciliatus* WAHLENB., subsp. *alpestris* (SCHUR), *Ononis arvensis* L., *Medicago lupulina* L., *Melilotus albus* MEDIK., *M. officinalis* (L.) PALLAS, *Trifolium campestre* SCHREB., *T. aureum* POLLICH., *T. fragiferum* L., *T. repens* L., *T. montanum* L., *T. pratense* L., *Lotus corniculatus* L., *Robinia pseudoacacia* L., *Astragalus glycyphyllos* L., *A. onobrychis* L., *Coronilla varia* L., *Vicia sylvatica* L., *V. dumetorum* L., *V. cracca* L., *Lathyrus sylvestris* L., *L. pratensis* L., *L. venetus* (MILL.) WOHLF;

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Fam. Lythraceae: *Lythrum salicaria* L.;

Fam. Onagraceae: *Epilobium collinum* GMEL, *E. roseum* SCHREB., *Chamaerion angustifolium* (L.) HOLUB;

Fam. Aceraceae: *Acer campestre* L., *A. pseudoplatanus* L.;

Fam. Linaceae: *Linum austriacum* L.;

Fam. Oxalidaceae: *Oxalis acetosella* L.;

Fam. Geraniaceae: *Geranium robertianum* L., *G. columbinum* L., *G. rotundifolium* L., *G. pusillum* BURM. fil., *Erodium cicutarium* (L.) L'HER;

Fam. Balsaminaceae: *Impatiens noli-tangere* L.;

Fam. Polygalaceae: *Polygala comosa* SCHKUHR.;

Fam. Celastraceae: *Evonymus latifolia* L.;

Fam. Rhamnaceae: *Rhamnus cathartica* L., *Frangula alnus* MILL.;

Fam. Euphorbiaceae: *Chamaesyce maculata* L., *E. amygdaloides* L., *E. cyparissias* L.;

Fam. Loranthaceae: *Loranthus europaeus* JACQ.;

Fam. Cornaceae: *Cornus mas* L., *C. sanguinea* L.;

Fam. Araliaceae: *Hedera helix* L.;

Fam. Apiaceae (Umbelliferae): *Eryngium planum* L., *Chaerophyllum aromaticum* L., *C. temulum* L., *Anthriscus sylvestris* (L.) HOFFM., *Daucus carota* L., *Seseli libanotis* (L.) KOCH, *S. rigidum* W. et K., *Angelica sylvestris* L.;

Fam. Hypericaceae (Guttiferae): *Hypericum hirsutum* L., *H. humifusum* L., *H. umbellatum* A.KERN, subsp. *transsilvanicum* (CEL.);

Fam. Violaceae: *Viola tricolor* L., subsp. *tricolor* şi subsp. *subalpina* GAUD, *V. declinata* W. et K., *V. reichenbachiana* JORD., *V. alba* BESS., *V. collina* BESS.;

Fam. Brassicaceae (Cruciferae): *Sisymbrium altissimum* L., *Alliaria petiolata* (BIEB.) CAVARA et GRANDE, *Erysimum diffusum* EHRH., *E. comatum* PANC, *E. odoratum* EHRH., *Rorippa sylvestris* (L.) BESS., *R. pyrenaica* (L.) RCHB., *Cardaminopsis arenosa* (L.) HAY., *Turritis glabra* L., *Arabis allionii* DC., *A. procurrens* W. et K., *Alyssoides graeca* (REUT.) JAV. var. *graeca* (REUTER) HAYEK, *Alyssum saxatile* L., *A. murale* W. et K., *Draba nemorosa* L., *Erophila verna* (L.) Chevall., *Capsella bursa-pastoris* (L.) MEDIK., *Thlaspi perfoliatum* L., *Cardaria draba* (L.) Desv., *Lepidium virginicum* L.

Fam. Resedaceae: *Reseda lutea* L.;

Fam. Salicaceae: *Salix triandra* L., *S. purpurea* L., *S. silesiaca* Willd., *S. caprea* L., *S. cinerea* L., *Populus tremula* L.;

Fam. Tiliaceae: *Tilia tomentosa* MOENCH, *T. cordata* MILL.;

Fam. Malvaceae: *Malva neglecta* WALLR., *M. sylvestris* L.;

Fam. Thymelaeaceae: *Daphne blagayana* FREYER;

Fam. Pyrolaceae: *Moneses uniflora* (L.) A.GRAY;

Fam. Ericaceae: *Bruckenthalia spiculifolia* (SALISB.) RCHB., *Vaccinium myrtillus* L., *V. uliginosum* L.;

Fam. Monotropaceae: *Monotropa hypopitys* L.;

Fam. Primulaceae: *Primula veris* L., subsp. *columnae* (TEN.) LUDI, *Cortusa matthioli* L., *Lysimachia nummularia* L., *Anagallis arvensis* L.;

Fam. Gentianaceae: *Centaurium erythraea* RAFIN., *Gentiana asclepiadea, G. acaulis* L.;

Fam. Apocynaceae: *Vinca minor* L.;

Fam. Asclepiadaceae: *Vincetoxicum hirundinaria* MEDIC.;

Fam. Rubiaceae: *Asperula taurina* L., *Galium aparine* L., *G. baillonii* BRANDZA, *G. schultesii* VEST, *G. kitaibelianum* SCHULT. et SCHULT., *G. verum* L., *G. album* MILL., *Cruciata pedemontana* (BELL.) EHREND., *C. glabra* (L.) EHREND.;

Fam. Caprifoliaceae: *Sambucus ebulus* L., *S. nigra* L., *Viburnum opulus* L.;

Fam. Adoxaceae: *Adoxa moschatellina* L.;

Fam. Valerianaceae: *Valeriana tripteris* L., *V. sambucifolia* MIKAN fil., *V. officinalis* L.;

Fam. Dipsacaceae: *Dipsacus fullonum* L., *Knautia arvensis* (L.) COULT., *Scabiosa columbaria* L., subsp. *columbaria;*

Fam. Oleaceae: *Fraxinus ornus* L., *F. excelsior* L.;

Fam. Convolvulaceae: *Calystegia sepium* (L.) R.BR., *Convolvulus arvensis* L.;

Fam. Boraginaceae: *Myosotis sylvatica* (EHRH.) HOFFM., *M. alpestris* F.W. SCHMIDT., *Pulmonaria officinalis* L., *Symphytum officinale* L., *S. tuberosum* L., *Cynoglossum germanicum* JACQ., *C. officinale* L.;

Fam. Lamiaceae (Labiatae): *Ajuga reptans* L., *A. genevensis* L., *Teucrium chamaedrys* L., *Scutellatia altissima* L., *Nepeta pannonica* L., *Glechoma hederaceae* L., *Prunella vulgaris* L., *Lamium galeobdolon* (L.) NATH., *L. album* L., *Leonurus cardiaca* L., *Stachys alpina* L., *S. sylvatica* L., *S. recta* L., *Salvia glutinosa* L., *Origanum vulgare* L., *Thymus comosus* HEUFF., *T. jankae* CEL., *T. balcanus* BORB., *Mentha pulegium* L., *M. aquatica* L., *M. arvensis* L.;

Fam. Scrophulariaceae: *Verbascum phlomoides* L., *V. glabratum* FRIV., *V. lychnitis* L., *Linaria genistifolia* (L.) MILL., subsp. *dalmatica* (L.) MAIRE et PETITMENGIN, *Scrophularia heterophylla* WILLD., *S. nodosa* L., *Veronica polita* Fr., *V. dillenii* Cr., *V. arvensis* L., *V. urticifolia* JACQ., *V. serpyllifolia* L., *V. bachofenii* HEUFF., *V. officinalis* L., *V. chamaedrys* L., *Digitalis grandiflora* MILL., *Pedicularis comosa* L., *Rhinanthus rumelicum* VELEN., *Melampyrum bihariense* A.KERN.;

Fam. Plantaginaceae: *Plantago media* L.;

Fam. Campanulaceae: *Campanula persicifolia* L., *C. rapunculus* L., *C. patula* L., *C. abietina* GRIS. et Sc., *C. grossekii* HEUFF., *C. glomerata* L., *C. rotundifolia* L., *Symphyandra wanneri* (ROCH.) HEUFF., *Phyteuma confusum* A. KERN.;

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Fam. Asteraceae (Compositae): *Eupatorium cannabinum* L., *Solidago virgaurea* L., *Bellis perennis* L., *Conyza canadensis* (L.) CRONQ. *(Erigeron canadensis* L.), *Erigeron annuus* (L.) PERS., *E. acer* L., *Antennaria dioica* (L.) GAERTN., *Gnaphalium sylvaticum* L., *Inula helenium* L., *Galinsoga parviflora* CAV., *Anthemis tinctoria* L., *A. ruthenica* BIEB., *A. carpatica* WILLD., *A. cretica* L., subsp. *cretica (A. montana* L.) şi subsp. *kitaibelii* (SPRENGEL) CIOCÂRLAN, *Achillea crithmifolia* W. et K., *A. distans* W. et K., *A. pannonica* SCHEELE, *Artemisia campestris* L., *Tussilago farfara* L., *Petasites hybridus* (L.) GAERTN., MEy et SCHREB, *Doronicum columnae* TEN., *Senecio viscosus* L., *S. jacobaea* L., *Echinops sphaerocephalus* L., *Carlina vulgaris* L., *C. acaulis* L., *Arctium lappa* L., *Carduus acanthoides* L., *C. collinus* W. et K., *C. candicans* (BORB.) HAY., *Cirsium arvense* (L.) SCOP., *Centaurea macroptilon* Borb., *C. triniifolia* HEUFF., *C. rhenana* BOR, *C. micranthos* S.G. GMEL., *Cnicus benedictus* L., *Cichorium intybus* L., *Leontodon crispus* VILL., *Scorzonera purpurea* L., *Taraxacum officinale* WEBER, *Sonchus asper* (L.) HILL., *Crepis setosa* HALLER, *Hieracium hoppeanum* SCHULT., *H. pilosella* L., *H. alpicola* SCHLEICH., subsp. *ullepitschii, H. piloselloides* VILL., *H. bauhinii* SCHULT., *H. caespitosum* DUMORT., *H. cymosum* L., *H. rotundatum* KIT. ex SCHULTES, *H. bifidum* KIT. ex HORNEM, *H. schmidtii* TAUSCH, *H. umbellatum* L., *H. racemosum* W. et K.;

Cls. Liliopsida (Monocotyledonatae), Subcls. Alismatidae, Fam. Liliaceae: *Colchicum autumnale* L., *Veratrum album* L., *Allium ochroleucum* W. et K., *A. paniculatum* L., *Lilium martagon* L., *Erythronium dens-canis* L., *Ornithogalum orthophyllum* TEN. subsp. *kochii* (PARL.) ZAHAR.;

Fam. Iridaceae: *Iris ruthenica* KER.-GAW., *I. aphylla* L., *Crocus vernus* (L.) HILL.;

Fam. Orchidaceae: *Gymnadenia conopsea* (L.) R.Br.;

Fam. Juncaceae: *Luzula luzuloides* (LAM.) DANDY et WILMOTT, *L. spicata* (L.) DC., *L. multiflora* (RETZ.) Lej.;

Fam. Cyperaceae: *Carex ovalis* GOOD., *C. divulsa* STOKES, *C. digitata* L., *C. ornithopoda* WILLD., *C. montana* L., *C. brachystachys* Schrank.;

Fam. Poaceae (Gramineae): *Festuca drymeja* MERT. et KOCH, *F. heterophylla* LAM., *F. rubra* L., *F. pseudovina* HACK., *F. rupicola* HEUFF., *F. airoides* LAM., *Vulpia myuros* (L.) C.C. GMELIN, *Poa alpina* L., *P. rehmannii* (A. et G.) WOL, *P. nemoralis* L., *P. pratensis* L., *Bellardiochloa violacea* (BELL.) CHIOV., *Cynosurus cristatus* L., *Apera spica-venti* (L.) BEAUV., *Bromus tectorum* L., *B. riparius* REHM., subsp. *barcensis* (SIMK.) SOO, *B. arvensis* L., *Avenula compressa* (HEUFF.) W. SAUER et CHMELITSCHEK, *Koeleria macrantha* (LEDEB.) SCHULT., *Deschampsia flexuosa* (L.) TRIN., *Anthoxanthum odoratum* L., *Agrostis capillaris* L., *Phleum alpinum* L., *P. montanum* C. KOCH.;

CONCLUSIONS

Le mont Cozia est une centreé adéquate pour la conservation des éléments méditeraneéns, des plantes calcicoles, ainsi que des éléments alpins et sous-alpins. Cozia dispose également des conditions nécessaires pour creér des formes nouvelles, endémiques.

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COMPARATIVE STUDY OF PLANT FLORA AND VEGETATION IN PROTECTED WETLANDS: LACUL ROSU AND LACUL CUIEJDEL (COUNTY NEAMT)

NICOLETA NECHITA LĂCĂTUŞ

Abstract. The lakes Lacul Rosu and Cuiejdel are the largest aquatic ecosystems of natural dam in our country. This paper presents a comparative study of the two areas from the point of view of physical and geographical features and also from the point of view of the flora and the vegetation. The study is important because, due to their peculiar nature and their value, the lake Cuiejdel is declared natural reservation, and Lacul Rosu is part of the National Park Hasmas- Cheile Bicazului.

Key words: wetland, natural dam lake, Lacul Rosu, Lacul Cuiejdel.

Rezumat. Studiu comparativ asupra florei şi vegetaţiei unor areale umede protejate: Lacul Roşu şi Lacul Cuiejdel (jud. Neamţ). Lacul Roşu şi Lacul Cuiejdel sunt cele mai mari ecosisteme acvatice de baraj natural din ţara noastră. În lucrare se face un studiu comparativ al celor două areale, din punct de vedere al caracteristicilor fizico - geografice, al florei şi vegetaţiei. Studiul este important deoarece, datorită particularităţilor şi valorii lor, Lacul Cuiejdel este declarat rezervaţie naturală, iar Lacul Roşu face parte integrantă din Parcul Naţional Hăşmaş - Cheile Bicazului.

Cuvinte cheie: areal umed protejat, lac natural de baraj, Lacul Roşu, Lacul Cuiejdel.

INTRODUCTION

The basin of Bistrita in Moldova has numerous artificial reservoirs, made for hydro-energetic purposes. Besides there are two more lakes, Lacul Rosu and Lacul Cuiejdel, by their dimensions, are the largest lakes of this kind in our country.

Their genesis is similar. Lacul Rosu was formed in 1837, after the river Bicaz was blocked as a consequence of a powerful slide of the inferior shore of the complex of debris from Mount Ghilcoş, because of the infiltration waters, the 1837 earthquake and heavy rains.

Similarly, Lacul Roşu, the lake on the Cuiejdel brook was formed as a result of the large-area landslide, a long process, climaxing with the event of 1991. The causes of lake forming were natural (heavy rains, the 1990 earthquake), but also of human nature (sectioning the sliding diluvium of the left slope for a forestry road). (RĂDOANE N., 2002)

Geological and morphological considerations

The shape and morphometric characteristics of the two lakes are typical for natural dam lakes, and have many resemblances.

Analyzing morphobatimetric data of the two lakes we can observe: for two of the parameters Lacul Rosu records higher dimensions (surface: 12.63 ha, total length: 1.34 km) as compared to Lacul Cuiejdel (surface: 12.20 ha, length: 1.20 km).

As to the other parameters, the values are higher for Lacul Cuiejdel (average width: 102 m, maximum width: 185 m, average depth: 7.44 m, and maximum depth: 16.40) as compared to Lacul Roşu (average width: 100 m, and maximum width: 140 m, average depth: 5.46 m and maximum depth: 10.50). The water volume contained is about 907,000 m^3 for Lacul Cuiejdel and about 680,084 m^3 for Lacul Roşu respectively.

Lacul Roşu has a central place in the Carpaţii Orientali girdle, being located in the Moldavian Division of crystal-Mesozoic area. It lies in the northern-west part of Hăşmaş Mountain, above Cheile Bicazului.

The climate is temperate-continental, the lake is framed in the climatic land of afforest middle mountains. Average annual temperature is about 6^0C, rainfalls around 750 mm.

The out-zone soil is alluvial and peat, and the in-zone soil is podzolic.

Geographically wise, Lacul Cuiejdel lies in the Cuejdiu brook basin, a tributary of the Bistriţa river, and is part of the larger unit of the Stânişoarei Mountains. From a geological viewpoint, the region is a part of the last unit of flysch (unit Vrancea) placed on the border with inner Carpathians.

Climatically wise, the area belongs to the low mountain areas, near the border with the Cracău corridor.

The average annual temperature is 7.5- 8^0 C, the average quantity of rainfalls is about 650 mm. The soil reflects the pedogenetic conditions of the contact area above, the types of soil are acid, podzolic and carbon soil.

Analysis of the Flora

Most of the flora studies in the Lacul Roşu area have been made by R. Soó, M. GUŞULEAC, E.I. NYÁRÁDY, C. DOBRESCU, V. GHENCIU (DOBRESCU C. & GHENCIU V., 1974), and later by on the author (NECHITA NICOLETA, 2006),

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in the water of the lake and in the surroundings (silted up areas, banks), were found 480 species and subspecies of cormophyte.

Being rather new, there are few flora studies, of which we only mentioned those of Gh. Mihai, Elena Podoleanu in the Sălătruc basin – a tributary of Cuiejdiu (MIHAI GH. & PODOLEANU ELENA, 1979), and by Nicoleta Nechita and Bliderişanu for the lake area (NECHITA NICOLETA & BLIDERIŞANU PETRUŢA, 2004). Thus, for the lake Cuiejdel and its neighbouring area 195 species and subspecies of cormophyte have been inventoried so far.

To continue, we present the list of the species inventoried of the Cuiejdel lake:

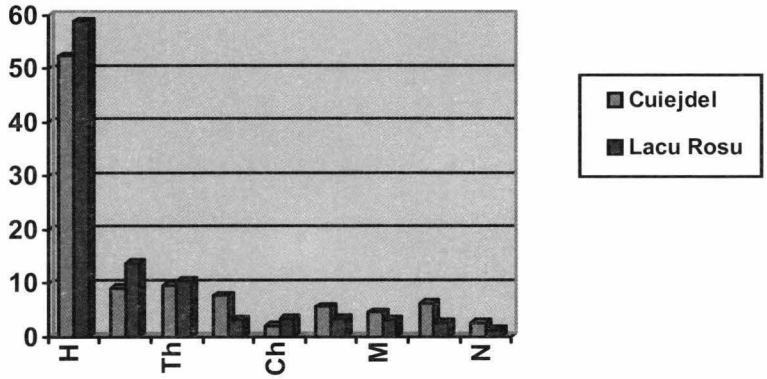
Fam. Betulaceae: *Alnus glutinosa*
Fam. Ranunculaceae: *Hepatica nobilis, Ranunculus cassubicus, Ranunculus ficaria, Ranunculus repens*
Fam. Cruciferae: *Capsella bursa- pastoris*
Fam. Crassulaceae: *Sedum telephium*
Fam. Rosaceae: *Agrimonia eupatoria, Crataegus monogyna, Geum urbanum, Potentilla erecta*
Fam. Leguminosae: *Trifolium aureum, Trifolium campestre*
Fam. Geraniaceae: *Geranium phaeum*
Fam. Thymelaeaceae: *Daphne mezereum*
Fam Onagraceae: *Epilobium hirsutum, Epilobium montanum*
Fam. Cornaceae: *Cornus mas*
Fam. Umbelliferae: *Bupleurum falcatum, Heracleum sphondylium* ssp. *eusphondylium, Torilis japonica*
Fam. Rubiaceae: *Galium mollugo*
Fam. Boraginaceae: *Myosotis scorpioides*
Fam. Labiatae (Lamiaceae): *Galeopsis speciosa, Galeopsis tetrahit, Lycopus exaltatus, Salvia glutinosa, Stachys officinalis*
Fam. Scrophulariaceae: *Verbascum lychnitis, Verbascum nigrum, Veronica chamaedrys, Veronica urticifolia*
Fam. Campanulaceae: *Campanula serrata, Campanula rapunculoides*
Fam. Compositae: *Achillea setacea, Bellis perennis, Centaurea phrygia* ssp. *phrygia, Centaurea micranthos, Crepis biennis, Leontodon autumnalis* f. *pinnatifida, Leontodon hispidus, Senecio nemorensis, Solidago virgaurea, Sonchus arvensis, Xanthium spinosum*
Fam. Juncaceae: *Juncus articulatus*
Fam. Gramineae: *Bromus arvensis, Catabrosa aquatica, Poa annua, Poa pratensis*
Fam. Sparganiaceae: *Sparganium emersum*

comparative analysis of the two lake floras leads to a series of conclusions.

Lacul Cuiejdel is a young ecosystem, has a low variety of flora comparatively to Lacul Roşu that is a 150 year old. A certain instability of the area can be also noticed especially at the tail of the lake, where the heavy rainfalls in different periods of time caused silted up surfaces, covering parts of the surface with water floods, and the loss of some phytocoenoses from the area.

It is recommend to conduct further flora and phytocoenoses studies for the Lacul Cuiejdel area, because flora and vegetation continues to develop, a common characteristic for a young ecosystem.

Analysis of biological forms:



The range of bioforms of the Lacul Cuiejdel lake looks like this: H=52.3%, G= 9.2%, Th= 9.7%, TH= 7.7%, Ch= 2.1%, HH= 5.6%, M= 4.6%, MM= 6.2%, N= 2.6%. Half of the species belong to hemicriptophytes because here there are grasslands, herbaceous species in the neighbouring forest and at the end of it. Terophytes are numerous because the lake lies in a depression area, protected and under human and animals influence. Megaphanerophytes, microphanerophytes, nanophanerophytes are also numerous because of the location of the lake close to the forest.

Flora of Lacul Roşu has the following range of bioforms: H= 58.8%, due to the large surfaces of grassland and herbaceous plants from forests, G= 13.7%, Th= 10.4%, TH= 3.1% as here the human impact is powerful, Ch= 3.4%, HH= 3.4%, and bioforms: M= 3.2%, MM= 2.6%, N= 1.4% are found because of the nearby forest.

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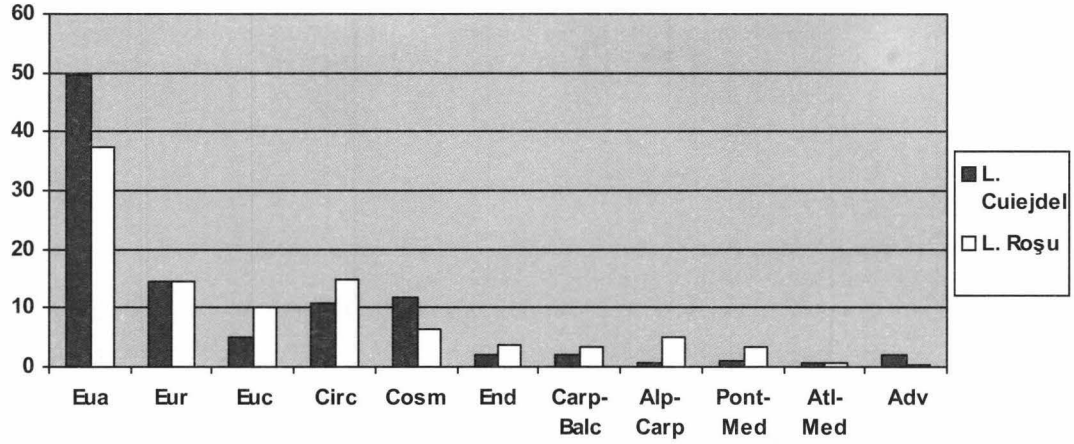

The phyto-geographic spectrum shows a high percentage of Eurasian elements (49.7%- Lacul Cuiejdel and 37.5% Lacul Roşu), European (14.4%, also 14.5%), Central European (5.1% and 10%), circumpolar (10.8% and 15%), cosmopolite (11.8% and 6.4%), Carpathian - Balkan (2% and 3.4%), alpine-Carpathian (0.6% and 4.9%), ponto-Mediterranean (1% and 3.5%), Atlantic-Mediterranean (0.6% and 0.8%), adventives (2.0% and 0.4%), and Carpathian endemic (2% and 3.6%).

The Lacul Cuiejdel and its neighbouring area have rare elements: *Hepatica transsilvanica, Ranunculus carpaticus, Symphytum cordatum, Epipactis helleborine.*

Near Lacul Roşu were found endemic species: *Hepatica transsilvanica, Silene dubia, Campanula carpatica, Leucanthemum waldsteinii, Gentiana phlogifolia, Thymus bihorensis, Poa rehmanii,* also glacial relics: *Carex appropinquata and Carex elongata.*

Ecological range looks like this:

		0	1- 1.5	2- 2.5	3- 3.5	4- 4.5	5- 5.5	6
U	Lacul Cuiejdel	2.8	2.0	16.8	45.5	18.8	10.3	4.6
	Lacul Roşu	4.5	3.9	22.9	40.0	18.2	7.5	3.0
T	Lacul Cuiejdel	17.9	1.0	16.5	58.5	6.1	-	-
	Lacul Roşu	20.0	2.8	26.8	45.6	4.6	0.2	-
R	Lacul Cuiejdel	37.9	-	4.6	24.6	30.3	2.6	-
	Lacul Roşu	31.6	0.6	8.8	21.2	34.6	3.2	-

Comparing data related to the humidity variation on species (U), both areas are noticed to have mesophilous species, followed by meso-hydrophilous species, also present in the nearby forests and grasslands; a high percentage belongs to xeromesophilous species, found in sunny and dry places. The nature of the two ecosystems induced a high percentage of hydrophilous species and less ultra-hydrophilous species.

With regard to temperature (T), a large number of mesotherm species and a small number of microtherm species were found in both areas, due to the cold climate here. Moreover, a large number of species, which tolerate both high and low temperatures, can be noticed.

With regard to soil (R), there is a high percentage of low acid-neutral and acid neutral species in the two areas, and a high percentage of *euryionics* species.

To conclude, from the point of view of bioforms, phytogeographic elements, ecological facts, and adaptation of species, Lacul Cuiejdel and Lacul Roşu have many resemblances, despite their different flora oldness and stage of development.

Phytocoenological study

Lacul Roşu has well developed phytocenoses, because of its age, whereas the vegetation of Lacul Cuiejdel, being newly formed, is evolving. Some of the plant associations from Lacul Roşu can be also found in Lacul Cuiejdel, but because the area is not geologically stable and due to the rainfalls, there are often high floods, large parts of the lake plugged and some phytocoenosis were covered with mud. Therefore is difficult to study floristic structures here.

The vegetation of Lacul Cuiejdel contains the following floristic structures: *Potamogetonetum pectinati, Eleocharidetum palustris, Typhetum angustifoliae, Typhetum latifoliae, Schoenoplectetum lacustris, Sparganietum erecti,*

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Agrostetum stoloniferae, Trifolio repenti- Lolietum, Scirpetum sylvatici, Epilobio-Juncetum effusi, Deschampsietum caespitosae, Tussilaginetum farfarae, Eupatorietum cannabini, Juncetum inflexi.

Lacul Roşu has floristic structures as: *Telekio speciosae- Alnetum incanae, Lemnetum minoris, Batrachio trichophyllo- Callitrichetum polymorphae, Potametum natantis, Typhetum angustifoliae, Typhetum shuttleworthii, Glycerietum plicatae, Carici flavae- Cratoneuretum filicini, Scirpetum sylvatici, Angelico- Cirsietum oleracei, Festucetum pratensis, Deschampsietum caespitosae, Telekio - Petasitetum hybridi, Caricetum vesicariae, Equisetetum fluviatilis, Caricetum rostratae, Caricetum appropinquatae.*

CONCLUSIONS

Lacul Cuiejdel is an interesting ecosystem because of its biodiversity, geological and geomorphologic particularities, as well as a landscape, that is why it was declared a Natural Reserve. Lacu Roşu, valuable due to the same elements, is also *a witness* of the evolution of Lacul Cuiejdel and it is a significant part of the Hăşmaş-Cheile Bicazului National Park.

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FAM. SCROPHULARIACEAE FROM THE CERNA OF OLTET BASIN (ROMANIA)

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Abstract. In this paper we present all the species from Scrophulariaceae, identified in the Basin of Cerna of Oltet in the region of Oltenia – Romania. The representatives of this family had been found in all the types of vegetation: forest- *Digitalis ferruginea, D. grandiflora, Verbascum nigrum, Veronica officinalis* etc., meadows: *Euphrasia* spp., *Rhinanthus rumelicus, Veronica acinifolia*; places with elevated humidity - *Gratiola officinalis, Scrophularia umbrosa, Veronica anagallis-aquatica, V. catenata, V. beccabunga* or in cultivated places or ruderalized: *Veronica persica, V. polita, V. hederifolia* etc.

Key words: The Basin Cerna of Oltet, Romania, Scrophulariaceae.

Rezumat. Familia Scrophulariaceae din Bazinul Cernei de Olteţ. În lucrare se prezintă speciile din familia Scrophulariaceae, identificate în Bazinul Cerna de Olteţ, regiunea Oltenia – România. Reprezentanţii acestei familii au fost identificaţi în toate tipurile de vegetaţie: pădure: *Digitalis ferruginea, D. grandiflora, Verbascum nigrum, Veronica officinalis* etc.; pajişti: *Euphrasia* spp., *Rhinanthus rumelicus, Veronica acinifolia*; locuri cu umiditate ridicată: *Gratiola officinalis, Scrophularia umbrosa, Veronica anagallis-aquatica, V. catenata, V. beccabunga*, precum şi în locuri cultivate şi ruderale: *Veronica persica, V. polita, V. hederifolia* etc.

Cuvinte cheie: Bazinul Cernei de Olteţ, Romania, Scrophulariaceae

INTRODUCTION

The Cerna of Oltet Basin is situated in the south-eastern part of Romania on a surface of approximatively 750 km^2. Ir runs towards the NE and has a length of 99 km on the axis of the main valley (UJVÁRI I., 1972).

If we refer to the historic-floristic region of Oltenia the territory studied here lies on the north-eastern part of it.

From the physical-geographical point of view it lies in the superior part of the Gaetic Plateau, the Sub-Carpathian Depression of Oltenia and the mountainous region (inferior, middle and superior) (IELENICZ M. 1999, POSEA G., 2002).

The alterations of the environmental components and of the structure utilization on the NS direction, from the tall Carpathians peaks till the hills, lead to certain changings within the actual relief.

At the latitudine of the Cerna and Cernisoara river mouths we notice an EW inclination, generated by positive movements from the anticline Măgura Slătioarei. The higher plateau in the western half is given by the intense moving of the quaternary deposits in this part (POPESCU N., 1977).

MATERIAL AND METHOD

The first stage while studying the Cerna of Oltet Basin was the reading of the bibliographical material.

That is why many publications mentioned in the bibliography represented a reference material through the similarity of the geographical zone and the studied one.

Starting from this information we repeatedly studied the area conform to the method of itinerary as the surface was very large, but when necessary we used the method of stationary and detailed our analyses collecting and preserving the floristic material.

We collected the material monthly, in numerous samples in different vegetation stages.

After the collecting, the material was dried in blotting paper and then stuck on A_3 sheets of paper, each of them having a label on the right low corner mentioning: the scientifically name, the locality from which it was collected, the date the persons who collected it and its identification.

The identification of the taxons was performed on preserved dry material or on live material, using the latest taxonomic informative sources (BELDIE Al., 1977, 1979, SĂVULESCU T., 1952-1976, TUTIN T.G., et al. 1964-1980, BRUMMITT R.K. & Powell C.E. 1992, CIOCÂRLAN V., 2000). For the localities we use the cartographic index UTM (LEHRER A. & LEHRER ALEXANDRINA 1990).

RESULTS AND DISCUSSIONS

The floristic list is presented in alphabetical order:

Digitalis ferruginea L. – HT.-H., 2n = 56, 70. Giuleşti - GQ35. Balc. *Quercion frainetto.*

D. grandiflora MILL. (*D. ambigua* Murray) - H., 2n = 56. Cerna - "Plaiul Cernei" Hill - GR20, Cerna Dl. "Roşcăi" - GR20, Buciumu Peak- GR22, Zăvidanu Peak- GR22, Corşoru Peak - GR22. Centr. Eur. *Symphyto-Fagion.*

Euphrasia rostkoviana HAYNE (*E. officinalis* L. subsp. *pratensis* SCHÜBL. & MARTENS) - T., 2n = 22. Cerna - "Dumbrăviţa Hill", "La Rudarii de la Cerna Hill" - GR20, Miloştea - GR20, Cerna "Roşcăi Hill" - GR20, Stânişoara Peak - GR22. Eur. Car. *Molinio-Arrhenatheretea.*

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E. salisburgensis FUNCK - T., 2n = 44. Buciumu Peak - GR22, Zăvidanu Peak - GR22, Corşoru Peak - GR22, La Nedei Peak - GR22.. Alp. Eur. *Seslerietalia.*

E. stricta D. WOLFF EX J. F. LEHM. (incl. subsp. *pectinata* (TEN.) P. FOURN., *E. tatarica* auct. p.p.) - T., Frecv. in basin. Eur. *Arrhenatheretalia, Festuco-Brometea.*

Gratiola officinalis L. - H., 2n = 32. Oteteliş - GQ34, Rugetu - GR20, Cerna - "Dumbrăvița Hill", "La Rudarii de la Cerna Hill" - GR20, Miloştea - GR20, Cerna - "Plaiul Cernei Hill" - GR20. Circ. *Phragmitetea australis*, car. *Molinietalia caeruleae.*

Kickxia elatine (L.) DUMORT. (*Linaria elatine* (L.) MILL.) subsp. *sieberi* (Arcang.) Hayek (subsp. *crinita* (Mabille) Greuter) - T., 2n = 18, 36. Oteteliş - GQ34, Fârtăţeşti - GQ36, Lădeşti -. Eur. de S. *Stellarietea mediae*, car. *Caucalidion.*

Lathraea squamaria L. - G., 2n = 36, 42. Cireşu - GQ29, Stroeşti - GQ29/39, Mogeşti - GQ29, Obroceşti - GQ39, Rugetu - GR20. Euras. *Querco-Fagetea, Fagetalia sylvaticae, Alno-Ulmion.*

Linaria angustissima (LOISEL.) BORBÁS subsp. *bessarabica* (KOTOV) CIOCÂRLAN & NEGREAN - H., Buciumu Peak - GR22, Zăvidanu Peak - GR22. Pont. *Festucetalia valesiacae.*

L. genistifolia (L.) MILL. (incl. var *procera* SIMS.) - H., 2n = 12. Pietroasa - GQ34, Fârtăţeşti - GQ36, Ciumagi - KK67, Bereşti - GQ37, Hotărasa - KK68, Copăceni - GQ38. Cont. Euras. *Festuco-Brometea, Festucetalia valesiacae.*

L. vulgaris MILL. - H., 2n = 12. Frecv. in basin. Euras. *Chenopodietalia, Epilobietea angustifolii, Onopordion acanthii.*

Melampyrum arvense L. - T., 2n = 18. Fârtăţeşti - GQ36, Ciocănari - KK65, Bocşa - KK65, Măciuca - KK65/66, Gârnicet - KK66, Obroceşti - GQ39, Slătioara - "Gurgui Hill" - GR20/30, Cerna - "Dumbrăvița Hill", "La Rudarii de la Cerna Hill" - GR20, Miloştea - GR20. Eur. *Festucetalia valesiacae.*

M. barbatum WALDST. & KIT. - T., Ciocănari - KK65, Bocşa - KK65, Măciuca - KK65/66. Pan. Car. *Festuco-Brometea.*

M. bihariense A. KERN. - T., Bocşa - KK65, Lădeşti - KK67, , Stroeşti - GQ29/39, Slătioara - "Gurgui Hill" - GR20/30, Miloştea - GR20. Dacic. *Carpinion betuli.*

M. cristatum L. - T., 2n = 18. Popeşti - KK65, Ciocănari - KK65, Oveselu - KK65/66, Bocşa - KK65, Lădeşti - KK67, Cerna - "Dumbrăvița Hill", "La Rudarii de la Cerna Hill" - GR20, Miloştea - GR20, Cerna - "Roşcăi Hill" - GR20. Euras. Cont. *Quercetea pubescenti-petraeae, Festucetalia valesiacae.*

M. sylvaticum L. - T., 2n = 18. Cerna - "Plaiul Cernei Hill" - GR20, Cerna "Roşcăi Hill" - GR20. Euras. Car. *Piceetalia excelsae.*

Odontites vernus (BELLARDI) DUMORT. (*O. rubra* (BAUMG.) PERS.) subsp. *serotinus* (Dumort.) Corb. - T., 2n = 20. Oteteliş - GQ34, Valea Mare - GQ35, Fârtăţeşti - GQ36, Dejoi - KK66, Copăceni - GQ38. Euras. *Cynosurion cristati, Agropyro-Rumicion.*

Pedicularis verticillata L. - H., 2n = ?. Buciumu Peak - GR22, Zăvidanu Peak - GR22, Corşoru Peak - GR22. Circ.-Arct.-Alp.-Euram. *Nardetalia strictae, Seslerietalia.*

Rhinanthus angustifolius C.C. GMEL. (*R. serotinus* (SCHÖNH.) OBORNÝ; *R. glaber* LAM. p.p.; *R. major* EHRH. non L.) - T., Cerna - "Dumbrăvița Hill", "La Rudarii de la Cerna Hill" - GR20, Miloştea - GR20. Euras. *Molinio-Arrhenatheretea.*

R. minor L. - T., 2n = 22. Frecv. in basin. Euras. Car. *Molinio-Arrhenatheretea.*

R. rumelicus VELEN. - T., Frecv. in basin. Pont.-Pan.-Balc. *Arrhenatheretalia.*

R. wagneri DEGEN (*R. r.* var. *wagneri* (DEGEN) NYÁR.) - T., 2n = ?. Cireşu - GQ29, Stroeşti - GQ29/39, Mogeşti - GQ29, Obroceşti - GQ39. Balc.-Pan. *Cynosurion cristati, Arrhenatheretalia.*

Scrophularia nodosa L. - H., 2n = 36. Valea Mare - GQ35, Afânata - GQ35, Fârtăţeşti - GQ36, Cernişoara - KK68, Zăvidanu Peak - GR22. Euras. *Querco-Fagetea*, car. *Fagetalia sylvaticae, Epilobietea angustifolii.*

S. scopolii HOPPE (*S. glandulosa* WALDST. & KIT.) - H., 2n = ?. Buciumu Peak - GR22, Zăvidanu Peak - GR22, (Răduţoiu D. 2004). Pont.-Pan.-Balc. *Fagetalia sylvaticae, Galio-Alliarion.*

S. umbrosa DUMORT. (*S. alata* GILIB., *S. ehrhartii* STEVEN) subsp. *neesii* (WIRTG.) E. MAYER - H., 2n = 26, 52. Pojogi - Cerna - GQ29/39, Cireşu - GQ29, Stroeşti - GQ29/39, Mogeşti - GQ29, Obroceşti - GQ39. Eur. Centr. Car. *Phragmitetea australis, Glycerio-Sparganion.*

Verbascum blattaria L. - HT., 2n = 30. Dejoi - KK66, Găgeni - KK66, Păsculeşti - KK67, Ciumagi - KK67, Zăvoieni - KK66. Euras. (Submedit.). Car. *Onopordion acanthii.*

- fo. *blattariforme* (GRIS.) HAL. (*V. blattariforme* Gris.) - Măldăreşti - KK66, Ştefăneşti - KK66, Şotani - KK66, Gârnicet - KK66, Dejoi - KK66.

V. chaixii VILL. subsp. *austriacum* (SCHOTT) HAYEK - H., 2n = 26-36. Oveselu - KK65/66, Buciumu Peak - GR22, Zăvidanu Peak - GR22. Eur. Centr. şi E. *Festucetalia valesiacae*;

- subsp. *orientale* (M. BIEB.) HAYEK - Ciocănari - KK65, Bocşa - KK65, Măciuca - KK65/66.. Pont. *Festucetalia valesiacae, Quercetea pubescenti-petraeae.*

V. densiflorum BERTOL. (*V. thapsiforme* SCHRAD.) - HT., 2n = 32, 36. Goruneşti - GR29, Rugetu - GR20, Mariţa - GR20, Recea - GR20. Eur. *Onopordetalia acanthii.*

V. lychnitis L. - HT., 2n = 26, 32, 34. Cerna - "Plaiul Cernei Hill" - GR20, Buciumu Peak - GR22, Zăvidanu Peak - GR22, Corşoru Peak - GR22, Izvoru Rece - GR20. Eur. *Geranion sanguinei.*

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V. nigrum L. subsp. *nigrum* - H., 2n = 30, 34. Slătioara - "Gurgui Hill" - GR20/30, Buciumu Peak - GR22, Zăvidanu Peak - GR22, Stânişoara Peak - GR22. Euras. Car. *Epilobietalia angustifolii*;

- subsp. *abietinum* (BORBÁS) I. K. FERGUSON (*V. abietinum* BORBÁS) - Cerna - "Plaiul Cernei Hill" - GR20, Cerna "Roşcăi Hill" - GR20, Zăvidanu Peak - GR22, Stânişoara Peak - GR22, Mariţa - GR20. Daco-Balc. *Arction lappae.*

V. phlomoides L. - HT., 2n = 32, 34. Frecv. in basin. Eur. Centr. şi SE. Car. *Onopordion acanthii.*

V. phoeniceum L. - H., 2n = 32, 36. Hotărasa - KK68, Vetelu - GQ38, Bâlteni - GQ38, Cerna - "Dumbrăviţa Hill", "La Rudarii de la Cerna Hill" - GR20, Miloştea - GR20. Euras. Cont. *Festucetalia valesiacae.*

V. speciosum SCHRAD. (*V. longifólium* DC.) - HT., 2n = ?. Cerna - "Plaiul Cernei Hill" - GR20. Pont.-Pan.-Balc. *Festucetalia valesiacae.*

V. thapsus L. - HT., 2n = 32, 36. Cerna - "Plaiul Cernei Hill" - GR20. Euras. *Epilobietalia angustifolii, Onopordion acanthii.*

Veronica acinifolia L. - T., 2n = 14, 16. Giuleşti - GQ35. Atl.-Medit. *Nanocyperion.*

V. anagallis-aquatica L. (*V. anagallis* auct.) - H.(HH.), 2n = 18, 36. Oteteliş - GQ34, Valea Mare - GQ35, Afânata - GQ35, Giuleşti - GQ35, Dejoi - KK66. Circ. *Phragmitetea australis, Glycerio-Sparganion.*

V. arvensis L. (*V. micrantha* SCHUR) - T., 2n = 14, 16. Frecv. in basin. Euras. *Stellarietea mediae, Arrhenatheretalia.*

V. bachofenii HEUFF. (*V. media* BAUMG. non SCHRAD.) - H., 2n = ?. Cerna - "Plaiul Cernei Hill" - GR20, Cerna "Roşcăi Hill" - GR20, Zăvidanu Peak - GR22. Carp.-Balc.-Anat. *Asplenion septentrionalis.*

V. beccabunga L. - H.(HH.), 2n = 18, 36. Frecv. in basin. Euras. *Glycerio-Sparganion.*

V. catenata Pennell (*V. aquática* Bernh. non Gray) - H.(HH.), 2n = 36. Giuleşti - GQ35, Pojogi - Cerna - GQ29/39, Cireşu - GQ29, Stroeşti - GQ29/39, Mogeşti - GQ29, Obroceşti - GQ39. Circ. *Glycerio-Sparganion.*

V. chamaedrys L. subsp. *chamaedrys* - H.-Ch., 2n = 16. Frecv. in basin. Euras. *Querco-Fagetea, Prunetalia spinosae.*

V. hederifolia L. - T., 2n = 54. Frecv. in basin. Euras. *Veronico-Euphorbion, Centauretalia cyani, Stellarietea mediae, Chenopodietalia.*

V. jacquinii BAUMG. (*V. austriaca* subsp. *jacquinii* (BAUMG.) EB. FISCH.) - H., 2n = 48. Pojogi - Cerna - GQ29/39, Cireşu - GQ29, Stroeşti - GQ29/39, Mogeşti - GQ29, Obroceşti - GQ39, Slătioara - Dl. "Gurgui" - GR20/30. Pont.-Centr. Eur.-Medit. *Festucetalia valesiacae*, car. *Danthonio-Brachypodion.*

V. montana L. - Ch., 2n = 18. Mariţa - GR20, Izvoru Rece - GR20. Eur. *Alno-Ulmion.*

V. officinalis L. - Ch., 2n = 18, 36. Frecv. in basin. Euras. *Potentillo-Nardion, Carpinion betuli.*

V. opáca FR. - T., 2n = 28. Cireşu - GQ29, Stroeşti - GQ29/39, Mogeşti - GQ29, Obroceşti - GQ39. Eur. *Stellarietea mediae.*

V. orchidea CRANTZ (*V. spicata* L. subsp. *orchidea* (CRANTZ) ČELAK.) - H., 2n = 34. Oteteliş - GQ34, Ciumagi - KK67, Roeşti - KK67, Miloştea - GR20. Pont.-Pan.-Balc. *Festucetalia valesiacae.*

V. persica POIR. - T., 2n = 28. Frecv. in basin. Adv. (As. de SV.). Car. *Chenopodietalia.*

V. polita FR. (*V. didýma* auct.) - T., 2n = 14, 18. Frecv. in basin. Euras. *Stellarietea mediae, Veronico-Euphorbion, Centauretalia cyani, Chenopodietalia.*

V. scutellata L. - H.(HH.), 2n = ?. Pojogi - Cerna - GQ29/39, Cireşu - GQ29, Stroeşti - GQ29/39, Mogeşti - GQ29, Obroceşti - GQ39, Cerna - "Plaiul Cernei Hill" - GR20. Circ. *Magnocaricion.*

V. serpyllifolia L. - H., 2n = 14. Cernişoara - KK68, Săruleşti - KK67, Bereşti - GQ37, Hotărasa - KK68, Vetelu - GQ38, Stroeşti - GQ29/39, Slătioara - "Gurgui Hill" - GR20/30, Buciumu Peak - GR22, Zăvidanu Peak - GR22. Cosm. *Agropyro-Rumicion, Agrostion stoloniferae, Cynosurion cristati.*

V. spicata L. - H., 2n = 34, 68. Oteteliş - GQ34, Stroeşti - GQ29/39, Cerna - "Dumbrăviţa Hill", "La Rudarii de la Cerna Hill" - GR20, Cerna "Roşcăi Hill" - GR20. Cont. Euras. *Festuco-Brometea, Festucetalia valesiacae.*

V. teucrium L. - H., 2n = 64. Lădeşti - KK67, Cireşu - GQ29, Stroeşti - GQ29/39, Mogeşti - GQ29, Obroceşti - GQ39. Cont. Euras. *Festucetalia valesiacae.*

V. triphyllos L. - T., 2n = 14. Oteteliş - GQ34. Eur. *Stellarietea mediae.*

V. urticifolia JACQ. - H., 2n = 18. Cerna - "Plaiul Cernei Hill" - GR20, Buciumu Peak - GR22, Zăvidanu Peak - GR22. Centr. Eur.-Submedit. (Mont.). *Symphyto-Fagion, Tilio-Acerion.*

V. verna L. - T., 2n = 16. Cermegeşti - KK67, Chiriceşti - KK67, Lădeşti - KK67, Măldăreşti - KK67. Euras. *Festuco-Brometea, Sedo-Scleranthetea.*

CONCLUSIONS

In the Cerna of Olteţ Basin the family *Scrophulariaceae* it is represented through 56 species. Among those there are rare taxons or with a limited habitat in the flora of our country (*Digitalis ferruginea, Veronica catenata, V. bachofenii, Melampyrum sylvaticum, Kickxia elatine* subsp. *sieberi*, etc.).

At each of the species, near the localities it is placed the cartographic index UTM too, in this way contributing at the chorology of the species with the precise localization of the points where they were identified.

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FAM. LILIACEAE FROM THE CERNA OF OLTET BASIN (ROMANIA)

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Abstract. The results of the recent research about the Liliaceae family, especialy anatomical research, cytotaxonomical, ecological, biochemical, and the morphological have influenced a lot the taxonomy of plants. Lately they are producing deep changes in the content of some taxons: family, genus, species, etc. Lots of taxons change their upright position, increasing or reducing their value, or the horizontal position moving from a genus to other or even from a family to other. In the last 10-15 years it has been talking more and more often about the division of the Liliaceae family in 9-15 families. Some romanian botanists (CIOCÂRLAN V., 1998) tell that although the Liliaceae family is a heterogeneous family, she must be admited as a unitary family, the heterogeneity being through taxons at level of underfamilies: Asparagoideae, Colchicoideae, Melanthioideae, Asphodeloideae, Lilioideae and Scilloideae. In this paper we present all the species from Liliaceae, identified in the Basin of Cerna of Oltet in the region of Oltenia – Romania.

Key words: The Basin Cerna of Oltet, Liliaceae.

Rezumat. Fam. Liliaceae din Bazinul Cernei de Olteţ (România). Rezultatele cercetărilor recente asupra plantelor, în special cercetări anatomice, citotaxonomice, ecologice, arealogice, biochimice, alături de cele morfologice au influenţat mult taxonomia plantelor. În ultimul timp se produc mereu modificări profunde asupra conţinutului unor taxoni: familie, gen, specie etc. Mulţi taxoni îşi schimbă poziţia pe verticală, mărindu-şi sau micşorându-şi valoarea, sau pe orizontală trecând de la un gen la altul sau chiar de la o familie la alta. În ultimii 10-15 ani se vorbeşte tot mai des de divizarea familiei Liliaceae în 9-15 familii. Unii botanişti români (V. CIOCÂRLAN 1998) spun că deşi familia Liliaceae este o familie eterogenă, totuşi ea trebuie admisă ca o familie unitară, eterogenitatea putând fi prin taxoni la nivel de subfamilii: Asparagoideae, Colchicoideae, Melanthioideae, Asphodeloideae, Lilioideae şi Scilloideae. În această lucrare prezentăm speciile din familia Liliacee, identificate în Bazinul Cerna de Olteţ, regiunea Oltenia - România

Cuvinte cheie: Bazinul Cernei de Olteţ, Liliaceae.

INTRODUCTION

The River Cerna is a Meridional Carpathic affluent which flows in the Oltet River at approximatively 180 m altitudine. It springs from the Căpătânii Mountains under the Corşoru Peak (1900 m) and accompanies the river Oltet from the very high zone of these mountains` peaks. It has a length of 99 km and a surface of approximatively 617 km^2.

As a result of the very varied relief, climate and rock structure conditions, we can encounter a large range of soils (dark acide, podsol, rendzine, forest dark soils and alluvial from the river meadows of the main rivers), also reflected in the floristic composition of the studied area. The relief is under the form of low hills interrupted by the valleys of some rivers and small Sub-Carpathian depressions. The diversity of the relief is given by the steps in which it is arranged, by the mountaineous and Sub-Carpathian peaks oriented generally to the west-eastern side, the hilly plateau oriented to the north-southern direction and also by the the aspect of the valleys and depressions, by the river meadows along the main running waters and the geomorphological particularities of all the relief forms. This variety is the result of certain areas of massive relief forms: The Meridional Carpathians, The Gaetic Sub-Carpathians and the Gaetic Plateau which, have a complex geological structure.

MATERIAL AND METHOD

Starting from this information we repeatedly studied the area conform to the method of itinerary as the surface was very large, but when necessary we used the method of stationary and detailed our analyses collecting and preserving the floristic material.

The identification of the taxons was performed on preserved dry material or on live material, using the latest taxonomic informative sources (BELDIE Al., 1977, 1979, SĂVULESCU T., 1952-1976, TUTIN T.G., et al. 1964-1980, BRUMMITT R.K. & POWELL C.E. 1992, CIOCÂRLAN V., 2000). For the localities we use the cartographic index UTM (LEHRER A. & LEHRER ALEXANDRINA 1990).

RESULTS AND DISCUSSIONS

The floristic list is presented in alphabetical order:

Asparagus tenuifolius LAM. - G., 2n = 20. Botorani, Mărgineni, Drăganu, Fârtăţeşti - GQ36, Roeşti - KK67. Pont.-Medit. *Querco-Fagetea.*

Colchicum autumnale L. - G., 2n = 38. Oteteliş - GQ34, Fârtăţeşti - GQ36, Măciuca - KK65/66, Cerna - Dl. "Dumbrăviţa", Dl. "La Rudarii de la Cerna" - GR20, Cerna Dl. "Roşcăi" - GR20. Centr. Eur. Car. *Molinietalia caeruleae.*

Convallaria majalis L. - G., 2n = 38. Rusăneşti - GQ35, Giuleşti - GQ35. Eur. Car. *Querco-Fagetea.*

Erythronium dens-canis L. subsp. *niveum* (BAUMG.) BUIA & PĂUN - G., 2n = 24. Pietroasa - GQ34, Giuleşti - GQ35, Botorani - KK65, Fârtăţeşti - GQ36, Nisipi - KK66, Popeşti - KK65, Ciocănari - KK65, Oveselu - KK65/66, Măciuca - KK65/66, Lădeşti - KK67, Copăceni - GQ38. Carp. Rom. *Carpinion betuli.*

Gagea lutea (L.) KER.-GAWL. - G., 2n = 72. Fârtăţeşti - GQ36, Stroeşti - GQ29/39, Slătioara - Dl. "Gurgui" - GR20/30, Goruneşti - GR29, Rugetu - GR20. Euras. *Carpinion betuli.*

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G. minima (L.) KER.-GAWL. - G., 2n = 24. Goruneşti - GR29, Rugetu - GR20 (RĂDUȚOIU 2004), Recea - GR20, Miloştea - GR20. Euras. Cont. *Carpinion betuli.*

G. villosa (M. BIEB.) SWEET (*G. arvensis* auct., non DUMORT.) - G., 2n = 48. Bocşa - KK65, Măciuca - KK65/66, Măldăreşti - KK66, Ştefăneşti - KK66, Goruneşti - GR29. Eur. *Chenopodietalia.*

Lilium martagon L. - G., 2n = 24. Goruneşti - GR29. Euras. *Fagetalia sylvaticae.*

Muscari comosum (L.) MILL. (*Leopoldia comosa* (L.) PARL.) - G., 2n = 18, 27. Fârtăţeşti - GQ36, Lădeşti - KK67, Hotărasa - KK68, Vetelu - GQ38, Copăceni - GQ38, Bâlteni - GQ38. Eur. (excepţie N.). *Festuco-Brometea.*

Ornithogalum orthophyllum Ten. subsp. *kochii* (PARL.) ZAHAR. (*O. kochii* PARL., *O. gussonei* auct., rom. non TEN.) - G., 2n = ?. Miloştea - GR20. Centr. Eur. Submedit. *Festucetalia valesiacae.*

O. pyramidale L. (*O. brevistylum* WOLFNER) - G., 2n = 24. Fârtăţeşti - GQ36, Nisipi - KK66, Miloştea - GR20. Centr. Eur. *Stellarietea mediae.*

O. pyrenaicum L. (*O. flavescens* LAM.) - G., 2n = 16-18. Cernişoara - KK68, Săruleşti - KK67, Bereşti - GQ37, Vetelu - GQ38, Copăceni - GQ38. Atl -Medit. *Carpinion betuli.*

O. umbellatum L. (*O. divergens* BOREAU; *O. umbellatum* L. subsp. *divérgens* (BOREAU) BONNIER & LAYENS) – G., 2n = 18-20, 27, 28, 35, 36, 42, 44, 45, 54, 72, 90, 108. Gârnicet - KK66, Dejoi - KK66, Zăvoieni - KK66, Vârleni - KK66. Submedit. *Stellarietea mediae, Festuco-Brometea.*

Polygonatum latifolium (JACQ.) DESF. - G., 2n = 20. Giuleşti - GQ35, Fârtăţeşti - GQ36, Ciumagi - KK67, Lădeşti - KK67, Stroeşti - GQ29/39, Slătioara - Dl. "Gurgui" - GR20/30, Goruneşti - GR29, Rugetu - GR20. Pont.-Pan.-Balc. *Querco-Fagetea.*

P. multiflorum (L.) ALL. - G., 2n = 18, 32. Slătioara - Dl. "Gurgui" - GR20/30 (Lehrer A. & Lehrer Alexandrina 1990). Euras. Car. *Fagetalia sylvaticae.*

P. odoratum (MILL.) DRUCE (*P. officinale* ALL.) - G., 2n = 20. Ciumagi - KK67, Lădeşti - KK67, Stroeşti - GQ29/39, Mogeşti - GQ29. Euras. *Geranion sanguinei, Prunetalia spinosae.*

P. verticillatum (L.) ALL. - G., 2n = 28. Cerna - Dl. "Plaiul Cernei" - GR20, Cerna Dl. "Roşcăi" - GR20, Vf. Zăvidanu - păd. - GR22, Vf. Stânişoara - GR22. Euras. *Betulo-Adenostyletea.*

Scilla bifolia L. subsp. *bifolia* - G., 2n = 18, 36, 54. *Querco-Fagetea.*;

- fo. *uniflora* G. GRINŢ.: Giuleşti - GQ35 ;

- fo. *trifolia* PETRESCU: Giuleşti - GQ35.

- subsp. *drunensis* SPETA: Lădeşti - KK67, Copăceni - GQ38, Stroeşti - GQ29/39. Eur. Centr. şi Sudică. *Querco-Fagetea*;

- subsp. *subtriphylla* (SCHUR) DOMIN (*S. bifolia* var. *praecox* (WILLD.) MASTERS, *S. praecox* WILLD.) Mez.: Oteteliş - GQ34. *Querco-Fagetea.*

Veratrum album L. subsp. *lobelianum* (BERNH.) ARCANG. - H., 2n = 32. Vf. Buciumu - GR22, Zăvidanu - GR22, Vf. Stânişoara - pajişti- GR22, Vf. Corşoru - pajişti - GR22, Vf. La Nedei - GR22. Euras. Car. *Betulo-Adenostyletea.*

CONCLUSIONS

In the Cerna of Olteţ Basin the *Liliaceae* family, is represented through 17 species, 4 subspecies and 2 formes. Among those exists an endemic taxon too in the flora of our country (*Erythronium dens-canis* subsp. *niveum*). This has a more rare spreading at the inferior part or the researched teritory. At the level of the subcarpathian hills and of the highlands it is absent.

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HISTO-ANATOMICAL STUDY ON THE *Nigella Damascena* L. (RANUNCULACEAE) SPECIES

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CORNELIA BEJENARU, GEORGE-DAN MOGOŞANU

Abstract. The paper contains the histo-anatomical study of the root, stem and leaf's rachis of the * *Nigella damascena* species. The root has circular contour in cross section and secondary structure resulted from the activity of the both lateral meristems (cambium and phellogen). The stem has a circular contour in cross section and primary structure with: epidermis, angular collenchyma in the ribs, collenchyma between the ribs, vascular bundles, and pith. The leaf's rachis has the shape of "V" letter presenting a characteristic structure: epidermis covered by a thick cuticle, angular collenchyma, vascular bundles, and fundamental parenchyma.

Key words: * *Nigella damascena L.*, histo-anatomical study.

Rezumat. Studiu histo-anatomic asupra speciei *Nigella Damascena* L. (Ranunculaceae). Lucrarea cuprinde studiul histo-anatomic al rădăcinii, tulpinii şi rahisului foliar provenite de la specia * Nigella damascena. În secţiune transversală, rădăcina are contur circular şi structură secundară, datorită felogenului şi cambiului. Tulpina prezintă contur circular şi următoarele ţesuturi: epidermă, colenchim angular, fascicule libero-lemnoase, parenchim medular. Rahisul foliar are forma literei "V", fiind delimitat la exterior de epidermă, acoperită de o cuticulă groasă şi cuprinzând în poziţie hipodermică colenchim angular, iar în parenchimul fundamental numeroase fascicule libero-lemnoase.

Cuvinte cheie: * *Nigella damascena* L., studiu histo-anatomic.

INTRODUCTION

The * *Nigella damascena* L. (*Ranunculaceae*) species, love-in-a-mist, is a floristic element naturalized and cultivated in Romania. It is a honey-bearing plant, with blue flowers, spontaneous in Syria and South of Europe, frequently cultivated as ornamental (CIOCÂRLAN V., 2000; TOMA CLAUDIA-CRINA, 2004). Considering the chemical composition, this species contains a diversity of active principles: volatile oil, saponosides, tannin, polyphenols, alkaloids, fatty acids, heteroglycans, carotenoids (ISTUDOR VIORICA, 2001; TOMA CLAUDIA-CRINA, 2004).

The aerial parts of this species are used for their carminative, stomachic, diuretic, vermifuge and aphrodisiac properties, for the treatment of some digestive diseases (anorexia, gripes, flatulence, and intestinal parasites), oedemas and sexual male dysfunctions. The seeds are used sometimes for the flavouring of various kinds of cheese (cottage-cheese) and cookies. The volatile oil from the aerial parts presents anti-inflammatory and antihistaminic action, recommended in asthma and asthmatic bronchitis (ISTUDOR VIORICA, 2001).

MATERIAL AND METHODS

Cross-sections through the root, stem and leaf's rachis of the *Nigella damascena* species, collected in June 2006, from the Vladimirescu village, County of Arad, have been made using the anatomic razor. The cross-sections were washed with distilled water, and then treated with Javel water. The staining was made using the Genovese reagent (Congo red and chrisoidine), which put in evidence the cell walls: red for the cellulose, yellow or orange for the lignine, and golden-yellow for the cutin (ANDREI & PARASCHIVOIU, 2003; TOMA & GOSTIN, 2000; TOMA CLAUDIA-CRINA, 2004). The examination of the cross sections has been made using an AMPLIVAL microscope with a SONY DSC-P52 photographic digital camera, at different objectives, i.e.: ×4, ×10, and ×40.

RESULTS AND DISCUSSIONS

The interpretation of the cross sections has been made in the manner of the recognized authors (TOMA & RUGINĂ, 1998; TOMA & GOSTIN, 2000).

The root structure

The root presents circular contour in cross section and secondary structure (Figs. 1–3).

The cork has big cells, slightly tangentially elongated, with suberized walls.

The phellogen has small cells, with thin cellulosic walls.

The phelloderm presents big cells, uniformly disposed, without intercellular spaces.

The conducting tissues form two concentric rings. At the external part there is a thin phloem ring, formed by sieve-tubes, companion cells and phloem parenchyma.

The cambium consisted of 2–3 layers, tangentially elongated.

The secondary xylem represents the most developed tissue of the root presenting big vessels.

They are a few primary small vessels in the axle of the root. The medullary rays are multicellular, one-seriated, and slightly lignified.

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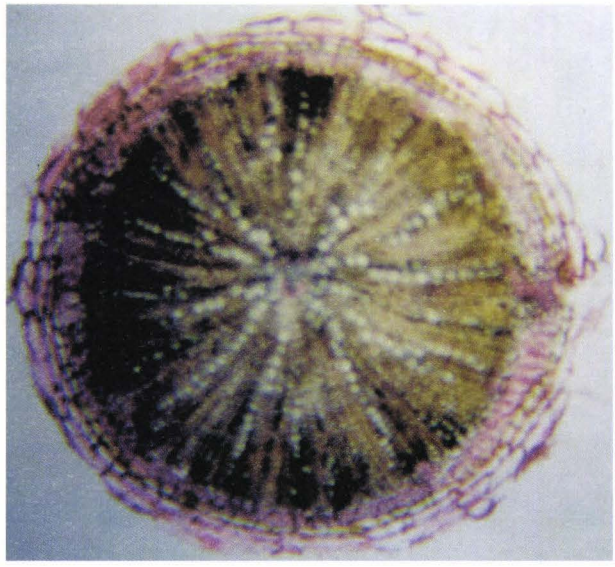

Figure 1. Cross section through the root, ob. ×4 [Secțiune transversală prin rădăcină, ob. ×4]

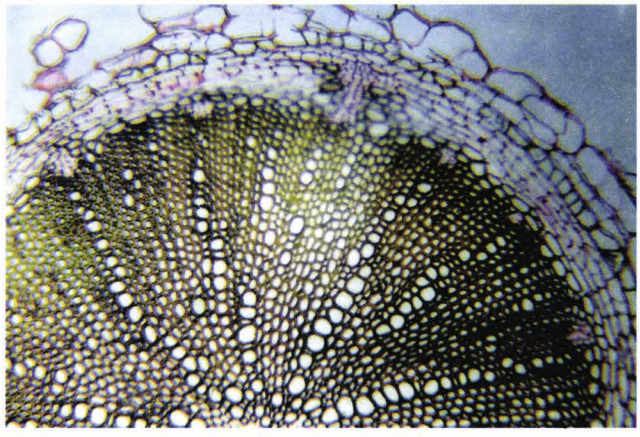

Figure 2. Cross section through the root, ob. ×10 [Secțiune transversală prin rădăcină, ob. ×10]

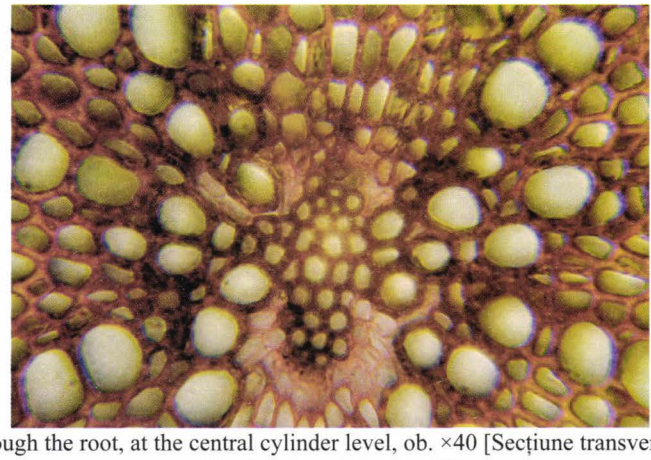

Figure 3. Cross section through the root, at the central cylinder level, ob. ×40 [Secțiune transversală prin rădăcină, la nivelul cilindrului central, ob. ×40]

The stem structure

The stem has a circular contour, in cross section and primary structure (Figs. 4–6).

The epidermis is consisted of isodiametric tangentially elongated cells, which present thick periclinal walls, the external one being covered by a thick cuticle. At the rib's level, under the epidermis, we can observe 4–5 layers of angular collenchyma, and 3–4 layers of collenchyma between the ribs.

The conducting tissues are organized in numerous vascular bundles of collateral open type, disposed on a circle. At the periphery of the phloem, cordons of sclerenchymatous fibres are present. Into the libero-ligneous fascicle the ligneous tissue, made from 2–3 vessels of big calibre, with a small amount of cellulosic xylem parenchyma, few

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ligneous vessels with small calibre and ligneous parenchyma predominate.

The pith is parenchymatous cellulosic, presenting a big central aeriferous cavity resulted from the disorganization of some cells.

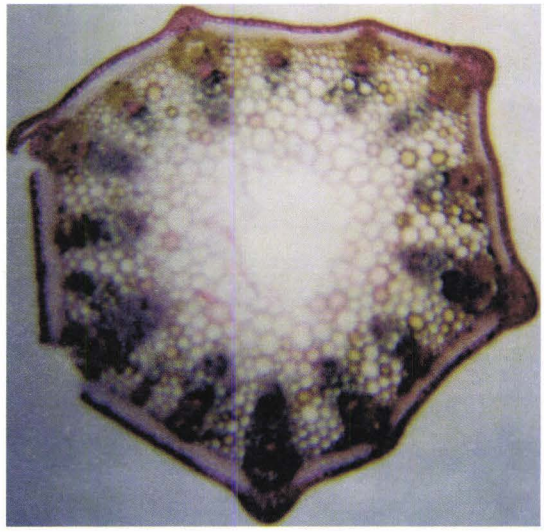

Figure 4. Cross section through the stem, ob. ×4 [Secţiune transversală prin tulpină, ob. ×4]

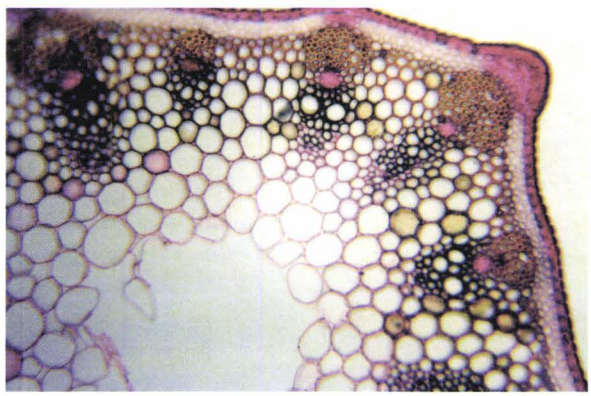

Figure 5. Cross section through the stem, ob. ×10 [Secţiune transversală prin tulpină, ob. ×10]

Figure 6. Cross section through the stem, ob. ×40 [Secţiune transversală prin tulpină, ob. ×40]

The structure of the leaf's rachis

In the cross section, the leaf's rachis has the shape of "V" letter (Fig. 7) and is delimited by an epidermis, consisted of isodiametric cells with thick periclinal walls; the external walls are covered by a thick cuticle.

In front of the median vascular bundle, under the lower epidermis, we can observe 4–5 layers of angular collenchyma.

Under the lower epidermis, 3–4 layers of collenchyma are present.

In the fundamental parenchyma, numerous vascular bundles with various sizes may be observed (Fig. 8).

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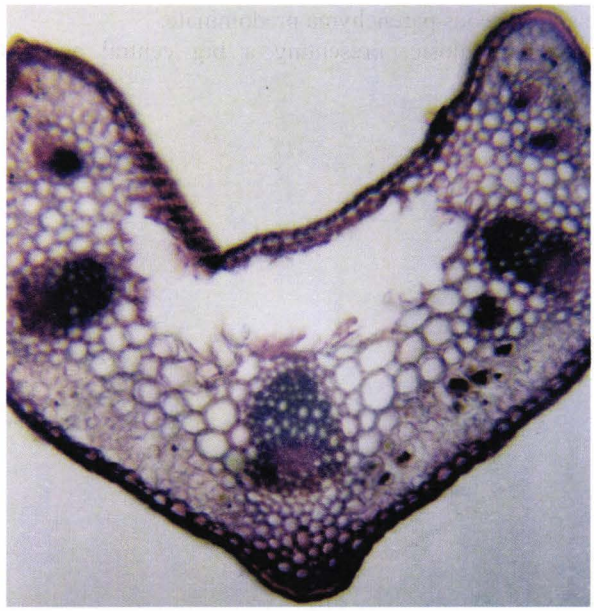

Figure 7. Cross section through the leaf's rachis, ob. ×10 [Secţiune transversală prin rahisul foliar, ob. ×10]

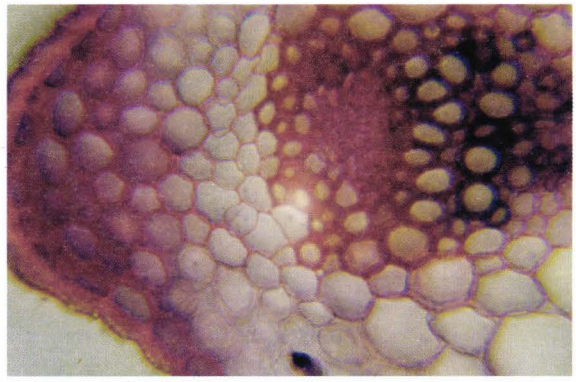

Figure 8. Cross section through the leaf's rachis, ob. ×40 [Secţiune transversală prin rahisul foliar, ob. ×40]

CONCLUSIONS

The root of the ✳ *Nigella damascena* species has circular contour in cross section and secondary structure resulted from the activity of the both lateral meristems (cambium and phellogen).

The stem has a circular contour in cross section and primary structure with: epidermis, angular collenchyma in the ribs, collenchyma between the ribs, vascular bundles, and pith.

The leaf's rachis has the shape of "V" letter presenting a characteristic structure: epidermis covered by a thick cuticle, angular collenchyma, vascular bundles, and fundamental parenchyma.

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THE SYNECOLOGICAL ANALYSIS OF SOME POPULATIONS OF SCARAB BEETLES (INSECTA, COLEOPTERA, SCARABAEOIDAEA) FROM SLANIC MOLDOVA, BACAU COUNTY

MIHAELA ARINTON

Abstract. Slanic Moldova is situated in the South-West side of Bacau County, in a narrow and long hollow, limited by high heights covered with beech and fir, in the Slanic creek valley. This region has a transition climate (between the characteristic climate for the hilly region and mountainous climate). The vegetation of this valley is influenced by the relief and climate. Hereby, in this region there are beech and fir woods and subalpine meadows. The entomologic material collected from Slanic Moldova during three years of study (2004-2006) was represented by 201 scarab beetles. Systematically, these coleopterans are included into two families (Geotrupidae - 0.5% and Scarabaeidae – 99.5%), four subfamilies (Geotrupinae, Rutelinae, Trichiinae and Cetoniinae), seven genera and eight species. Cetonia aurata (LINNAEUS, 1761) predominates (36.81%), and it is followed by Trichius fasciatus (LINNAEUS, 1758) – 30.35%. Cetonia aurata L., Trichius fasciatus (LINNAEUS, 1758), Gnorimus nobilis (LINNAEUS, 1758) and Anomala solida (ERICHSON, 1847) are euconstant and characteristic species for Slani Moldova. The highest affinity (100%) is between three species: *Lethrus apterus* (LAXMANN, 1770), *Gnorimus octopunctatus* (FABRICIUS, 1775) and *Tropinota hirta* (PODA, 1761). Another group of species is represented by *Trichius* fasciatus L. and *Cetonia aurata* L. (86%).

Key words: Scarabaeoidaea, synecological analyse, coenotic affinities

Rezumat. Analiza sinecologică a unor populaţii de scarabeoidee (Insecta, Coleoptera, Scarabaeoidaea) din Slănic Moldova, judeţul Bacău. Localitatea Slănic Moldova este situată în partea de sud-vest a judeţului Bacău ($26^0$37' longitudine estică şi $46^0$17' latitudine nordică), într-o mică depresiune îngustă şi lungă, mărginită de culmi înalte, acoperite cu fag şi brad, pe valea pârâului Slănic, la o altitudine de 530m. În scopul studierii faunei de scarabeoidee din Slănic Moldova, în perioada 2004-2006 au fost colectate 201 coleoptere, care aparţin la două subfamilii: Geotrupidae (cu o singură subfamilie – Geotrupinae) şi Scarabaeidae (cu 3 subfamilii – Rutelinae, Cetoniinae şi Trichiinae), 7 genuri şi 8 specii. Din cele 201 de scarabeoidee colectate, cele mai multe exemplare aparţin speciei Cetonia aurata (LINNAEUS, 1761). (36,81%), urmată de Trichius fasciatus (LINNAEUS, 1758) cu un procent de 30,35%. Conform analizei sinecologice, Cetonia aurata L., Trichius fasciatus L., Gnorimus nobilis (LINNAEUS, 1758) şi Anomala solida (ERICHSON, 1847) sunt specii euconstante şi în acelaşi timp caracteristice pentru zona cercetată. Analiza sinecologică mai indică şi faptul că cea mai mare afinitate ecologică există între speciile: *Lethrus apterus* (LAXMANN, 1770), *Gnorimus octopunctatus* (FABRICIUS, 1775) şi *Tropinota hirta* (PODA, 1761) – respectiv 100%. O altă grupă de specii este reprezentată de *Trichius fasciatus* L. şi *Cetonia aurata* L. (86%). Această a doua grupă se corelează cu *Gnorimus nobilis* L., afinitatea fiind de aproape 78%.

Cuvinte cheie: Scarabaeoidaea, analiza sinecologică, afinităţi cenotice

INTRODUCTION

Slanic Moldova is situated in the South-West side of Bacau County, in a narrow and long hollow, limited by high heights covered with beech and fir, in the Slanic creek valley (530 m altitude).

This region has a transition climate (between the characteristic climate for the hilly region and mountainous climate). Thus, the temperature here runs to +17.8° C in summer days and -4.2° C in winter. The Salt Mines of Slanic are characteristic for this valley. The vegetation of this valley is influenced by the relief and climate. Hereby, in this region there are beech and fir woods and subalpine meadows; the grassy vegetation is represented by crocus (*Crocus Heuffelianus*), primroses (*Primula veris*), bluebells (*Campanula patula*), *Dianthus* sp., *Scilla bifolia*, *Cypripedium calceolus*, *Saxifraga cymbalaria*, *Gentiana asclepiadea*, *Rubus idaeus*, *Sagittaria sagittifolia*, *Menta* sp., etc. The fauna is well represented: mammals, birds, reptilians, amphibians and invertebrates (ALBOTĂ M., 1983).

MATERIAL AND METHODS

The researches concerning the Scarabaeoidaea fauna from Slanic Moldova were made in 2004-2006, and the material was collected directly from the plants.

The material was identified using the specialty literature (PANIN S., 1957). The taxonomy and nomenclature used in this paper is conforming to MARY LIZ JAMESON & B. C. RATCLIFF (CHIMIŞLIU CORNELIA, 2002).

In order to make a synecological analysis, some ecological indexes were calculated: abundance, frequency, constancy, dominance, the ecological significance index (W) and the similarity index (VARVARA M. et al., 2001).

RESULTS AND DISCUSSIONS

The entomologic material collected from Slanic Moldova during three years of study (2004-2006) was represented by 201 scarab beetles. Systematically, these coleopterans are included into two families (Geotrupidae and Scarabaeidae), four subfamilies (Geotrupinae, Rutelinae, Trichiinae and Cetoniinae), seven genera and eight species. Comparing the two families, according to the results presented in table 1, the Geotrupidae family was represented by a single specimen (0.5%); the rest of individuals belong to the Scarabaeidae family (99.5%).

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The results also indicate that, for the three years of study, *Cetonia aurata* (LINNAEUS, 1761) predominates (36.81%). This specie is followed by *Trichius fasciatus* (LINNAEUS, 1758) – 30.35%. The other two species: *Gnorimus nobilis* (LINNAEUS, 1758) and *Anomala solida* (Erichson, 1847) are also well represented: 19.4% and 11.4% respectively. Four species are represented by a single individual (representing 0.5%): *Lethrus apterus* (LAXMANN, 1770), *Gnorimus octopunctatus* (FABRICIUS, 1775), *Tropinota hirta* (PODA, 1761) and *Oxythyrea funesta* (PODA, 17619).

Table 1. Distribution of species and individuals within the families and subfamilies of Scarabaeoidaea (Slanic Moldova, 2004-2006)
Tabel 1. Repartiția speciilor şi indivizilor în cadrul familiilor şi subfamiliilor de scarabeoidee (Slănic Moldova, 2004-2006)

No	Family	Subfamily	Specie	2004		2005		2006		Total	
				A	%	A	%	A	%	A	%
1.	Geotrupidae	Geotrupinae	*Lethrus apterus* LAXM.	1	2.08	-	-	-	-	1	0.5
2.	Scarabaeidae	Rutelinae	*Anomala solida* ERICH.	3	6.25	8	11.11	12	14.81	23	11.44
3.		Trichiinae	*Gnorimus nobilis* L.	13	27.09	15	20.83	11	13.58	39	19.4
4.			*Gnorimus octopunctatus* FABR.	1	2.08	-	-	-	-	1	0.5
5.			*Trichius fasciatus* L.	16	33.33	21	29.17	24	29.63	61	30.35
6.		Cetoniinae	*Cetonia aurata* L.	13	27.09	28	38.89	33	40.74	74	36.81
7.			*Tropinota hirta* PODA	1	2.08	-	-	-	-	1	0.5
8.			*Oxythyrea funesta* PODA	-	-	-	-	1	1.24	1	0.5
	2	**4**	**8**	**48**	**100**	**72**	**100**	**81**	**100**	**201**	**100**

Comparing the abundance of the species collected in Slanic Moldova it is easy to see that this ecological index is variable (fig. 1).

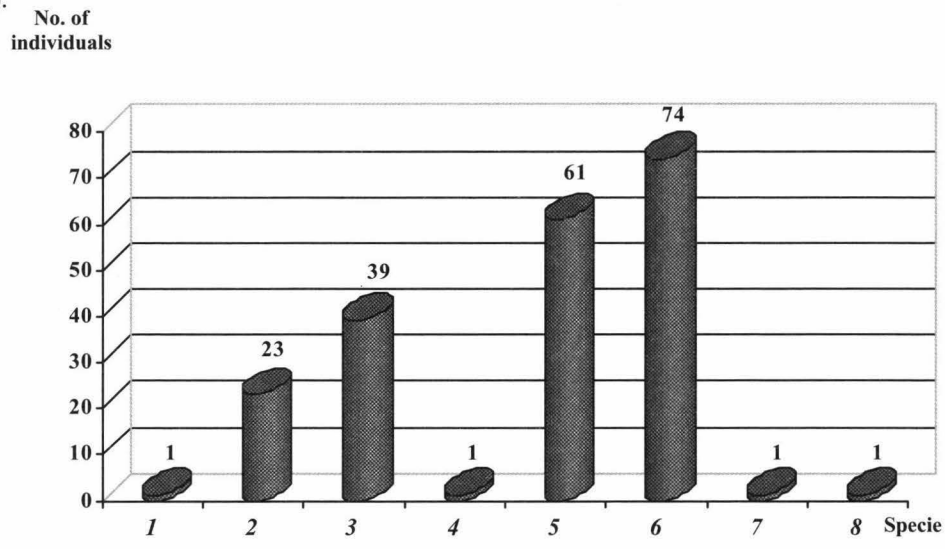

Figure 1. Species of Scarabaeoidaea collected in Slanic Moldova in 2004-2006
Figura 1. Specii de scarabeoidee colectate în Slănic Moldova, în perioada 2004-2006
(1 *Lethrus apterus* LAXMANN; 2 *Anomala solida* ERICH.; 3 *Gnorimus nobilis* L.; 4 *Gnorimus octopunctatus* FABR.; 5.*Trichius fasciatus* L.; 6 *Cetonia aurata* L.; 7 *Tropinota hirta* PODA; 8 *Oxythyrea funesta* PODA)

In table 2 it is presented the synecological analysis for the eight species collected in the Slanic Moldova in 2004-2006. According to the specialty literature, the eudominant and dominant species are influent species, well adapted, with many individuals (VARVARA M. et al., 1997). Thus, the synecological analysis shows that four species are euconstant: (*Cetonia aurata* L., *Trichius fasciatus* L., *Gnorimus nobilis* L. and *Anomala solida* ERICH.) and the other four are accessory species: *Lethrus apterus* LAXMANN, *Gnorimus octopunctatus* FABR., *Tropinota hirta* PODA and *Oxythyrea funesta* PODA. The values of dominance distribute the eight species also into two classes: in this case, the euconstant species become eudominant and the accessory ones become subrecedent species.

The values of the ecological significance index (W) indicate that the euconstant species (eudominant species) are also the characteristic species for Slanic Moldova; the other four species are accessory.

For revealing the coenotic affinities between the species, it was necessary to calculate the similarity index (table 3). Based on the values of this index it was easy to represent graphically the coenotic relationships between the species of Scarabaeoidaea collected from Slanic Moldova (2004-2006). The dendrograme is presented in figure 2.

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Table 2. The synecological analysis for the Scarabaeoidaea species collected from Slanic Moldova (2004-2006)
Tabel 2. Analiza sinecologică pentru speciile de Scarabaeoidaea colectate în Slănic Moldova (2004-2006)

No.	Specie	2004	2005	2006	A	C		D		W	
1	*Cetonia aurata* L.	13	28	33	74	100	C4	36.81	D5	36.81	W5
2	*Trichius fasciatus* L.	16	21	24	61	100	C4	30.35	D5	30.35	W5
3	*Gnorimus nobilis* L.	13	15	11	39	100	C4	19.4	D5	19.4	W5
4	*Anomala solida* ERICH.	3	8	12	23	100	C4	11.44	D5	11.44	W5
5	*Lethrus apterus* LAXMANN	1	-	-	1	33.33	C2	0.5	D1	0.17	W2
6	*Gnorimus octopunctatus* FABR.	1	-	-	1	33.33	C2	0.5	D1	0.17	W2
7	*Tropinota hirta* PODA	1	-	-	1	33.33	C2	0.5	D1	0.17	W2
8	*Oxythyrea funesta* PODA	-	-	1	1	33.33	C2	0.5	D1	0.17	W2
	Total	**48**	**72**	**81**	**201**	-	-	**100**	-	-	-

Table 3. The values of the similarity index calculated for the species of Scarabaeoidaea collected from Slanic Moldova (2004-2006)
Tabel 3. Valorile indicelui de similaritae calculat pentru speciile de scarabaeoidee colectate în Slănic Moldova (2004-2006)

Specie	1	2	3	4	5	6	7
1							
2	85.92						
3	69.02	78					
4	47.42	54.76	70.96				
5	2.66	3.22	5	8. 33			
6	2.66	3.22	5	8.33	100		
7	2.66	3.22	5	8.33	100	100	
8	2.66	3.22	5	8.33	0	0	0

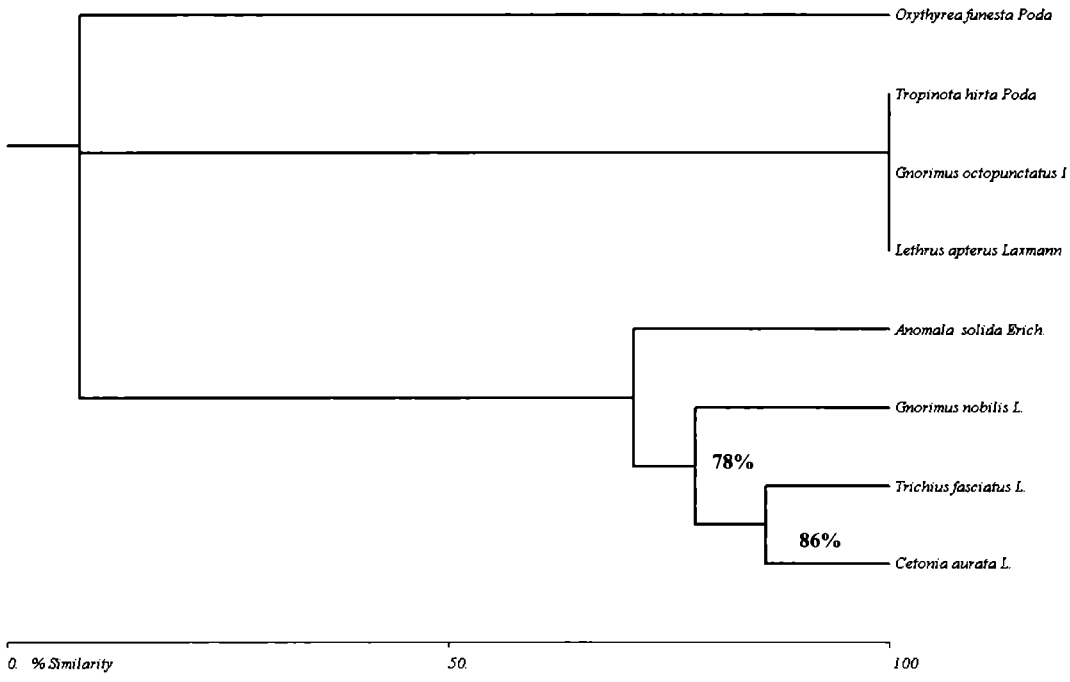

Figure 2. The coenotic affinities between the species of Scarabaeoidaea collected in Slanic Moldova, in 2004-2006
Figura 2. Afinităţile cenotice dintre speciile de scarabeoidee colectate în Slănic Moldova, în perioada 2004-2006

The dendrograme (fig. 2) shows that the highest affinity (100%) is between three species: *Lethrus apterus* LAXMANN, *Gnorimus octopunctatus* FABR. and *Tropinota hirta* PODA. This situation can be explained by the fact that the three species were collected only in 2004 and their abundance has the same value (a single specimen – 0.5%). The dendrograme also reveals another group of species: *Trichius fasciatus* L. and *Cetonia aurata* L. In this case the affinity is

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86%. The high affinity is due to the fact that they are best represented species and they were collected in each year of study, but the number of individuals differs (the values of abundance are almost similar). This second group is correlated with *Gnorimus nobilis* L. (according to the values of abundance this is the third specie) – the value of the similarity index is 78%. In the same dendrograme *Oxythyrea funesta* PODA appears as single specie because it was collected only in 2006 (a single specimen).

CONCLUSIONS

1. The Scarabaeoidaea fauna from Slanic Moldova was studied in 2004-2006 and during three years of study, 201 scarab beetles were collected, included into two families (Geotrupidae and Scarabaeidae) four subfamilies (Geotrupinae, Rutelinae, Trichiinae and Cetoniinae), seven genera and eight species. The Geotrupidae family was represented by a single specimen (0.5%); the rest of individuals belong to the Scarabaeidae family (99.5%).

2. *Cetonia aurata* L., *Trichius fasciatus* L., *Gnorimus nobilis* L. and *Anomala solida* ERICH. were collected in each year of study, but values of the dominance of the first two species are over 30%: (36.81% , respectively 30.35%).

3. According to the synecological analysis, *Cetonia aurata* L., *Trichius fasciatus* L., *Gnorimus nobilis* L. and *Anomala solida* ERICH. are euconstant species and the other four are accessory species: *Lethrus apterus* Laxmann, *Gnorimus octopunctatus* FABR., *Tropinota hirta* PODA and *Oxythyrea funesta* PODA.

4. Analysing the values of dominance index it is remarked that the euconstant species are also the eudominants and the accessory ones become subrecedent species.

5. The characteristic species for Slanic Moldova are *Cetonia aurata* L., *Trichius fasciatus* L., *Gnorimus nobilis* L. and *Anomala solida* ERICH. The other four species are accessory.

6. *Lethrus apterus* Laxmann, *Gnorimus octopunctatus* FABR. and *Tropinota hirta* Poda were collected only in 2004 and their abundance has the same value (a single specimen – 0.5%). This fact explains the value of similarity indicator – 100%. The affinity between *Trichius fasciatus* L. and *Cetonia aurata* L. is 86% – these species were collected in each year of study, the individuals are numerous, but the values of their abundance were different. This second group is correlated with *Gnorimus nobilis* L. – 78%.

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THE SYNECOLOGICAL ANALYSES OF THE EDAPHIC BEETLES (COLEOPTERA) FROM THE MIXED FOREST (ELM, ASH AND FIELD MAPLE) FROM THE „CODRII TIGHECIULUI" LANDSCAPE RESERVE

SVETLANA BACAL

Abstract. This paper represents a faunistic and ecological study on the edaphic coleoptera from a mixed forest of the "Codrii Tigheciului" landscape reserve, accomplished during the vegetation period of 2004-2006. The coleopteran fauna from a forest of elm-tree (*Ulmus caprinifolia*) mixed with ash-tree (*Fraxinus excelsior*), sycamore (*Acer campestre*) and maple (*Acer platanoides*) was represented by 77 species from 37 genera and 7 families. The most well represented was the family Carabidae with 39 species from 16 genera, followed by family Staphylinidae with 15 species from 10 genera, then by the families Silphidae and Scarabaeidae with 9 species each from 4 and respectively 2 genera and the families Lucanidae and Tenebrionidae with 2 species from 2 genera each. The family Trogidae was represented by one species. Within the study the analysis of some analytical ecological indexes was realized, such as the abundance, the dominance, the stability and some synthetic indexes such as the index of ecological significance and the diversity index (the index of real diversity – H(S), the maximum diversity – H(S)max and the relative diversity (evenness).

Key words: edaphicolous beetles, synecological analyses, Codrii Tigheci Landscape Reserve

Rezumat: Analiza sinecologică a coleopterelor edafice (Coleoptera) din pădurea de amestec (ulm de câmp, frasin şi jugastru) din rezervaţia peisagistică „Codrii Tigheciului". Lucrarea de faţă este un studiu faunistic şi ecologic asupra coleopterelor edafice dintr-o pădure de amestec a rezervaţiei peisagistice "Codrii Tigheciului", realizat în perioada de vegetaţie a anilor 2004-2006. Fauna coleopterelor din pădurea de ulm de câmp (*Ulmus carpinifolia*) în amestec cu frasin (*Fraxinus excelsior*), jugastru (*Acer campestre*) şi arţar (*Acer platanoides*), a fost reprezentată prin 77 specii, ce aparţin la 37 genuri şi 7 familii. Cea mai bine reprezentată a fost Familia Carabidae cu 39 specii din 16 genuri, urmată de familia Staphylinidae cu 15 specii aparţinând la 10 genuri, apoi familiile Silphidae şi Scarabaeidae cu câte 9 specii fiecare şi respectiv 4 şi 2 genuri, şi familiile Lucanidae şi Tenebrionidae cu câte 2 specii din 2 genuri fiecare. Familia Trogidae a fost reprezentată printr-o singură specie. În cadrul studiului, a fost realizată analiza unor indici ecologici analitici precum: abundenţa, dominanţa, constanţa şi indici ecologici sintetici ca: indicile de semnificaţie ecologică şi indicii de diversitate (indicele de diversitate reală –H(S), diversitatea maximală –H(S)max şi diversitatea relativă (echitabilitatea).

Cuvinte cheie: coleoptere, analiză sinecologică, rezervaţia peisagistică Codrii Tigheciului

INTRODUCTION

Till 2003, information concerning the coleopterans' study from the "Codrii Tigheciului" landscape Reserve were quite beaked up. MILLER ED. and ZUBROVSKI N. (1917), MEDVEDEV S. and ŞAPIRO D (1957), had made an inventory of the beetle fauna of Basarabia. The authors cited a few new species for Moldova and specified several collecting sites situated near by that landscape reserve. This area was also investigated by Neculiseanu Z. concerning the Carabidae family - a complex taxonomic, zoogeographical, ecological and biological study, pointing out their importance in the ecosystems of the Republic of Moldova. During the period 2003-2006 I have studied the edaphicolous beetles of the landscape reserve from faunistic and ecological point of view.

The "Codrii Tigheci" landscape Reserve is situated in the central part of Tigheci hillock, where there are kept the most representative biocoenotic forest and forest-steppe associations, amenable at the present to a few centralized conservancy measurement and amelioration (Pic.2).

"Codrii Tigheci" is a reserve with multifunctional statute, where takes place different kind of activities like land clearing, sanitary outthought work, and tourists' activities with destructive effects on the forest ecosystem. Thereby, the human unreasonable interventions on the natural habitat, affect lots of species of the coleopterans.

Therefore, it is a very important problem to know the coleopterans diversity, the role which they have in maintaining the natural equilibrium.

This study presents the components and the diversity of edaphicolous coleopterans from one type of the forest of this landscape reserve. As well, it was made an analyse of a few ecological analitical indexes like: abundance, dominance, constancy and ecological synthetic indexes like: index of ecological significance, and diversity indexes (index of the real diversity –H(S), maximum diversity –H(S) max and relative diversity (evenness).

COLLECTING METHODS

For the collection of the entomological material I used pitfall traps, being collected the coleopterans which are active on the soil and those which live in the superficial stratum of the soil. This method was described in different scientific papers, A. CUDRIN (1966, 1971), M. LAMOTTE (1969), J. LE BERRE and M. ROTH (1996), V. ŞILENCOV (1982), O. KRYZHANOVSKIJ (1983), Gh. MOHAN and A. ARDELEAN (1993).

As pitfall traps I used glasses with different volume (700-1000 ml). Those glasses were ploughed under the soil till to the top level. Ten pitfall traps were set in that biotope during the vegetation period of the years 2004-2006. (O.

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CRIJANOVSKIJ, 1983). The traps were placed in a right line (equal distance between them). Ten pitfall traps represented by glasses with different volume (700-1000 ml) were placed in right line (equal distance between them) in the mixed forest during the vegetation period of years 2004-2006). A concentrate solution of NaCl was used as a preserving liquid being a good conservator and prevents the maceration of the captured individuals. At the same time the presence of the preserving liquid excludes the cannibalism between the individuals, entrap and decrease the escape probability of the individuals (BÂZOVA, 1987).

METHODS USED FOR SCIENTIFIC WORKING OUT OF THE MATERIAL

For the working out of the collecting materials different ecological parameters were used such as: abundance, dominance, constancy, the ecological index of significance and the index of diversity (Simpson, Shannon, evenness), according to authors: Gh. STAN (1994), V. SIMIONESCU (1983), ANDREEV A. and IU. PESENCO (1982).

RESULTS AND DISCUSSIONS

From the mixed forest - field elm (*Ulmus carpinifolia*) with ash trees (*Fraxinus excelsior*), field maple (*Acer campestre*) and maple trees (*Acer platanoides*)- 77 species were collected.These species belong to 37 genera and 7 families.

The family Carabidae is the most representative with 39 species from16, genera followed by Staphylinidae family with 15 species from 10 genera; and the families Silphidae and Scarabaeidae with 9 species each, 4 and 2 genera respectively. The Lucanidae and Tenebrionidae families are represented by 2 species from 2 genera. The Trogidae family is represented by one species. (Fig.1).

Research investigations made in those 3 years demonstrate that the biggest number of coleopterans was collected in 2005 (1708 specimens), followed by the year 2006 (686 specimens) and the year 2004 (238 specimens).

The analyse after of the ecological indexes of the collected coleopteran species in the elm forest mixed with ash trees, field maples and maples, ascertains the following:

- the most abundant (A) are the species *Brachinus crepitans* (978 individuals) and *Silpha carinata* (760 individuals), these are also the eudominant species (D_5) – more than 10 %, 3 species are subdominant (D_3), 6 species are recedent (D_2), the rest of the species are subrecedent, each holding less than one percent from the species' total.

-the constance index (C) brought up into evidence 2 constant species (C_3) and one accessory species (C_2), the rest of the species are accidental;

- the most characteristic species for this forest type concerning the index of ecological significance (W), are *Brachinus crepitans* and *Silpha carinata* (W_5), 9 species are accessory (W_3 - W_2) and the rest of species are accidental (Tab. 1).

Table 1. The synecological analyse of coleopterans from field elm forest mixed with ash trees, field maple and maple trees in the years of 2004, 2005, 2006

Tabel 1. Analiza sinecologică a coleopterelor din pădurea de ulm de câmp în amestec cu frasin, jugastru şi arţar, în anii 2004, 2005, 2006

Nr.	Species list	A	D		C		W	
			%	Class	%	Class	%	Class
1	*Brachinus crepitans* (LINNAEUS, 1758)	978	37.16	D5	63.25	C3	23.50	W5
2	*Silpha carinata* HERBST, 1783	760	28.88	D5	70.48	C3	20.35	W5
3	*Ophonus rufibarbis* (FABRICIUS, 1792)	120	4.56	D3	27.71	C2	1.26	W3
4	*Nicrophorus fossor* ERICHSON, 1837	83	3.15	D3	12.05	C1	0.38	W2
5	*Nicrophorus vespillo* (LINNAEUS, 1758)	69	2.62	D3	7.83	C1	0.21	W2
6	*Onthophagus coenobita* (HERBST, 1783)	52	1.98	D2	12.05	C1	0.24	W2
7	*Harpalus tardus* (PANZER, 1797)	48	1.82	D2	18.67	C1	0.34	W2
8	*Onthophagus ovatus* (LINNAEUS, 1758)	48	1.82	D2	10.84	C1	0.20	W2
9	*Nicrophorus humator* OLIVIER, 1790	40	1.52	D2	12.05	C1	0.18	W2
10	*Nicrophorus vespilloides* HERBST, 1784	39	1.48	D2	10.84	C1	0.16	W2
11	*Anchomenus dorsale* (PONTOPPIDAN, 1763)	35	1.33	D2	13.86	C1	0.18	W2
12	*Ophonus schaubergerianus* PUEL, 1937	23	0.87	D1	8.43	C1	0.07	W1
13	*Aleochara curtula* (GOEZE, 1777)	23	0.87	D1	7.83	C1	0.07	W1
14	*Brachinus psophia* SERVILLE, 1821	20	0.76	D1	4.82	C1	0.04	W1
15	*Harpalus rufipes* (DE GEER, 1774)	19	0.72	D1	9.04	C1	0.07	W1
16	*Carabus convexus* FABRICIUS, 1775	19	0.72	D1	7.83	C1	0.06	W1
17	*Trox sabulosus* (LINNAEUS, 1758)	18	0.68	D1	7.83	C1	0.05	W1
18	*Harpalus flavicornis* DEJEAN, 1829	17	0.65	D1	6.02	C1	0.04	W1
19	*Ocypus nitens* (SCHRANK, 1781)	14	0.53	D1	6.63	C1	0.04	W1
20	*Amara aenea* (DE GEER, 1774)	14	0.53	D1	5.42	C1	0.03	W1

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21	*Aphodius sticticus* PANZER, 1798	14	0.53	D1	4.82	C1	0.03	W1
22	*Philonthus succicola* THOMSON, 1860	10	0.38	D1	4.82	C1	0.02	W1
23	*Lucanus cervus* (LINNAEUS, 1758)	8	0.30	D1	4.22	C1	0.01	W1
24	*Stomis pumicatus* (DE GEER, 1774)	7	0.27	D1	4.22	C1	0.01	W1
25	*Carabus coriaceus* KRAATZ, 1877	7	0.27	D1	4.22	C1	0.01	W1
26	*Ontholestes haroldi* (EPPELSHEIM, 1884)	7	0.27	D1	3.61	C1	0.01	W1
27	*Philonthus tenuicornis* (MUL. & REY, 1853)	7	0.27	D1	3.01	C1	0.01	W1
28	*Pterostichus melas* (CREUTZER, 1799)	6	0.23	D1	3.01	C1	0.01	W1
29	*Aphodius melanostictus* SCHMIDT, 1840	6	0.23	D1	2.41	C1	0.01	W1
30	*Dorcus parallelopipedus* (LINNAEUS, 1758)	6	0.23	D1	2.41	C1	0.01	W1
31	*Brachinus explodens* DUFTSCHMID, 1812	6	0.23	D1	2.41	C1	0.01	W1
32	*Ontholestes tesselatus* (GEOFFROY, 1785)	6	0.23	D1	2.41	C1	0.01	W1
33	*Amara saphyrea* DEJEAN, 1828	5	0.19	D1	3.01	C1	0.01	W1
34	*Amara familiaris* (DUFTSCHMID, 1812)	5	0.19	D1	3.01	C1	0.01	W1
35	*Onthophagus taurus* SCHREBER, 1759	5	0.19	D1	2.41	C1	0.001	W1
36	*Pterostichus chamaelion* MOTS., 1865	5	0.19	D1	2.41	C1	0.001	W1
37	*Calathus distinguendus* CHAUDOIR, 1846	5	0.19	D1	0.60	C1	0.001	W1
38	*Amara plebeja* (GYLLENHAL, 1810)	4	0.15	D1	2.41	C1	0.001	W1
39	*Aphodius prodromus* (BRAHM, 1790)	4	0.15	D1	2.41	C1	0.001	W1
40	*Drusilla canaliculata* (FABRICIUS, 1787)	4	0.15	D1	2.41	C1	0.001	W1
41	*Aleochara lata* GRAVENHORST, 1802	4	0.15	D1	0.60	C1	0.001	W1
42	*Cylindronotus aeneus* (SCOPOLI, 1763)	3	0.11	D1	1.81	C1	0.001	W1
43	*Tasgius pedator* (GRAVENHORST, 1802)	3	0.11	D1	1.81	C1	0.001	W1
44	*Anotylus sculpturatus* GRAVENHORST, 1806	3	0.11	D1	1.20	C1	0.001	W1
45	*Amara communis* (PANZER, 1797)	3	0.11	D1	1.20	C1	0.001	W1
46	*Onthophagus vitulus* FABRICIUS, 1776	3	0.11	D1	1.20	C1	0.001	W1
47	*Panagaeus bipistulatus* (FABRICIUS, 1775)	3	0.11	D1	1.20	C1	0.001	W1
48	*Tanathophilus rugosus* (LINNAEUS, 1758)	3	0.11	D1	1.20	C1	0.001	W1
49	*Amara tricuspidata* DEJEAN, 1831	2	0.08	D1	1.20	C1	0.001	W1
50	*Amara similata* (GYLLENHAL, 1810)	2	0.08	D1	1.20	C1	0.001	W1
51	*Harpalus amplicollis* MENETRIES 1848	2	0.08	D1	0.60	C1	0.001	W1
52	*Onthophagus lemur* FABRICIUS, 1781	2	0.08	D1	1.20	C1	0.001	W1
53	*Platyderus rufus* (DUFTSCHMID, 1812)	2	0.08	D1	1.20	C1	0.001	W1
54	*Pterostichus leonisi* APFELBECK, 1904	2	0.08	D1	1.20	C1	0.001	W1
55	*Rugilus subtilis* ERICHSON, 1840	2	0.08	D1	1.20	C1	0.001	W1
56	*Silpha obscura* LINNAEUS, 1758	2	0.08	D1	1.20	C1	0.001	W1
57	*Tachyta nana* (GYLLENHAL, 1810)	2	0.08	D1	1.20	C1	0.001	W1
58	*Licinus silphoides* (ROSSI, 1790)	2	0.08	D1	0.60	C1	0.001	W1
59	*Leistus ferrugineus* (LINNAEUS, 1758)	2	0.08	D1	0.60	C1	0.001	W1
60	*Nicrophorus vestigator* HERSCH., *1807*	2	0.08	D1	0.60	C1	0.001	W1
61	*Amara eurynota* (PANZER, 1797)	1	0.04	D1	0.60	C1	0.001	W1
62	*Badister bipustulatus* (FABRICIUS, 1787)	1	0.04	D1	0.60	C1	0.001	W1
63	*Calathus fuscipes* (GOEZE, 1777)	1	0.04	D1	0.60	C1	0.001	W1
64	*Calathus melanocephalus* (LINNAEUS, 1758)	1	0.04	D1	0.60	C1	0.001	W1
65	*Calosoma inquisitor* (LINNAEUS, 1758)	1	0.04	D1	0.60	C1	0.001	W1
66	*Calathus halensis* (SCHALLER, 1783)	1	0.04	D1	0.60	C1	0.001	W1
67	*Falagrioma thoracica* (STEPHENS, 1832)	1	0.04	D1	0.60	C1	0.001	W1
68	*Harpalus atratus* LATREILLE, 1804	1	0.04	D1	0.60	C1	0.001	W1
69	*Harpalus rubripes* (DUFTSCHMID, 1812)	1	0.04	D1	0.60	C1	0.001	W1
70	*Licinus depressus* (PAYKULL, 1790)	1	0.04	D1	0.60	C1	0.001	W1
71	*Mycetoporus nigricolis* STEPHENS, 1835	1	0.04	D1	0.60	C1	0.001	W1
72	*Onthophagus ruficapillus* BRULLE, 1832	1	0.04	D1	0.60	C1	0.001	W1
73	*Philonthus addendus* SHARP. 1867	1	0.04	D1	0.60	C1	0.001	W1
74	*Philonthus laminatus* (CREUTZER. 1799)	1	0.04	D1	0.60	C1	0.001	W1
75	*Phosphuga atrata* (LINNAEUS. 1758)	1	0.04	D1	0.60	C1	0.001	W1
76	*Pterostichus melanarius* (ILliger. 1798)	1	0.04	D1	0.60	C1	0.001	W1
77	*Scaphidema metalica* (FABRICIUS. 1792)	1	0.04	D1	0.60	C1	0.001	W1
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The specific diversity was calculated on the basis of the dominant coleopterans – the *Carabidae* family. The real index diversity –H(S). calculated for the elm forest mixed with ash trees and field maple. represents the value of 1.95; the maximum diversity –H(S)max. had the value of 5.15; relative diversity (evenness) - Hr had the value of 0.38%. This point of evernness estimation. through the report between real diversity –H(S) and maximum diversity –H(S) max. till present it is not used. on the reason that in nature the maximum diversity can not be never reached. Therefore. there was chosen other possibility to calculate the equitability. (ε). with the relation ε = S′/S. The evenness value calculated through the relation proposed by Lloyd and Ghelardi for the elm forest mixed with ash trees and field maple. is 0.12. up to the ideal community with the same numbers of the species. but with the individuals reasonableness distributed. were ε=1. The evenness value calculated by those two methods is different. Let's consider. that the second value (0.12). reflects the reality better. the analysed test is characterized by a low evenness in the distribution of individuals in the species.

From the total of 1.383 specimens of ground beetles - 70.71% belongs to one species only. The calculation demonstrates that the carabids diversity in the forest elm mixed with ash trees. represents only 0.12% in comparison with the ideal community from the same number of the species. only with the individuals equitable distributed. This inequitable signification. it is explained not by the instability of the biotope. because this biotope has been already existing for 47 years. but by the very intensive anthropic activity. There has been found near the villages Cociulia and Tigheci. the forest it is intensely explored for dry wood collections. medicinal plants. mushrooms. as well as for grazing by the domestic animals. as well as this biotope is affected by the irresponsible people who recreate themselves in the middle of the nature. and leave the big quantities of recycle. cut the trees. make fire and destroy. The climactic conditions also contribute to the evolution of coleopterans density.

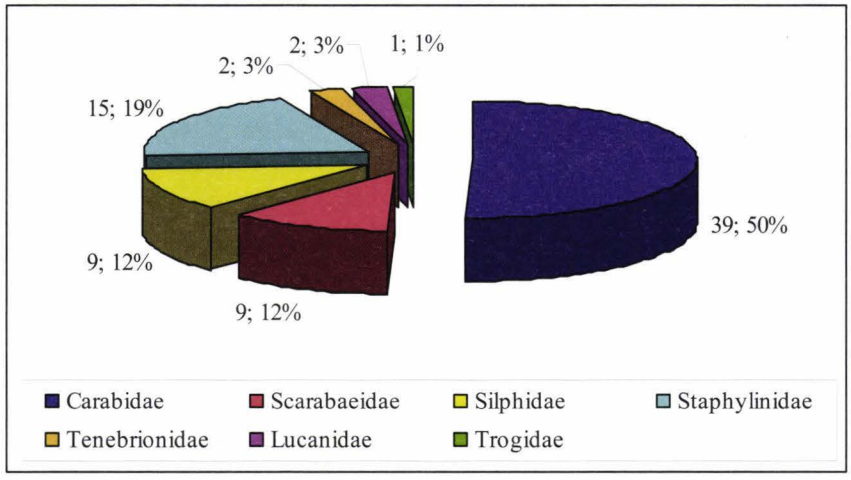

Figure 1. Ecological spectrum of the coleopterans families from the elm wood mixed with ash tree, field maple and maple tree collected in the years of 2004. 2005. 2006 using the pitfall traps

Figura 1. Spectru ecologic al familiilor de coleoptere din pădurea de ulm de câmp în amestec cu frasin, jugastru şi arţar, colectate în anii 2004, 2005, 2006 folosind-capcane de sol

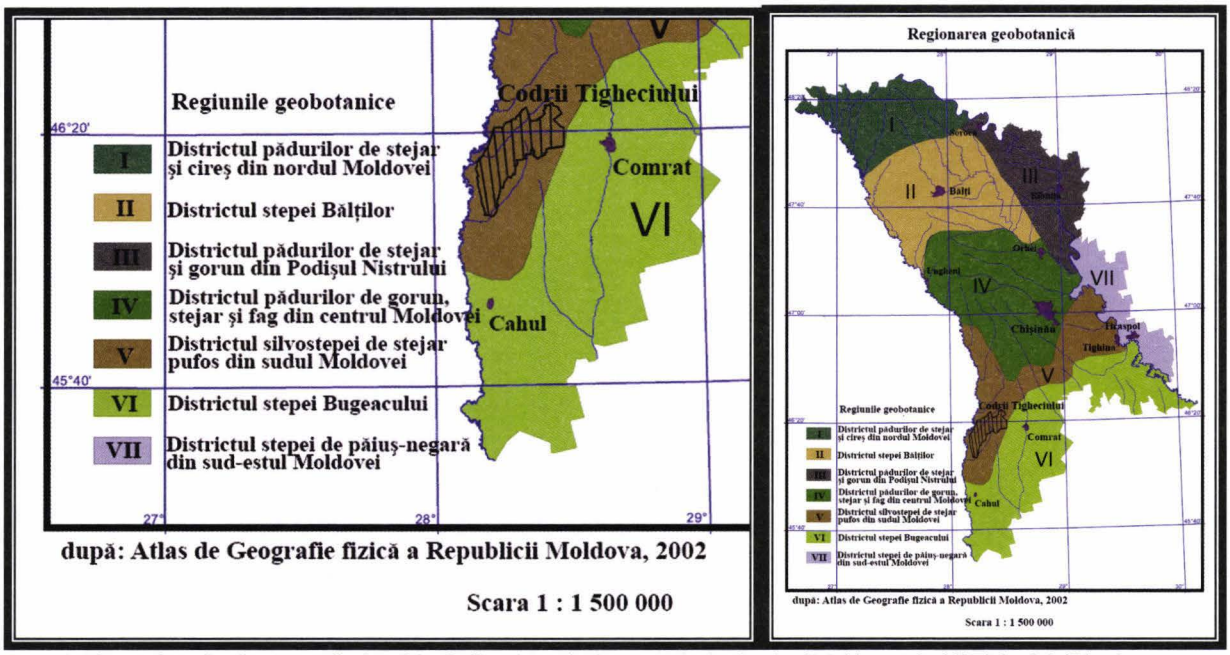

Figure 2. The geo botanic placement. district of the fluffy oak tree in the steppe in the South of Moldova. "Codrii Tigheciului" landscape reserve

Figura 2. Regionarea geobotanică. districtul silvostepei de stejar pufos din sudul Moldovei. rezervaţia peisagistică "Codrii Tigheciului"

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CONCLUSIONS

The edaphic beetle fauna of the elm forest (*Ulmus carpinifolia*) mixed with ash tree (*Fraxinus excelsior*) field maple (*Acer campestre*) and maple (*Acer platanoides*) is represented by 77 species which belong to 37 genera and 7 families.

The family Carabidae was the most representative with 39 species from 16. genera followed by the family Staphylinidae with 15 species from 10 genera; families Silphidae and Scarabaeidae are represented by 9 species each and respectively 4 and 2 genera. Families Lucanidae and Tenebrionidae are represented by 2 species and 2 genera. The Trogidae family is represented by one specie.

The diversity real index –H(S). calculated for this forest. has the value of 1.95; maximum diversity –H(S)max. has the value of 5.15; relative diversity (evenness) - Hr 0.38%. The evenness value – ε. 0.12.

Of the total number of 1383 ground beetles specimens 70.71% belongs to the same species - *Brachinus crepitans*.

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DATA ABOUT MACROLEPIDOPTERA (S. ORD. RHOPALOCERA) FAUNA OF THE HAŢEG BASIN HUNEDOARA COUNTY, ROMANIA)

SILVIA BURNAZ

Abstract. 79 Macrolepidoptera species (S.ord. Rhopalocera) were recorded from three natural reserves situated in Haţeg Basin (Hunedoara County). At present, the most part of Haţeg Basin is included in a great natural parc known as „Geoparcul Dinozaurilor – Ţara Haţegului (The Geoparc of Dinosaurs – Haţeg Country). Beside the well-known sites of reptilian paleofauna (Upper Cretacic), Haţeg Basin has also some natural reserves: "The Narcissus lawns of Sălaşu de Sus", "The rocks of Ohaba de Sub Piatră" (the village of Sălaşu de Sus) and The Slivuţ Forest of Haţeg town. If the first natural reserves are known for their rare plants, The Slivuţ Forest is known as the first protected area in which the bison were colonized. The Macrolepidoptera species of these natural reserves were studied between 2004-2006, every year, in May-August. The checklist of the species, accompanied by data about the frequency of species, the collecting sites and IUCN categories of endangerment is presented. *Euphydryas aurinia, Hyponephele lycaon, Maculinea teleius, Maculinea alcon, Neozephyrus quercus and Pseudophilotes schiffermuelleri*, included in the Red List of the Butterflies of Romania are some of the rare species identified in these natural areas of Haţeg Basin. For these species some data about the collecting site, the fly period, the trophic source of larvae and adults are presented.

Key words: Macrolepidoptera, Haţeg Basin, Romania

Rezumat. Date despre fauna de macrolepidoptere (S. Ord. Rhopalocera) din Bazinul Haţegului (Judeţul Hunedoara, România). 79 de specii de macrolepidoptere diurne (S.ord. Rhopalocera) au fost semnalate în trei rezervaţii naturale situate în Bazinul Haţegului (judeţul Hunedoara). În prezent, cea mai mare parte a Bazinului Haţegului este inclusă într-un mare parc natural cunoscut sub numele de «Geoparcul Dinozaurilor-Ţara Haţegului». Alături de binecunoscutele situri cu paleofaună reptiliană aparţinând Cretacicului superior, o importanţă deosebită o au şi rezervaţiile naturale "Fânaţele cu narcise de la Sălaşu de Sus", Stâncăriile de la Ohaba de Sub Piatră (comuna Sălaşu de Sus) şi Pădurea Slivuţ Haţeg. Dacă primele două sunt cunoscute mai ales pentru unele raritaţi floristice, Pădurea Slivuţ Haţeg, rest al unor extinse quercete din Bazinul Haţegului, este cunoscută ca fiind prima rezervaţie în care au fost colonizate câteva exemplare de zimbri. Macrolepidopterele din habitatele acestor rezervaţii naturale au fost studiate în 2004-2006, în fiecare an în lunile mai-august. Este prezentată lista sistematică a speciilor însoţită de date privind frecvenţa speciilor, locurile de colectare şi categoriile de periclitare conform IUCN 2001. *Euphydryas aurinia, Hyponephele lycaon, Maculinea teleius, Maculinea alcon, Neozephyrus quercus* şi *Pseudophilotes schiffermuelleri*, incluse în Lista Roşie a fluturilor din România, sunt câteva dintre speciile rare identificate în ariile naturale cercetate. Pentru aceste specii sunt prezentate date privind locul colectării, perioada de zbor a adulţilor, sursa trofică a larvelor şi adulţilor.

Cuvinte cheie: Macrolepidoptera, Bazinul Haţeg, România

INTRODUCTION

The Haţeg Basin is a distinct geographical unity of Hunedoara County (Romania). The depressionary area, with a surface of 550 km^2, is delimited in its Southern part by Retezat-Ţarcu Mountains and in the Western and Northwestern part by Poiana Ruscă Mountains. Şureanu Mountains and the Hills of Hunedoara border the Haţeg Basin in North and North-East (GRUMĂZESCU CORNELIA 1975; POPA 1999).

From 1979 until present, a lot of historical and natural monuments has been protected in the area of Haţeg Basin. The fame of this depression is due to its archaeological sites of Ulpia Traiana Sarmizegetusa but also to the fossiliferous sites with cretaceous reptilian fauna (especially dinosaurs) of Sânpetru and Tuştea localities.

The relief of the Haţeg Basin is formed by down and high plains. Hills with 500-600 m and 650-850 m altitude border the depression.

In 2004, The Geopark of Dinosaurs – Haţeg Country was created. This natural park, situated in the Southwestern part of Hunedoara County, protects not only the sites of fossil reptiles but also ecosystems, landscapes, plant and animal species, geological formations, historical and archaeological sites. Some natural reserves are situated into this park: "The forest of Slivuţ" (near Haţeg town), "The lawns of Narcissus stellaris of Sălaşu de Sus", "The rocks of Ohaba de Sub Piatră" (Sălaşu de Sus Village).

Between 2004-2006 we studied the lepidoptera fauna (S.ord. Rhopalocera) of the protected areas of Haţeg Basin. The aim of this study is to evidence the diversity of the butterflies of these areas.

GEOGRAPHICAL SITUATION

The lawns of *Narcissus stellaris* are situated in Haţeg Depression, on the territory of Sălaşu de Sus commune. These coenoses are bordered by the Retezat Mountains in South (GRUMĂZESCU CORNELIA 1975; POPA 1999). The rocks of Ohaba de Sub Piatră (Şureanu Mountains) are also situated on the territory of the village of Sălaşu de Sus. The Forest of Slivuţ is situated on the territory of Haţeg town. Two of these natural reserves, "The Stones of Ohaba de Sub Piatră" and "The lawns with *Narcissus* of Sălaşu de Sus" are situated on the principal route to the National Park of Retezat Mountains.

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CLIMATE

According to TRUFAŞ (1985) and GRUMĂZESCU CORNELIA (1975), the area of Haţeg Basin has an annual average of the temperature of 8-9^{0}C and an annual average of precipitations of 600 mm.

FLORA AND VEGETATION

Some very important associations characterize the vegetation of these natural reserves. For example, BOŞCAIU (1965) has described from Sălaşu de Sus *Peucedanum (rocheliani) – Molinietum coeruleae* association. The coenoses of this association are situated in the southern part of Sălaşu de Sus village. *Narcissus stellaris* (in April-May), *Peucedanum rochelianum*, *Molinia coerulea*, *Gladiolus imbricatus*, *Gentiana pneumonanthe*, *Iris sibirica*, *Orchis morio*, *Anthoxanthum odoratum*, *Briza media*, *Poa pratensis*, *Festuca rubra*, *Agrostis tenuis*, *Luzula campestris*, *Myosotis palustris*, *Senecio jacobaea*, *Carex flava*, *Carex hirta*, *Lythrum salicaria*, *Salix cinerea*, *Galium verum*, *Potentilla erecta*, and other species were reported by this coenoses. The rocks of Ohaba de Sub Piatră are protected because of their very rare plants such as: *Plantago holosteum*, *Anthemis montana*, *Alyssum murale*, *Astragalus onobrychis* var. *linearifolius* (BOŞCAIU, PETERFI & CERNELEA 1974). The Forest of Slivuţ is formed especially by *Quercus petraea*, *Quercus robur* but also by *Fagus silvatica*, and *Carpinus betulus*. *Hepatica transsylvanica*, an endemic species in Romania, was also reported of this protected area. Shrubs are very present in all these areas and represented by *Berberis vulgaris*, *Sambucus nigra*, *Sambucus racemosa*, *Clematis vitalba*, *Crataegus monogyna*, *Rosa canina* and *Prunus spinosa*. Near the lawns with *Narcissus stellaris* of Sălaşu de Sus village, *Alnetum glutinosae* and *Alneto-Salicetum* associations borders Sălaşu de Sus river.

MATERIAL AND METHODS

The studies of butterflies were carried out in 2004-2006. Using an entomological net we sampled in the protected areas of Haţeg Basin, every year, in April-May and June-August. Coenoses of mesophilous and mesohygrophilous lawns, shrubs, forests, alder associations and stones with mesophilous and mesoxerophilous vegetation were the principal habitats we studied.

The lepidopterological material was identified after SPULER (1909-1911), BERGMANN (1952), NICULESCU (1961, 1965, 1966, 1967), CONTARINI & FIUMI (1982), CHYNERY (1996), HIGGINS & RILEY (1970, 1993), STILL (1996) and FELTWELL (2001). The scientifical nomenclature and the classification of butterflies is according to RÁKOSY (2002).

The frequency of the species was established according to RÁKOSY & VIEHMANN (1991) classification:

Common species – 6-15 specimens/day;

Very common species – over 16 specimens/day;

Relative common species – 1-5 specimens/day;

Rare species – 5-10 specimens /generation;

Very rare species – 1-4 specimens /generation.

The status of the species, according to IUCN 2001 categories of endangerment, is presented. These categories of endangerment of taxa were published by RÁKOSY (2002) in the Red List of Romanian butterflies.

EX- Extinct taxa;

CR- Critical Endangered taxa;

EN- Endangered taxa ;

VU- Vulnerable taxa ;

NT- Near threatened taxa;

LC – Least concern taxa.

RESULTS AND DISCUSSIONS

On the basis of the samples and field observations, 79 species of butterflies were identified.

68 species were recorded from Ohaba de Sub Piatră Stones, 74 species from Sălaşu de Sus lawns of Narcissus stellaris and 71 species from Slivuţ Forest (Haţeg). Most of the species were collected in the lawns of Sălaşu de Sus protected area.

The analysis of the lepidopterological material emphasizes the following structure of the families of Rhopalocera (Table 1).

Table 1. Number of the identified species in relation with the families of S.ord. Rhopalocera
Tabel 1. Numărul speciilor identificate în raport cu familiile S.ord. Rhopalocera

Families	Number of species
HESPERIIDAE	9
PAPILIONIDAE	2
PIERIDAE	8
LYCAENIDAE	21
NYMPHALIDAE	39
Total species	79

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Nymphalidae with 39 species and Lycaenidae with 21 species are the prevalent families.

The checklist of the species and data about the sites of sampling, the frequency of species and IUCN categories of endangerment are presented (Table 2).

Table 2. The checklist of Macrolepidoptera species (S. ord. Rhopalocera) reported from the natural protected areas of Haţeg Basin. The sites, the frequency of species and IUCN categories of endangerment.

Tabel 2. Lista sistematică a speciilor de Macrolepidoptere (S.ord. Rhopalocera) semnalate în arealele naturale protejate din Bazinul Haţegului. Locurile de colectare, frecvenţa speciilor şi categoriile de periclitare conform IUCN 2001

Erynnis tages tages (LINNAEUS, 1758)	+	+	+	C	LC
Pyrgus carthami (HÜBNER, 1813)	+	+	-	R.c.	LC
Carcharodus alceae (ESPER, 1780)	+	+	+	V.r.	LC
Carcharodus floccifera (Zeller, 1847)	+	+	+	V.r.	NT
Pyrgus malvae malvae (LINNAEUS, 1758)	+	+	+	C	LC
Carterocephalus palaemon (Pallas, 1771)	+	+	+	C	LC
Thymelicus sylvestris (PODA, 1761)	-	-	+	R.c	LC
Hesperia comma (LINNAEUS, 1758)	+	+	+	V.c.	LC
Ochlodes venatus faunus (TURATI, 1905)	+	+	+	V.c.	LC
Papilio machaon machaon (LINNAEUS, 1758)	+	+	+	R.c.	NT
Iphiclides podalirius (LINNAEUS, 1758)	+	+	+	R.c.	NT
Leptidea sinapis sinapis (LINNAEUS, 1758)	+	+	+	V.c.	LC
Anthocharis cardamines (LINNAEUS, 1758)	+	+	+	C	LC
Pieris rapae (LINNAEUS, 1758)	+	+	+	V.c.	LC
Pieris napi napi (LINNAEUS, 1758)	+	+	+	V.c.	LC
Pontia edusa (FABRICIUS, 1777)	+	+	+	V.c.	LC
Colias croceus (FOURCROY, 1785)	+	+	+	R.c.	LC
Colias hyale (LINNAEUS, 1758)	+	+	+	C	LC
Gonepteryx rhamni rhamni (LINNAEUS, 1758)	+	+	+	R.c.	LC
Hamearis lucina (LINNAEUS, 1758)	+	+	+	V.c.	LC
Lycaena phlaeas phlaeas (LINNAEUS, 1761)	+	+	+	C	LC
Lycaena dispar rutila (WERNEBURG, 1864)	+	+	-	R.c.	VU
Lycaena tityrus tityrus (PODA, 1761)	-	+	+	R	NT
Lycaena thersamon (ESPER, 1784)	+	+	-	R	VU
Thecla betulae (LINNAEUS, 1758)	+	+	+	R	LC
Neozephyrus quercus quercus (LINNAEUS, 1758)	-	-	+	V.r.	VU
Callophrys rubi (LINNAEUS, 1758)	+	+	+	C	LC
Satyrium w-album (KNOCH, 1782)	+	+	+	C	LC
Satyrium *acaciae* (Fabricius, 1787)	+	+	+	R	VU
Cupido minimus minimus (FUESSLY, 1775)	+	+	+	C	NT
Everes argiades (PALLAS, 1771)	+	+	+	C	LC
Celastrina argiolus (LINNAEUS, 1758)	+	+	+	C	LC
Pseudophilotes schiffermuelleri HEMMING, 1929	-	+	-	V.r.	NT
Glaucopsyche alexis (PODA, 1761)	+	+	+	R.c.	LC
Maculinea arion (LINNAEUS, 1758)	-	+	+	R	NT
Maculinea *teleius* (BERGSTRÄSSER, 1779)	-	+	-	V.r.	EN
Maculinea alcon (DENIS & SCHIFFERMÜLLER, 1775)	-	+	-	V.r.	EN
Plebeius argus argus (LINNAEUS, 1758)	+	+	+	V.c.	LC
Plebeius argyrognomon (BERGSTRÄSSER, 1779)	+	+	+	V.c.	LC
Polyommatus icarus (ROTTEMBURG, 1775)	+	+	+	V.c.	LC
Argynnis paphia paphia (LINNAEUS, 1758)	+	+	+	V.c.	LC
Argynnis aglaja (LINNAEUS, 1758)	+	+	+	V.c.	LC
Argynnis adippe (DENIS & SCHIFFERMÜLLER, 1775)	+	+	+	V.c.	LC
Argynnis niobe niobe (LINNAEUS, 1758)	+	+	+	V.c.	LC
Brenthis daphne (DENIS & SCHIFFERMÜLLER, 1775)	+	+	+	R	VU
Brenthis hecate (DENIS & SCHIFFERMÜLLER, 1775)	+	+	-	R	VU
Boloria euphrosyne (LINNAEUS, 1758)	+	+	+	V.c.	LC
Boloria selene (DENIS & SCHIFFERMÜLLER, 1775)	+	+	+	V.c.	LC
Boloria dia dia (LINNAEUS, 1767)	+	+	+	V.c.	LC
Vanessa atalanta (LINNAEUS, 1758)	+	+	+	V.c.	LC
Vanessa cardui (LINNAEUS, 1758)	+	+	+	V.c.	LC
Inachis io (LINNAEUS, 1758)	+	+	+	R.c.	LC
Polygonia c-album (LINNAEUS, 1758)	+	+	+	R.c.	LC
Araschnia levana (LINNAEUS, 1758)	+	+	+	R.c.	LC
Nymphalis antiopa (LINNAEUS, 1758)	+	+	+	R	LC
Euphydryas aurinia aurinia (ROTTEMBURG, 1775)	-	+	-	R.c.	EN

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Melitaea cinxia cinxia (LINNAEUS, 1758)	+	+	+	V.c.	LC
Melitaea britomartis ASSMANN, 1847	+	+	+	R	LC
Melitaea athalia athalia (ROTTEMBURG, 1775)	+	+	+	V.c.	LC
Neptys hylas (LINNAEUS, 1758)	+	+	+	R.c.	VU
Neptis rivularis (SCOPOLI, 1763)	+	+	+	R	LC
Apatura ilia ilia (DENIS & SCHIFFERMÜLLER, 1775)	-	+	+	R	VU
Apatura iris (LINNAEUS, 1758)	-	+	+	R	VU
Pararge aegeria tircis BUTLER, 1867	+	+	+	V.c.	LC
Lasiommata megera megera (LINNAEUS, 1767)	+	+	+	R.c.	LC
Lasiommata maera (LINNAEUS, 1758)	+	+	+	C	LC
Coenonympha arcania arcania (LINNAEUS, 1761)	+	+	+	V.c.	LC
Coenonympha glycerion glycerion (BORKHAUSEN, 1788)	+	+	+	R.c.	LC
Coenonympha pamphilus (LINNAEUS, 1758)	+	+	+	V.c.	LC
Pyronia tithonus tithonus (LINNAEUS, 1767)	+	+	+	R.c.	EN
Aphantopus hyperantus (LINNAEUS, 1758)	+	+	+	V.c.	LC
Erebia aethiops aethiops (ESPER, 1777)	+	-	+	R.c.	LC
Maniola jurtina jurtina (LINNAEUS, 1758)	+	+	+	V.c.	LC
Hyponephele lycaon (ROTTEMBURG, 1775)	+	-	+	V.r.	VU
Melanargia galathea (LINNAEUS, 1758)	+	+	+	V.c.	LC
Minois dryas (SCOPOLI, 1763)	+	+	+	R.c.	LC
Hipparchia fagi (SCOPOLI, 1763)	+	+	+	V.r.	LC
Satyrus circe pannonica (Fruhstorfer, 1919)	+	+	+	V.r.	LC
Arethusana arethusa (DENIS & SCHIFFERMÜLLER, 1775)	-	-	+	V.r.	EN

Abbreviations: SO: Ohaba de Sub Piatră Stones; **LS:** Lawns of Sălaşu de Sus; **SF:** Slivuț Forest (Hațeg); **F= Frequency: C** = Common species – 6-15 specimens/day; **V. c**.= Very common species – over 16 specimens/day; **R. c**.= Relative common species – 1-5 exemplare/zi; **R** = **Rare species** – 5-10 specimens/generation; **V. r**.= Very rare species – 1-4 specimens/generation (RÁKOSY & VIEHMANN 1991); Categories of endangerment according IUCN 2001 (RÁKOSY (2002): **CR**- Critical Endangered taxa; **EN**- Endangered taxa; **VU**- Vulnerable taxa; **NT**- Near threatened taxa; **LC** – Least concern taxa.

Concerning the frequency of the species, most of captured species are common or relative common species such as: *Erynnis tages*, *Pyrgus malvae*, *Callophrys rubi*, *Cupido minimus minimus*, *Celastrina argiolus*, *Lycaena phlaeas*, *Lycaena dispar rutila*, *Colias hyale*, *Euphydryas aurinia aurinia*. Very common species (over 16 specimens/day), in all the studied areas are: *Maniola jurtina jurtina*, *Pieris rapae*, *Pieris napi*, *Aphantopus hyperanthus*, *Coenonympha pamphilus*, *Coenonympha arcania*, *Hamearis lucina*. Rare species are *Lycaena tityrus tityrus*, *Lycaena thersamon*, *Apatura ilia ilia*, *Apatura iris*, *Neptis rivularis*, *Melitaea britomartis*, *Nymphalis antiopa*, *Brenthis hecate* and *Brenthis daphne*. Very rare species are: *Neozephyrus quercus quercus*, *Hipparchia fagi*, *Brintesia circe pannonica*, *Arethusana arethusa*, *Hyponephele lycaon*, *Maculinea teleius*, *Maculinea alcon*, *Pseudophilotes schiffermuelleri*.

Adults nectar sources are varied. For example a lot of species as *Erynnis tages*, *Hesperia comma*, *Polyommatus icarus*, *Leptidea sinapis*, *Melitaea athalia*, *Melitaea cinxia*, *Boloria selene selene*, *Boloria dia dia*, *Boloria euphrosyne euphrosyne*, *Glaucopsyche alexis*, *Argynnis aglaja*, *Argynnis adippe* and other species have been found on flowers of *Medicago lupulina*, *Melilothus officinalis*, *Trifolium campestre*, *Hypericum perforatum*, *Leucanthemum vulgare*, *Dianthus carthusianorum*, *Narcissus stellaris*, *Orchis morio*, *Scabiosa columbaria*, *Sanguisorba offinicalis*, *Senecio vulgaris*, *Salvia nemorosa*, *Galium verum*, *Tanacetum vulgare*, *Viola tricolor*, *Potentilla reptans*. *Neozephyrus quercus* prefers *Sambucus nigra* and *Sambucus racemosa*. Other species were rarely observed on flowers as *Neptis rivularis*. Some species like *Inachis io* and *Vanessa atalanta* prefer fruits or tree sap.

Some of the captured species are included in the Red List of Romanian butterflies (RÁKOSY 2002) as vulnerable or endangered taxa:

Neozephyrus quercus quercus (LINNAEUS, 1758) – 1♂, at the edge of the Slivuț Forest. Monovoltine species. The adults fly in July-August. Larvae breed on *Quercus cerris* and finish their stage in ants nests. Flowers of *Sambucus nigra* and *Sambucus racemosa* are often visited by the adults. It is a rare species in Hunedoara County and recorded from Costeşti, The Gorges of Bănița, The Gorges of Crivadia (Şureanu Mountains) and the Gorges of Cerna (Poiana Ruscă Mountains) (BURNAZ SILVIA 2002).

Maculinea alcon alcon (DENIS & SCHIFFERMÜLLER, 1775) – 1♂ 26. 06. 2006, at Sălaşu de Sus lawns. Monovoltine species. The adults fly in June-July and often visit *Teucrium chamaedrys*, *Thymus serpyllum*, *Aster amellus*, *Centaurea scabiosa*, *Cardamine pratensis*, *Arabis hirsuta*. Larvae breed on *Gentiana pneumonanthe* and finish their stage in ant nests.

Maculinea arion (LINNAEUS, 1758) – 5♂♂ 10.07.2005, 3♂♂ 26.06.2006 at Sălaşu de Sus lawns. The adults fly in June-July. Adult nectar sources are: *Filipendula ulmaria*, *Agrimonia eupatoria*, *Leucanthemum vulgare*, *Linum flavum*, *Thymus serpyllum*. Larvae breed on *Thymus serphyllum* and, after in ant nests.

Maculinea teleius (BERGSTRÄSSER, 1779) – 1♂ 26.06.2006, at Sălaşu de Sus lawns. Larvae breed on *Sanguisorba officinalis*. *Myrmecophilous* species.

Pseudophilotes schiffermuelleri HEMMING, 1929 – 1♂ 26. 06. 2006 at Sălaşu de Sus. It occurs in open fields and pastures. This species is bivoltine. The first flight extends from May to June inclusive and the second from July to August inclusive. Larvae breed on *Thymus serphyllum*. It is the first record of this species in Hunedoara County.

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Hyponephele lycaon lycaon (ROTTEMBURG, 1775) – 2♂♂, 26.06.2006 at Ohaba de Sub Piatră Stones and 1♂ at Slivuţ Forest (Haţeg). Monovoltine species (VII-IX). Butterflies occur in stony lowlands but also at the edge of the forest. Larvae breed on grasses (Poaceae).

Euphydryas aurinia aurinia (ROTTEMBURG, 1775) – 6♂♂ 20.05.2006 at Sălaşu de Sus lawns. Eurosiberian element, spread in the northern part of Africa, Europe and Asia. The adults like open spaces in both damp and dry conditions (STILL ,1996). In Romania it is a frequent species in Banat (Arad, Timiş) and Transilvania (Mureş, Braşov, Hunedoara, Alba) (KÖNIG ,1979; MOLDOVEANU ,1995). In Hunedoara County the adults prefer the dump habitats of the limestone areas (BURNAZ SILVIA, 2005). It is the first time we found this species in a law plain, near Retezat Mountains. Here, in the natural reserve of Narcissus, a lot of specimens we have seen in the second decade of May. The adults rest on *Carex hirta* and other Cyperaceae and Poaceae. The larvae breed on *Scabiosa columbaria* şi *Plantago* sp. (STILL 1996).

Arethusana arethusa (DENIS & SCHIFFERMÜLLER, 1775) - 1♂, 26.06.2006, at the edge of Slivuţ Forest. The adults fly in July-August. Larvae breed on different grasses, especially Festuca.

Brintesia circe pannonica FRUHSTORFER, 1911 - 3♂♂ 14.07.2004; 1♂ 20.07.2005; 4♂♂ 18.07.2006 at Slivuţ Forest. Monovoltine species. Flight dates from July to August. Larvae breed on Poaceae. Adults rarely visit flowers.

Figure 1. *Maculinea teleius* (BERGSTRÄSSER, 1779)

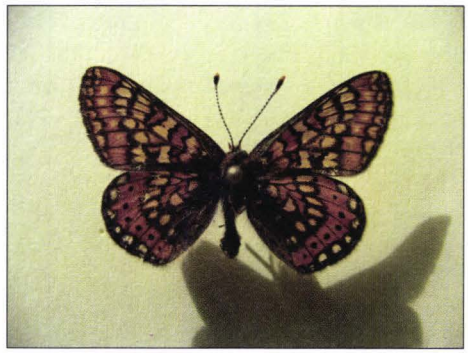

Figure 2. *Euphydryas aurinia aurinia* (ROTTEMBURG, 1775)

Figure 3. *Hyponephele lycaon* (ROTTEMBURG, 1775)

Figure 4. *Arethusana arethusa* (DENIS & SCHIFFERMÜLLER, 1775)

CONCLUSIONS

Even if the identified taxa represent only 33.96% of the total of butterflies of Romania, we consider that the fauna of butterflies is varied in the studied area. Some of species as *Euphydryas aurinia*, *Maculinea teleius*, *Maculinea alcon*, *Lycaena dispar rutila*, *Apatura iris*, *Apatura ilia*, etc., are included in the Red List of Romanian butterflies as endangered or vulnerable species. They are protected not only in Romania but also in the European Union.

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SEAZONAL FLUCTUATIONS AND SOME ASPECTS OF COLLEMBOLA DISTRIBUTION FROM THE "PLAIUL FAGULUI" NATURAL FOREST RESERVE

GALINA BUŞMACHIU

Abstract. The influence of soil humidity and temperature on seasonal fluctuation of Collembolan density was studied in seven experimental areas of the "Plaiul Fagului" Natural Forest Reserve. The study demonstrated that the insects from the order Collembola are very active in Moldova during the whole year and their density depends mostly on the soil humidity, less on the temperature and season.

Key words: Collembola, Natural Forest Reserve, seasonal dynamics.

Rezumat. Dinamica sezonieră şi unele aspecte ale distribuţiei colembolelor din Rezervaţia Naturală de Stat „Plaiul Fagului". Dinamica sezonieră a colembolelor şi influenţa temperaturii şi umidităţii solului asupra densităţii lor a fost studiată în şapte suprafeţe experimentale ale Rezervaţiei Naturale de Stat „Plaiul Fagului". S-a constatat, că insectele din ordinul Collembola sunt active pe parcursul întregului an calendaristic şi numai umiditatea redusă a solului în sezonul estival influenţează negativ asupra densităţii lor.

Cuvinte cheie: Collembola, Rezervaţie naturală forestieă, dinamica sezonieră.

INTRODUCTION

The important role of soil invertebrates in the decomposition of forest litter and the formation of humus profiles are an integral part of the ecological studies beginning from the first half of XXth Century (GRUIA M., ZAMFIRESCO A., 1971). Edafic microarthropods, particularly Collembola are important members of the detrital system. They participate in the fragmentation of plant detritus and stimulate the activity of fungal and bacterial colonies. Their relatively large population size and potential influence in nutrient mobilization make Collembola an important component in forest ecosystem processes. Soil microarthropods community is considered as a useful bioindicator of forest condition and change (HOLE F., 1981). The present study aimed at investigate the seasonal dynamics of Collembola communities' and some aspects of their distribution.

The first results of the study of Collembola fauna of "Plaiul Fagului" Natural State Reserve are presented in the paper BUŞMACHIU G., 2006 and include 53 species collected from the soil, litter and mosses. Among them, two species are cited as new for the Republic of Moldavia.

The objective of this experiment was to establish the influence of soil temperature and humidity on Collembola abundance in neighbouring forest sites situated in the slopes with Southern and Northern expositions. It was hypothesized that their response will be different according to the physical parameters of soil and as a result of ecological changes at temporal scales.

MATERIALS AND METHODS

The „Plaiul Fagului" Natural State Reserve is situated in the North – West of the Central Moldavian Hills, at 70 km from the city of Kishinev - the capital of the country, at the longitude of approximately $28^0\ 01^1$ E and latitude $47^0\ 17^1$ N. This reserve is an important part of Moldavian protected areas with a surface of 5,558.7 km^2. The Vegetation of the Reserve consists of several types of temperate mixed forest with dominant oak or monodominant beech trees, typical for European region. The rare species of plants and vertebrate animals are mentioned, including some Carpathian elements (URSU A., 2005).

The investigations were performed in seven selected experimental areas (EA) each of them with a surface of 50 x 50 m^2. The characteristics of experimental areas are given in Table 1. Six of them are temperate mixed oak forests on grey and brown soils, and one is old beech forest on rendzina soil:

1. Mixed forest from EA № 1 with dominant *Quercus petraea, Tilia tomentosa, Carpinus betulus* with grass *Carex brevicola.*
2. Mixed forest from EA № 3 with *Fraxinus excelsior, Quercus petraea, Tilia tomentosa* with grass *Parietaria officinalis.*
3. Mixed forest from EA № 6 with *Quercus robur, Tilia cordata, Carpinus betulus* with grass *Geranium phaeum.*
4. Mixed forest from EA № 8 with *Quercus robur, Carpinus betulus* with grass *Rubus caesius.*
5. Mixed forest from EA № 9 with *Quercus petraea, Tilia tomentosa, Carpinus betulus* with grass *Scutellaria altissima*
6. Forest from EA № 15 with predominant *Fagus sylvatica, Carpinus betulus* with grass *Cephalanthera damassonium.*
7. Mixed forest from EA №16 with *Quercus robur, Fagus sylvatica, Tilia cordata* with grass *Epipactis heleborine.*

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Table 1. Characteristics of experimental areas
Tabel 1. Caracateristicele suprafeţelor experimentale

		1	2	3	4	5	6	7
EA №		**1**	**3**	**6**	**8**	**9**	**15**	**16**
Altitude a.s.l.(m)		232	390	232	167	287	273	250
Exposition		N	N	SE	S	SE	N	NW
Slope		15^0-20^0	2^0-10^0	5-7^0	2-3^0	15^0	50^0 - 60^0	15^0
Soil type*		**Greyzems**	**Luvisol**	**Greyzems**	**Greyzems**	**Luvisol**	**Rendzina**	**Greyzems**
N		$47^0 17^l 55$	$47^0 17^l 16$	$47^0 18^l 17$	$47^0 18^l 13$	$47^0 18^l 43$	$47^0 17^l 29$	$47^0 17^l 41$
E		$28^0 01^l 46$	$28^0 01^l 42$	$28^0 03^l 57$	$28^0 04^l 65$	$28^0 01^l 76$	$28^0 03^l 18$	$28^0 02^l 82$
Number of soil cores		24	32	16	32	32	32	24
Soil depth (cm)		5	5	5	5	5	5	5
Litter layer (cm)		1.5 - 2	1.5 - 2	1 – 1.5	2 - 3	3.5 - 4	5 - 6	1- 2
Humus content*		5.7-6.0	6.1	6.89	4.93	2.78	7.28	3.6
pH*		6. 8	6. 8	6. 60	5. 6	6.2	7.2	6.3
W*	<0.001 mm	-	17	19	-	21	40.79	-
	<0.01 mm	-	32	29	-	25	25.52	-

*Type of soil, humus content, pH, W and soil moisture according to Ursu, 2005.

Samples were collected jointly from EA with S and N exposition from March 2006 to May 2007 in two horizons: soil and litter layers in eight replications. Soil samples with 25 cm^2 surface area and litter samples with 100 cm^2 and 5 cm depth were taken with squares 5 x 5 cm and 10 x 10 cm respectively. Specimens of Collembola were extracted from soil and litter samples using flotation method, then processed in 70-80 % ethanol and mounted in permanent slides.

For each sample point, soil temperature was recorded at the time of collection and soil humidity was determined in the lab. condition.

The winter season of 2006-2007 in the Republic of Moldova was the warmest for all the observation period. The registered mean of air temperature was + 0.9 - +2.8°C, being higher than usual with 4.1-4.6°C. The spring came very early with higher temperature and low precipitation. Climatic data are based on long-term observations and refer to the Meteorological Station of Kishinev.

RESULTS AND DISCUSSION

The general mean of collembolan density from all EA during the studied period was 21, 654 ind.m^{-2}, with minimum 10, 733 ind.m^{-2}, maximum 34, 950 ind.m^{-2} and SD 7 899. The maximum mean of the collembolan density was registered in the springs of 2006 and 2007.

The maximum collembolan density for one of the selected studied area was recorded in April 2006 in EA № 9 and minimum in July 2006 in EA № 8. The greatest difference in collembolan density occurred in collections taken from beech forest (EA №15) in January (min value 13, 775 ind.m^{-2}) and in May 2006 (max value 33, 900 ind.m^{-2}). Figure 1 shows the changes of collembolan density during the studied period including mean, maximum, minimum parameters and standard deviation for each month of collection.

The lowest annual mean of collembolan density between all the studied experimental areas only 13, 864 ind.m^{-2} were observed in EA № 8. Also in the same EA there were registered the lowest maximum, that is 20, 750 ind.m^{-2} and minimum value of 10, 733 ind.m^{-2}. The highest annual mean collembolan density value between all studied areas - was 23, 025 ind.m^{-2} and the value of the minimum density was - 16, 000 ind.m^{-2} and the maximum density of – 33, 700 ind.m^{-2} was observed in EA № 9.

Table 2. Mean value (mean dens.; ind.m^{-2}), standard deviation, minimum (min dens.; ind.m^{-2}) and maximum (max dens.; ind. m^{-2}) of Collembolan density for some EA
Tabel 2. Valoarea medie (dens. medie, ind.m^{-2}), deviaţia standard, minimă (dens. min., ind.m^{-2}) şi maximă (dens. max., ind. m^{-2}) a densităţii colembolelor pentru unele SE

EA №	Mean dens.*	SD*	Maximum*	Minimum*
EA № 3	20 599	±8 189	33 650	12 499
EA № 8	13 864	±4 628	20 750	10 733
EA № 9	23 025	±7 601	33 700	16 000
EA № 15	22 477	± 9 578	33 900	13 775

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The study demonstrated that Collembola are very active also in the winter season in the Republic of Moldova. The mean collembolan density value in the winter of the year 2006 – 2007 was higher than in autumn and it increases in the spring season.

The standard deviation (Table 2) shows the great fluctuation between recorded collembolan densities collected in each EA taken in the part during the studied period. The maximum SD 9 578 was calculated for EA № 15 and minimum for EA № 8.

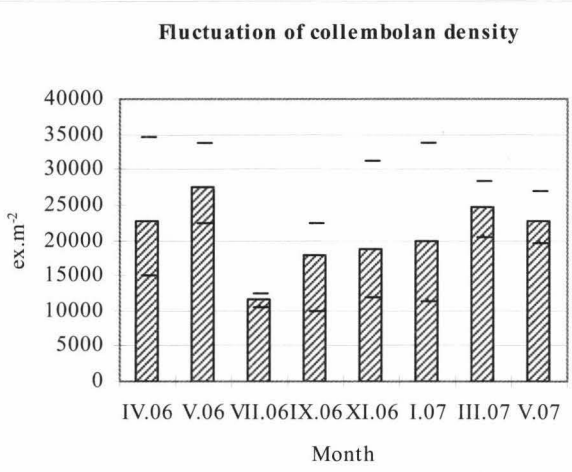

Figure 1. The fluctuation of collembolan density during the 14 studied months.
Vertical bars indicate standard deviation of the mean.
Figura 1. Fluctuaţia densităţii colembolelor în cele 14 luni de studiu. Barele verticale indica media deviaţiei standard.

Analyzing the 2006 – 2007 time-series data there was determined the fluctuation of annual mean density of Collembola collected from different EA of the Reserve in relation to the temperature and humidity (Fig.2). The changes of collembolans density, soil humidity and temperature during 14 studied months were considerable. The mean temperature measured monthly had value between $+3.1^0$ C in January 2006 and $+19.5^0$ C in May 2007 and it was clearly higher at EA with South exposition compared with North exposition.

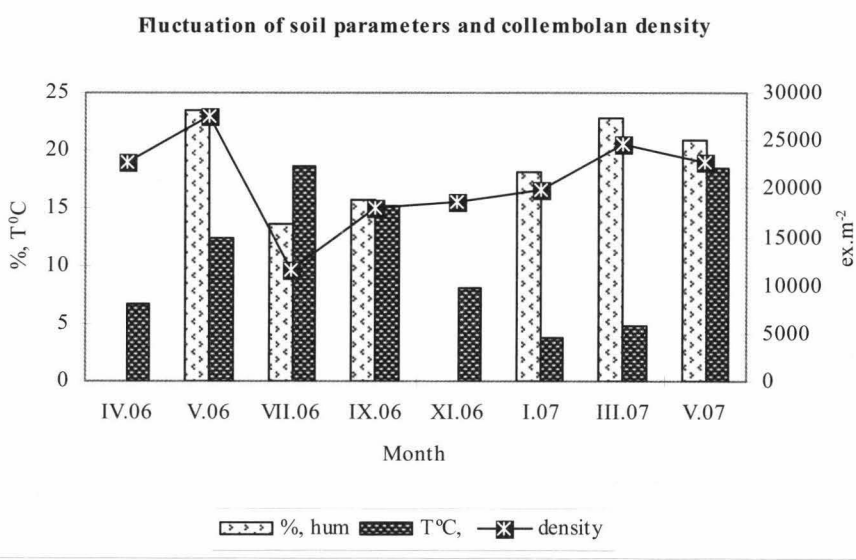

Figure 2. The fluctuation of soil humidity, temperature and collembolan density in the studied period.
Figura 2. Fluctuaţia umidităţii solului, temperaturii şi densităţii colembolelor în perioada studiată.

The mean registered value of the soil humidity during the studied months was minimum of 12.42 % in July 2006 and maximum of 26.18 % in January 2007. The registered decrease of the soil humidity in July 2006 was, of

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course, the cause of the minimum collembolan density in this month. The highest value of the soil humidity of 28. 48 % was registered in EA N.8 in January 2007. It was observed that the EA with South exposition was usually dryer than the EA with North exposition. The humidity decreases more quickly with the increasing of soil temperature in the EA with South exposition. The collembolan density changed in the same direction as the values of soil humidity being lower in hot summer period with insufficient precipitations. The changes of soil temperature during the year haven't big influence on the collembolan density, but lower soil humidity influenced negatively on their density.

CONCLUSIONS

In spite of the neighbouring location of the studied experimental areas, there were big differences between the values of the collembolan densities. The maximum annual mean density values were registered in the spring during both studied years. The study demonstrated that the insects from the order Collembola are very active in Moldova during the whole year and their density depends mostly on the soil humidity, less on the temperature and season.

ACKNOWLEDGEMENTS

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CONTRIBUTIONS TO THE KNOWLEDGE OF THE FAUNA OF COLEOPTERANS (INSECTA: COLEOPTERA: COCCINELLIDAE, ELATERIDAE, STAPHYLINIDAE) FROM THE "NORDUL GORJULUI" POTENTIAL NATURAL PARK, GORJ COUNTY, ROMANIA

CORNELIA CHIMIŞLIU

Abstract. The paper syntethisizes the species of the families: **Coccinellidae, Elateridae** and **Staphylinidae** mentioned in the consulted literature of speciality, published in the period of the years 1928-2006, from the „Nordul Gorjului" potential Natural Park. There were identified 78 species and subspecies included in 43 genera, belonging to those three families. Family **Coccinellidae** is best represented (27 species and subspecies, included in 19 genera), followed by the families: **Staphylinidae** (26 species and subspecies, included in 12 genera) and **Elateridae** (25 species and subspecies, belonging to 12 genera). The paper emphasizes the fact that the taxons of coleopterans have not been studied specially, the data coming from sporadical collections, the mentioned species being collected together with the species from other groups of coleopterans. 59 species were mentioned once in the last 79 years; of which 15 have not been yet mentioned since 1928. For the knowledge of the species diversity of those three families, we consider that toxanomic studies are necessary.

Key words: diversity, coccinelids, elaterids, stafilinids, "Nordul Gorjului" Natural Park, Gorj, Romania

Rezumat. Contribuţii la cunoaşterea diversităţii faunei de coleoptere (Insecta: Coleoptera: Coccinellidae, Elateridae, Staphylinidae) din potenţialul Parc Natural „Nordul Gorjului" - judeţul Gorj, România. Lucrarea sintetizează speciile familiilor: **Coccinellidae, Elateridae** şi **Staphylinidae** menţionate în literatura de specialitate consultată, publicată în perioada anilor 1928-2006, din perimetrul potenţialului Parc Natural „Nordul Gorjului". Au fost identificate 78 specii şi subspecii incluse în 43 genuri aparţinând celor 3 familii. Familia **Coccinellidae** este cel mai bine reprezentată (27 specii şi subspecii, incluse în 19 genuri) urmată de familiile: **Staphylinidae** (26 specii şi subspecii, incluse în 12 genuri) şi **Elateridae** (25 specii şi subspecii, incluse în 12 genuri). Lucrarea evidenţiază faptul că aceste grupe de coleoptere nu au fost studiate special, datele provenind din colectări sporadice, speciile menţionate fiind colectate împreună cu specii din alte grupe de coleoptere. 59 de specii au fost semnalate o singură dată în ultimii 79 de ani;, din care 15 nu au mai fost menţionate din 1928. Pentru cunoaşterea diversităţii speciilor celor 3 familii, considerăm că sunt necesare studii taxonomice.

Cuvinte cheie: diversitate, coccinelide, elateride, stafilinide, Parcul Natural „Nordul Gorjului", Gorj, România.

INTRODUCTION

The present paper is a continuation in the series of papers in order to introduce data in the scientific information of speciality on the stage of knowledge of diversity of the fauna of coleopterans from the perimeter of the "Nordul Gorjului" Natural Park which constitued one of the objectives of study by ICAS Bucharest in the year 2005, with a view to legalize the constitution of the "Nordul Gorjului" Natural Park.

Data referring to the lacalisation and the limits of the potential natural park were presented in our previous papers (CHIMIŞLIU 2006, 2006a).There were previously presented species of comunitary interest from this perimeter (CHIMIŞLIU, 2006), the species of the superfamily Scarabaeoidea (CHIMIŞLIU, 2006a) and the species of the family Cerambycidae (CHIMIŞLIU, 2007), mentioned up to the present in specialist literature.

The present paper contains a synthesis of data from the specialist literature consulted regarding the families: Coccinellidae, Elateridae and Staphylinidae.

First data referring to these groups of coleopterans are mentioned in one paper of synthesis by MARCU (1928) in which the author published a list of the coleopterans from the karstic zone of Oltenia from Gorj and Mehedinţi Counties. The following sporadical information are found starting from the year 1962, in the papers of the specialists from the Entomology Department of the Faculty of Agriculture of the University Craiova, data which were included in another paper of synthesis regarding systematics and ecology of the coleopterans of the fauna in the subcarpathian zone of Oltenia in the last 70 years (BOBÎRNAC et al., 1999).

To this data are added referring to the coleopterans collected and preserved in the collections of the Oltenia Museum, Craiova which were worked out and published starting from the year 1999 (ANDRIEV & CHIMIŞLIU, 2003, ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004, SERAFIM & CHIMIŞLIU, 2005, STAN & CHIMIŞLIU, 2005).

The present paper will be a guide mark in the future studies on species of the families: Coccinellidae, Elateridae and Staphylinidae, from the perimeter of the "Nordul Gorjului"potential Natural Park.

MATERIAL AND RESEARCHING METHODS

The material of the present paper is formed of the species from the families: Coccinellidae, Elateridae and Staphylinidae mentioned in the consulted papers of speciality by the author, published in the period of the years 1928-2006.

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As there is no paper of synthesis regarding coleopterans in this perimeter, a list of species was made in alphabetical order with the name of species to facilitate the identifications of species. Nomenclature and taxonomy of species and of those four families were updated in conformity with the taxonomic system and nomenclature used in Fauna Europaea (www.faunaeur.org). In the species whose name was changed, the old name was mentioned. There were specified the collecting sites and the authors of the papers in which there were mentioned.

Surely, there are still bibliographical sources referring to this perimeter to which the author didn't have access, and the data referring to these three families are not complete, but the present paper is a starting point for the future researches on these groups of coleopterans from the perimeter of the "Nordul Gorjului" potential Natural Park.

RESULTS

78 species and subspecies belonging to 43 genera and to those three families were identified. The Family **Coccinellidae** is the best represented (27 species and subspecies, included in 19 genera) followed by the families: **Staphylinida** (26 species and subspecies, included in 12 genera) and **Elateridae** (25 species and subspecies, included in 12 genera) (Table 1).

Table 1. Number of genera and species within the families.
Tabel 1. Ponderea genurilor şi speciilor în cadrul familiilor.

No. crt.	Family	No of genera	No of species
1	**Staphylinidae**	12	26
2	**Coccinellidae**	19	27
3	**Elateridae**	12	25
		43	78

The identified species come from 15 sites of collecting from the "Nordul Gorjului" potential Natural Park.

List of sites of collecting

Baia de Fier
Bumbeşti
Cheile Galbenului
Cloşani
Lainici
Munţii Parâng
Novaci
Oslea
Piatra Cloşani
Pietrele Albe
Rânca
Tismana
Topolniţa
Valea Olteţului
Valea Sohodol

In what follows we present the identified species alphabetically.

Family **COCCINELLIDAE**

Adalia (Adalia) bipunctata (LINNAEUS 1758) = *Adalia bipunctata* (LINNÉ 1758) - Baia de Fier (ANDRIEV & CHIMIŞLIU, 2003).

A. (Adalia) decempunctata (LINNAEUS 1758) = *Coccinella decempunctata* (LINNÉ 1758) - everwhere (MARCU, 1928).

Calvia (Anisocalvia) quatuordecimguttata (LINNAEUS 1758) = *Calvia quatuordecimguttata* (LINNÉ 1758) – Novaci (ANDRIEV & CHIMIŞLIU, 2003).

C. (Calvia) decemguttata (LINNAEUS 1758) – Tismana (MARCU, 1928)

C. (Anisocalvia) quindecimguttata (FABRICIUS 1777) – Novaci (ANDRIEV & CHIMIŞLIU, 2003).

C. (Anisocalvia) quatuordecimguttata (LINNAEUS 1758) – Tismana (MARCU, 1928), Novaci (BOBÎRNAC et al., 1999).

Coccinella (Coccinella) quinquepunctata LINNAEUS 1758 – everywhere (MARCU, 1928), Baia de Fier, Novaci, Sohodol, Tismana (BOBÎRNAC et al., 1999, ANDRIEV & CHIMIŞLIU, 2003, SERAFIM & CHIMIŞLIU, 2005).

C. septempunctata LINNAEUS 1758 - everywhere (MARCU, 1928), Polovragi, Rânca, Ch. Sohodol, Tismana, Topolniţa (ANDRIEV & CHIMIŞLIU, 2003, SERAFIM & CHIMIŞLIU, 2005).

Coccinula quatuordecimpustulata LINNAEUS 1758 – Piatra Cloşani (MARCU O, 1928), Pietrele Albe (SERAFIM & CHIMIŞLIU, 2005).

Endomichus coccineus LINNAEUS 1758 – Valaea Olteţului (BOBÎRNAC et al., 1999).

E. (Exochomus) nigromaculatus (GOEZE 1777) = *E. flavipes* THUNBG. - Tismana (BOBÎRNAC et al., 1999).

Halyzia sedecimguttata (LINNAEUS 1758) – Cloşani (MARCU, 1928), Baia de Fier (BOBÎRNAC et al., 1999, ANDRIEV & CHIMIŞLIU, 2003).

Harmonia quadripunctata (PONTOPPIDAN 1763) - Baia de Fier (SERAFIM & CHIMIŞLIU, 2005).

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Hyperaspis campestris (HERBST 1783) - Cloşani (MARCU, 1928).

Hippodamia (Semiadalia) undecimnotata (SCHNEIDER 1792) = *Semidalia 11-notata* SCHUC. – Cloşani (MARCU, 1928), Novaci (BOBIRNAC et al., 1999).

H. (Adonia) variegata (GOEZE 1777) = *Adonia variegata* (GOEZE 1777) - Baia de Fier (ANDRIEV & CHIMISLIU, 2003), Novaci, Rânca (SERAFIM & CHIMISLIU, 2005).

Myrrha (Myrrha) octodecimguttata (LINNAEUS 1758) – Tismana (MARCU, 1928).

Nephus (Nephus) quadrimaculatus (HERBST 1783) = *Synharmonia quadrimaculatus* (HERBST 1783) - Baia de Fier (ANDRIEV & CHIMISLIU, 2003).

Oenopia conglobata (LINNAEUS 1758) = *Synharmonia conglobata* LINNAEUS 1758 - Tismana, Baia de Fier (BOBIRNAC et al., 1999).

Propylaea quatuordecimpunctata (LINNAEUS 1758) - Baia de Fier (SERAFIM & CHIMISLIU, 2005).

Psyllobora vigintiduopunctata (LINNAEUS 1758) = *Thea vigintiduopunctata* (LINNE 1758) - Tismana, Baia de Fier (BOBIRNAC et al., 1999, ANDRIEV & CHIMISLIU, 2003).

Scymnus (Scymnus) frontalis (FABRICIUS 1787) - Piatra Cloşani (MARCU, 1928), Baia de Fier (BOBIRNAC et al., 1999, ANDRIEV & CHIMISLIU, 2003).

S. (Pullus) subvillosus (GOEZE 1777) = *S. subvillosus* GOEZE – Tismana (MARCU, 1928).

Sospita vigintiguttata (LINNAEUS 1758) (var. *tigrina*) – Novaci (ANDRIEV & CHIMIŞLIU, 2003).

Subcoccinella vigintiquatuorpunctata (LINNAEUS 1758) - Piatra Cloşani (MARCU, 1928), Valea Sohodol, Tismana (BOBÎRNAC et al., 1999, ANDRIEV & CHIMIŞLIU, 2003), Lainici (ANDRIEV & CHIMIŞLIU, 2003).

Psyllobora vigintiduopunctata (Linnaeus 1758) = *Thea vigintiduopunctata* LINNAEUS 1758 – Tismana (MARCU, 1928).

Vibidia duodecimguttata (Poda 1761) – Cloşani (Marcu, 1928), Baia de Fier (BOBÎRNAC et al., 1999, ANDRIEV & CHIMIŞLIU, 2003).

Family ELATERIDAE

Adrastus axillaris ERICHSON 1841 - Valea Sohodol (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

A. montanus (Scopoli 1763) – Tismana (MARCU, 1928, ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

Agriotes (Agriotes) pilosellus (SCHÖNHERR 1817) - Rânca (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

A. (Agriotes) sordidus (ILLIGER 1807) - Valea Sohodol (ZAHARIA (CIUCĂ) & CHIMIŞLIU CORNELIA, 2004).

A. (Agriotes) ustulatus (SCHALLER 1783) = *Agriotes ustulatus* SCHALLER 1783 - Valea Sohodol (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

Ampedus (Ampedus) cinnaberinus (ESCHSCHOLTZ 1829) – (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

A.(Ampedus) elegantulus (SCHÖNHERR 1817) – Novaci (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

A. (Ampedus) pomorum (HERBST 1784) – Novaci (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

A. (Ampedus) sanguineus (LINNAEUS 1758) - Valea Sohodol, Novaci (BOBÎRNAC et al., 1999, ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

A. (Ampedus) sanguinolentus (SCHRANK 1776) – Novaci (BOBÎRNAC et al., 1999, ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

Athous niger (LINNAEUS 1758) - Cloşani (MARCU, 1928).

Cidnopus pilosus (LESKE 1785) - Piatra Cloşani (MARCU, 1928), Ch. Sohodol (BOBÎRNAC et al., 1999), Baia de Fier (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

Ctenicera cuprea (FABRICIUS 1775) = *Corymbites cupreus* FABR. - Oslea (MARCU, 1928).

C. virens (SCHRANK 1781) - Ch. Sohodol (BOBÎRNAC et al., 1999).

C. pectinicornis (LINNAEUS 1758) - Ch. Sohodol (BOBÎRNAC et al., 1999).

Cidnopus pilosus (LESKE 1785) = *Agriotes pilosus* LESKE - Ch. Sohodol (BOBÎRNAC et al., 1999).

Eanus (Eanus) guttatus (GERMAR 1817) = *Selatosomus guttatus* GERMAR 1817 – Rânca (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

Hemicrepidius niger (LINNAEUS 1758) = *Pseudathous niger* HERBST, 1784 – Cloşani (MARCU, 1928, BOBÎRNAC et al., 1999), Novaci (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

Liotrichus (Liotrichus) affinis (PAYKULL 1800) = *Selatosomus affinis* PAYKULL 1800 - Valea Sohodol (BOBÎRNAC et al., 1999, ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

Melanotus (Melanotus) brunnipes (GERMAR 1824) – Piatra Cloşani (MARCU, 1928), Bumbeşti (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

M. (Melanotus) fusciceps (GYLLENHAL 1817) - Valea Sohodol (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

M. (Melanotus) punctolineatus (PELERIN 1829) = *Melanotus niger* FABRICIUS 1792 - Lainici, Novaci (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

M. (Melanotus) villosus (FOURCROY 1785) = *Melanotus rufipes* HERBST - Piatra Cloşani (MARCU, 1928).

M. (Melanotus) tenebrosus (ERICHSON 1841) = *Melanotus tenebrosus* ERICHSON, 1841 – Lainici (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

Sericus (Sericus) brunneus (LINNAEUS 1758) - M-ţii Parâng (Vf. Păpuşa) (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004).

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Family STAPHYLINIDAE

Aleochara intricata MANNERHEIM 1830 - Valea Galbenului (STAN & CHIMIŞLIU, 2005).

A. lanuginosa GRAVENHORST 1802 - Valea Galbenului (STAN & CHIMIŞLIU, 2005).

Anthophagus (Dimorphoschelus) alpestris HEER 1839 = *Anthophagus alpestris* HEER 1839 – Rânca (STAN & CHIMIŞLIU, 2005).

Autalia rivularis (GRAVENHORST 1802) - Valea Galbenului (STAN & CHIMIŞLIU, 2005).

Ocypus (Matidus) tenebricosus (GRAVENHORST 1846) = *Goerius tenebricosus* Graw - Piatra Cloşani (MARCU, 1928).

O. (Matidus) tenebricosus (GRAVENHORST 1846) = *Goerius tenebricosus* GRAV. - Piatra Cloşani (MARCU, 1928).

O. (Ocypus) olens (O. MÜLLER 1764) = *Goerius olens* MULL - Piatra Cloşani (MARCU, 1928).

Ontholestes murinus (LINNAEUS 1758) - Valea Galbenului (STAN & CHIMIŞLIU, 2005).

Oxyporus (Oxyporus) rufus (LINNAEUS 1758) – Tismana (MARCU, 1928).

Oxytelus (Tanycraerus) laqueatus (MARSHAM 1802) = *Oxytelus laqueatus* (MARSHAM 1802) - Valea Galbenului (STAN & CHIMIŞLIU, 2005).

Paederus (Poederomorphus) littoralis GRAVENHORST 1802 = *Paederus littoralis* GRAVENHORST 1802 – Novaci (STAN & CHIMIŞLIU, 2005).

Philonthus (Philonthus) addendus SHARP 1867 = *Philonthus addendus* SHARP 1867 - Valea Galbenului (STAN & CHIMIŞLIU, 2005).

P. (Philonthus) alpinus EPPELSHEIM 1875 = *Ph. alpinus* EPPELSHEIM 1875 - Valea Galbenului (STAN & CHIMIŞLIU, 2005).

P. (Philonthus) confinis A. STRAND 1941 = *Ph. confinis* STRAND 1941 - Valea Galbenului (STAN & CHIMIŞLIU, 2005).

Ph. (Philonthus) cruentatus (GMELIN 1790) = *Ph. cruentatus* (GMELIN 1790) - Valea Galbenului (STAN & CHIMIŞLIU, 2005).

Ph. (Philonthus) intermedius (LACORDAIRE 1835) – Novaci (BOBIRNAC et al., 1999a).

Ph. (Philonthus) laminatus (CREUTZER 1799) - Piatra Cloşani (MARCU, 1928).

Ph. (Philonthus) parvicornis (GRAVENHORST 1802) = *Ph. parvicornis* (GRAVENHORST 1802) - Valea Galbenului (STAN & CHIMISLIU, 2005).

Ph. (Philonthus) rufimanus HEER 1839 = *Ph. rufimanus* HEER 1839 - Ch. Sohodol (STAN & CHIMISLIU, 2005).

Ph. (Philonthus) sanguinolentus (GRAVENHORST 1802) = *Ph. sanguinolentus* (GRAVENHORST 1802) - Valea Galbenului (STAN & CHIMISLIU, 2005).

Ph. (Philonthus) spinipes SHARP 1874 = *Ph. spinipes* SHARP 1874 – Rânca (STAN & CHIMISLIU, 2005).

Ph. (Philonthus) splendens (FABRICIUS 1793) = *Ph. splendens* (FABRICIUS 1793) - Valea Galbenului (STAN & CHIMISLIU, 2005).

Ph. (Philonthus) tenuicornis MULSANT & REY 1853 = *Ph. tenuicornis* MULSANT & REY 1853 - Valea Galbenului (STAN & CHIMISLIU, 2005).

Platystethus (Platystethus) arenarius (GEOFFROY 1785) = *Platystethus arenarius* (GEOFFROY 1785) - Valea Galbenului (STAN & CHIMISLIU, 2005).

Staphylinus caesareus CEDERHJELM 1798 – Piatra Cloşani (MARCU, 1928), Ch. Sohodol, Baia de Fier, Tismana, Novaci (BOBIRNAC et al., 1999a, STAN & CHIMISLIU, 2005).

Tachyporus abdominalis (FABRICIUS 1781) – Tismana (MARCU, 1928, BOBIRNAC et al., 1999a).

DISCUSSIONS

From the family **Coccinellidae**, there were identified 27 species (about 33%) from the known species in the fauna of Romania. Of those 27 species, 16 were mentioned once: MARCU (1928) – 6 species, BOBÎRNAC et al. (1999) – species, ANDRIEV & CHIMIŞLIU (2003) – 5 species and SERAFIM & CHIMIŞLIU (2005) – 2 species. 11 species were mentioned two or three times.

Besides the common species: *Subcoccinella vigintiquatuorpunctata* (LINNAEUS 1758), *Coccinella septempunctata* (LINNAEUS, 1758), *Adalia bipunctata* (LINNÉ, 1758), *Hippodamia (Adonia) variegata* (GOEZE 1777), *Psyllobora vigintiduopunctata* (LINNAEUS 1758), there are also present rare species: *Sospita vigintiguttata* (LINNAEUS 1758) and *Harmonia quadripunctata* (PONTOPPIDAN 1763).

From a point of view of trophic spectrum, the majority of the species of this family are aphidophagous (species of genera: *Adalia*, *Coccinella*, *Propylaea*, *Adonia*, *Hippodamia*, *Calvia and so on.*). Of the few phytophagous species we mention the species *Subcoccinella vigintiquatuorpunctata* which attacks different herbaceous spontaneous plants, among which *Medicago sativa, Silene dioica, Cirisum* sp., *Lactuca* sp. The species *Halyzia sedecimguttata* and *Psyllobora vigintiduopunctata* are micetophagous (SERAFIM & CHIMIŞLIU, 2005).

Those 25 species mentioned up to the present from the family **Elateridae** represent a little over 18% of those 136 species (ZAHARIA (CIUCĂ) & CHIMIŞLIU, 2004) known in the fauna of Romania. Within those 25 species, 18 were

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mentioned once: MARCU (1928) – three species, BOBÎRNAC et al. (1999) – two species, and ZAHARIA (CIUCĂ) & CHIMIŞLIU (2004) – 13 species; only 7 species were mentioned two or three times.

From a point of view of trophic spectrum, the adults of this group of coleopterans are, in general, phytophagous. Some species are carnivorous. In the majority, the larvae are phytophagous, and some species are zoophagous. Phytophagous larvae are feeding on with springed seeds, plantlets, young roots, plant tubers or they dig corridors in the wood of the trees. Zoophagous larvae are feeding on pupae, larvae of curculionidae or larvae of cock chafers (ENE, 1971). Numerous species are very harmful to cultivated plants.

Within the family **Staphylinidae** there were mentioned from the studied zone perimeter 26 species (about. 2.4%) from the known species in Romania's fauna. (1240 species - STAN, 2004). Of those 26 species, 24 were mentioned once: MARCU (1928) – 5 species, BOBÎRNAC et. al. (1999) – 1 species and STAN & CHIMIŞLIU (2005) – 18 species; 2 species were mentioned two or three times.

Being a well adapted group of insects to environment conditions with a wide distribution in all the terrestrial ecosystems, the specification of a so small number of species demonstrates the fact that this group of coleopterans was not well studied.

From a point of view of trophic spectrum, the majority of these species are epigeic predatories with a strong influence on terricolous organisms having a considerable importance in agricultural ecosystems. Predatory staphilinids are feeding on with different invertebrates: nematods, mites, colembolla for the smaller species and larvae and adults of coleopterans, as well as other insects, and mollusks for larger species. Within the group there are detritophilous, coprophilous, necrophilous, micetophilous, nidicolous, foleophilous and cavernicolous species; few species are antophilous (they live on flowers and blooming bushes).

Within the species mentioned up to the present, besides ubiquitous species, (*Platystethus arenarius* (GEOFFROY), *Aleochara lanuginosa* GRAVENHORST, *Autalia rivularis* (GRAVENHORST) are present eurytopic species (The majority of species and a few stenotopic species: *Oxytelus piceus* (LINNAEUS) and *Philonthus spinipes* SHARP - coprophilous, *Philonthus rufimanus* HEER - hygrophilous, riparious (STAN & CHIMIŞLIU, 2005).

The majority of species in the families Coccinelidae and Staphilinidae are zoophagous with an important role in the biological control with pests and the keeping of specific equilibrium within natural ecosystems, and the majority of species of the family Elateridae are phytophagous which can produce damages to human economy.

CONCLUSIONS

As a result of synthetising data from literature of speciality published in the period of the years 1928-2004, 78 species were identified, of which: 27 species of coccinelids, 26 species of stafilinids, and 25 species of elaterids, that represent about 22.33% and 2.4% respectively of the total number of species known up to the present in Romania's fauna of those three families.

The data proceed from sporadical researches, a proof being those 59 species mentioned once from the perimeter of the Nordul Gorjului potential Natural Park. 15 species were recorded in the year 1928 by MARCU and it is necessary the reconfirmation of their presence in this zone.

The paper makes evident the fact that these groups of coleopterans have not been studied specially, the data resulting from sporadical collections, the mentioned species being collected together with species from other groups of coleopterans. 59 species were collected once in the last 79 years; of which, 15 species have not been mentioned since 1928. To know the diversity of species of those three families, we consider that taxonomic studies are necessary.

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DESCRIPTION OF THE PROTONYMPH OF THE SPECIES *Trachyuropoda cristiceps* CANESTRINI, 1884 AND *Trachyuropoda myrmecophila* WISNIEWSKI & HIRSCHMANN, 1992 (ACARINA: ANACTINOTRICHIDA: UROPODINA)

IOANA CRISTINA CONSTANTINESCU

Abstract. The paper contains the description of the protonymphs of the species Trachyuropoda cristiceps and Trachyuropoda myrmecophila, collected from ant hills.

Key words: myrmecophil mites, uropodids, protonimph description.

Rezumat. Descrierea protonimfei speciilor *Trachyuropoda Cristiceps* CANESTRINI, 1884 şi *Trachyuropoda Myrmecophila* WISNIEWSKI & HIRSCHMANN, 1992 (Acarina: Anactinotrichida: Uropodina). Lucrarea prezintă descrierea protonimfelor speciilor Trachyuropoda cristiceps şi Trachyuropoda myrmecophila, colectate din muşuroaie de furnici.

Cuvinte cheie: acarieni mirmecofili, uropodide, descrierea protonimfelor.

INTRODUCTION

Uropodids are a group of terrestrial mites being spread in varied types of habitats: leaf litter, lawns and pastures, tree trunks in decomposition, birds nests, anthills, etc.

The species *Trachyuropoda cristiceps* and *Trachyuropoda myrmecophila* are only myrmecophil species, the former being European species widely spread. The latter species was described by WISNIEWSKI and HIRSCHMANN in Poland (WISNIEWSKI & HIRSCHMANN, 1992) and was found afterwards in Slovakia (MASAN, 2001) and Hungary (KONTSCHAN, 2002) being an European species with limited distribution in the Central and South-Eastern Europe, and being for the first time recorded in Romania.

The literature contains the descriptions of the adults and of the deutonymphs of these species, namely for *Tracyuropoda myrmecophila* and its larva, but the protonimphs for both species were never described. This paper completed the descriptions of these species, with protonymps descriptions.

MATERIAL AND METHOD

The studied material comes from soil samples collected from anthills on two pastures in Hinţeşti and Ştefăneşti, two villages in the hilly area in Argeş, above three and fifteen kilometers away from the town of Piteşti, respectively.

The studied material:

Trachyuropoda myrmecophila

5.XI. 2005, Hinţeşti, 3 protonymphs;

Trachyuropoda cristiceps

5.XI. 2005, Hinţeşti, 2 protonymphs; 7.XI. 2005, Ştefăneşti, 16 protonymphs.

RESULTS AND DISCUSSION

The description of the protonymph for the species Trachyuropoda cristiceps (Figure 1).

Dorsal: It has an oval body , light red in colour , the length of the idiosoma is 660 μm, the width is 500 μm, and it has two shields (podosomal and pygidial) that are genus characteristics. The podosomal shield is longer in the front and concave in the posterior part, it has a cleary carved ant pentagonal pattern, with 13 pairs of dorsal hairs shaped like anchors and placed on the small inserrating platforms. The pygidial shield has two pairs of serrated hairs with the same pentagonal pattern.

Ventral: The sternal shield with three pairs of setae, shaped like anchors, and with the design of the cuticle pantagonal. The anal opening is surrounded by a chitin ring.

Peritrema: It is on the peritremal shield and is slightly sinuous, having only one long anterior branch.

Gnathosoma: The hypostome with C_1 hair simple, needle-like, C_2 has a bi-forked tip, C_3 is long and serrated, C_4 is shorter than C_3, strongly serrated, with simple corniculi shaped like teeth and sharp towards the tip. The hypostome has hypostomali denticles (approximately four rows) in between the C_4 hairs. The chelicerae have a nodus at the bottom of the fixed digit, the mobile digit has only one denticle, and the fixed digit has a cavity matching that tooth. The lacinae are much longer than the corniculi and they are filiform. The tritosternum has the bottom articul made up of two segments, the limb with median branch bi-forked and serrated, while the two lateral branches are serrated and longer than the median one.

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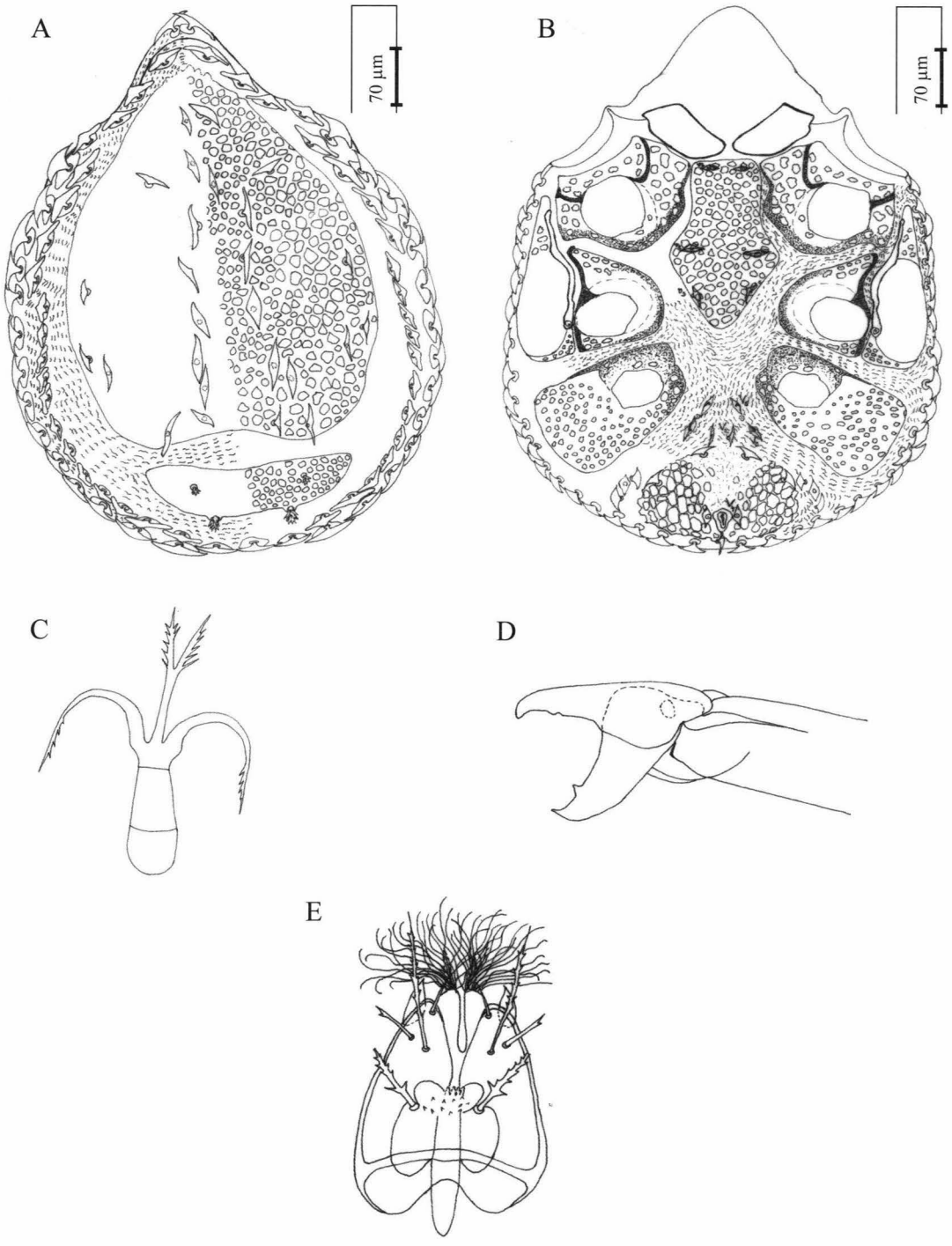

Figure. 1. *Trachyuropoda cristiceps*, A-protonymph dorsal, B- protonymph ventral C- tritosternum, D - chelicerae, E- hypostome.
Figura 1. *Trachyuropoda cristiceps*, A-protonimfă dorsal, B- protonimfă ventral C- tritostern, D -cheliceră, E-hipostom.

The description of the protonymph for the species *Trachyuropoda myrmecophila* (Fig.2)

Dorsal: The body colored in brown, the lenght of the idiosoma is 880 µm, the width is 560 µm. The podosomal shield with pentagonal ornamentation, some areas with well sclerotized cuticle, with dorsal hairs shaped like anchors, associated with large pores (≥ 10). The pygidial shield with the same ornamentation. The lateral hairs place on small inserrating platforms is disposed in three rows.

Ventral: The sternal shield with three pairs of setae, shaped like anchors, and with the design of the cuticle alveolate, with a pair of large pores. The pericoxal and anal shield with alveolat design, more or less pentagonal, strongly chitinised.

Peritrema: is little curved anterior, is situated on the peritremal shield, shield with pentagonal pattern, with strongly chitinised cuticle.

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***Gnatosoma*:** The hypostome with C_1 hair simple, needle-like, the hairs C_2, C_3, C_4 serrated, the hair C_3 thiner and twice longer than C_4. The corniculi are simple, teeth-like, and sharp towards the tip. The lacinae pennate, much longer than the corniculi. The chelicerae with fixed digit with pilus dentilis, the fixed digit is little longer than mobile digit. The mobil digit with one single denticle and two cavities matching that denticle and the distal termination of mobile digit, respectively. The tritosternum with the base article pyriform, the limb with median branch bi-forked and serrated, and the two lateral branches are serrated and with one basal thorn.

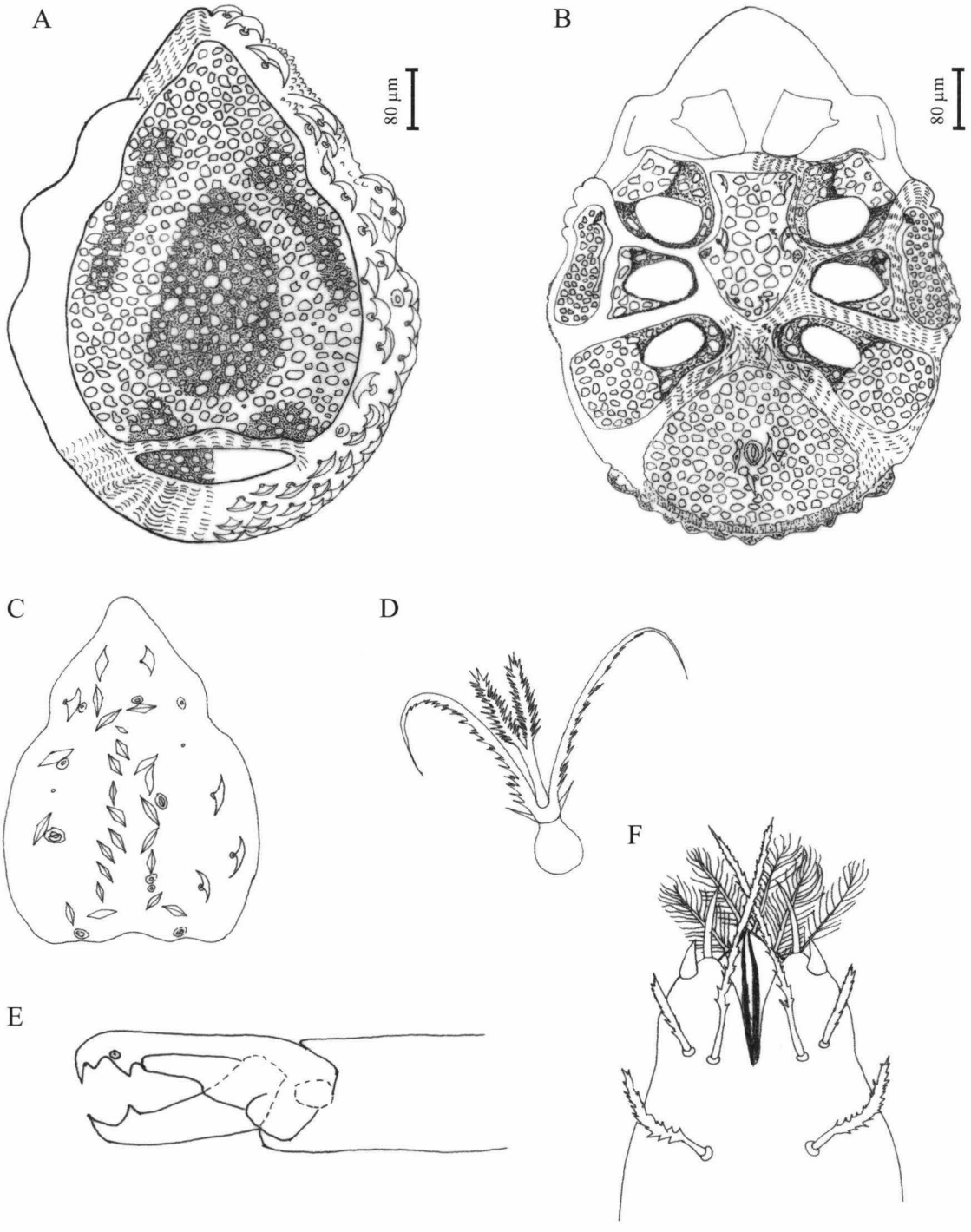

Figure 2. *Trachyuropoda myrmecophila*, A-protonymph dorsal, B-protonymph ventral, C-the setae on the podosomal shield, D-tritosternum, E-chelicerae, F-hypostome.
Figura 2. *Trachyuropoda myrmecophila*, A-protonimfă dorsal, B-protonimfă ventral, C- peri scutul podosomal, D-tritostern, E-cheliceră, F-hipostom.

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THE HYMENOPTERAN FAMILY SCELIONIDAE IN THE "CODRII" FOREST RESERVE, LOZOVA VILLAGE, REPUBLIC OF MOLDOVA

MARIANA GÎRNEŢ

Abstract. The insects of the *Scelionidae (Hymenoptera)* are an important component of the entomofauna of the ecosystems. They are numerous, populate the most various biotopes and play a distinct role in the process of formation and function of natural and anthropic ecosystems. The study of *Scelionidae* is necessary because these parasitical insects have an important role in the regulation of the number of many pests of cultured plants.

Key words: Scelionidae, Forest Reserve, eggs parasite.

Rezumat. Scelionidele (*Hymenoptera, Scelionidae*) din Rezervaţia Forestieră „Codrii" com. Lozova din Republica Moldova. Scelionidele (Hymenoptera) sunt un component important al entomofaunei ecosistemelor. Ele sunt numeroase, populează cele mai diverse biotopuri şi joacă un rol deosebit în formarea şi funcţionarea ecosistemelor naturale şi antropizate. Despre rolul lor în natură nu sunt cunoscute multe date, dar din punct de vedere economic, ele au cea mai mare importanţă şi perspectivă în reducerea numerică a dăunătorilor, care anual duc la scăderea esenţială a recoltei.

Cuvinte cheie: Scelionidae, Rezervaţie forestieră, oofag.

INTRODUCTION

The insects of the *Scelionidae (Hymenoptera)* family are an important component of the entomofauna of the ecosystems. They are numerous, populate the most various biotopes and play a distinct role in the process of formation and function of natural and anthropic ecosystems.

The study of *Scelionidae* is necessary because these parasitical insects have an important role in the regulation of the number of many pests of cultured plants. Such investigations in the Republic of Moldova are necessary in the family of *Scelionidae*, where the anthropic impact, as the result of high density of population and intense economic activity of man, is great. There are not many data about the role of *Scelionidae* in nature, but from the economic point of view, they have the greatest importance and perspective in the reduction of the number of pests, which annually lead to an essential reduction of harvest. The most untouched side in this aspect remains the study of the whole spectrum of hosts, because according to data from literature, hosts are known of only 20.2% of species of *Scelionidae*.

The present studies were carried out in the "Codrii" Reserve, which has a special place among the protected areas of the Republic of Moldova. It is situated at a distance of 19 km to the north-west of Chisinau, near the village of Lozova, Straseni district, with the following geographical coordinates of the headquarters: 47°06' Northern latitude and 28°21' Eastern longitude.

The "Codrii" Reserve is placed in the highest part of Central Moldova, which differs from neighboring regions by geological structure, relief, climate, soil and vegetation.

Forest vegetation of the "Codrii" Reserve is represented by leafy forests of the type of Central European forests. The edifice of the "Codrii" is the beech (*Fagus sylvatica*), durmast (*Quercus petraea*) and the oak tree (*Quercus robur*), the last being the most often met in the depression. The durmast grows on sectors of medium or high altitude. The beech mostly occupies higher levels. The coedifice is the hornbeam (*Carpinus betulus*). Accompanying them are: the ash (*Fraxinus excelsior*), the linden (*Tilia tomentosa*), the maple (*Acer platanoides*), the sycamore maple (*Acer pseudoplatanus*), the sweet cherry (*Cerasus avium*), the elm (*Ulmus carpinifolia*). On the second floor there grow the wild service tree (*Sorbus torminalis*), the common maple (*Acer campestre*), the forest pear (*Pyrus pyraster*) and the forest apple (*Malus sylvestris*) (according to POSTOLACHE, 1995).

The floristic composition and the structure of the underbrush depend on the degree of closing the crowning of the species of the underbrush more frequent are (*Cornus mas*), the hazelnut (*Corylus avellana*), hawthorn (*Crataegus curvisepala, Crataegus monogyna*), the European spindle (*Euonimus europaea*), (*Euonimus verucosa*), the cornel (*Swida sanguinea*) and the wayfaring tree (*Viburnum latana*).

The herbaceous cover is rich in Central-European and Under-Mediterranean species: the sedge (*Carex brevicollis, Carex pilosa*), (*Aegopodium podagraria*), (*Galeobdolon luteum*), (*Allium ursinum*), (*Melica uniflora*), (*Dactylis glomerata*) and ivy (*Hedera helix*).

MATERIALS AND METHODS

The material which constitutes the object of this work was collected in the year 2006 in the "Codrii" Reserve since the middle of May to the third decade of July. The collecting was produced by mowing the herbaceous vegetation with entomologic net and collecting small insects with the entomologic aspirator. The collected insects were kept in test tubes, previously disinfected. The mounted samples are kept in the collection of the museum of the Institute of Zoology, Academy of Sciences of Moldova.

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RESULTS AND DISCUSSIONS

The *Scelionidae* family has been studied by many authors, such as MAYR, GIARD, 1895; KIEFFER, 1912; KOZLOV, KONONOVA, KIEFFER, 1926 from the practical point of view, because it is exclusively composed of parasitical insects, which in nature play an important role in regulating the number of various pests, the cultivated and wild plants.

Of those over 400 species registered in the European part of the former USSR on the territory of Moldova there have been identified about 120 species, among which hosts have been established for only 24 species (Table 1).

In figure 1 there are presented eggs deposited by insects of the *Pentatomoidae* family 100% infested by the *Telenomus chloropus* species of the *Scelionidae* family. The size of the *Scelionidae* eggs varies between 0.1 and 0.5 mm in length and 0.015 – 0.15 mm in width. In each egg of the *Pentatomoidae* there is deposited a single egg of the given species. The embryonic development lasts 22-28 hours, during which the parasite develops and reaches the volume of the egg. The metamorphosis is complete and the larva passes 4 stages of development, reaching maturity at about 10 days.

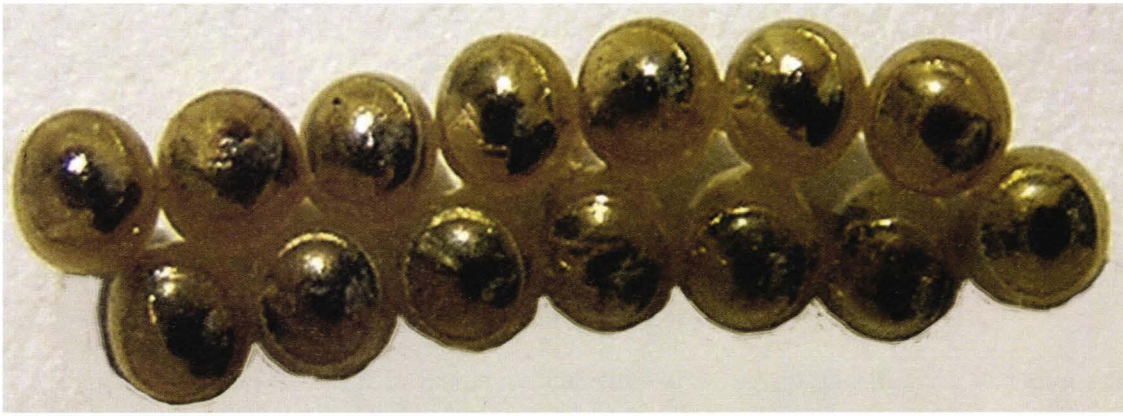

Figure 1. *Telenomus chloropus* (parasites in eggs of *Pentatomidae* family) (orig.)
Figure 1. *Telenomus chloropus* (parazitoizi ai ouălor familiei Pentatomidae) (orig.)

Within these studies on the territory of the "Codrii" Reserve, there have been collected 18 species of *Scelionidae*. Most of the species belong to the *Telenimini* tribe, the genera *Telenomus* (8 species), *Trissolcus* (4 species), which in nature participate in regulating the number of many pests of cultivated plants and of forest pests. These are followed by the *Gryon* genus (2 species), and the *Arodophagus, Apegus, Tiphodytes Teleas* genera - one species each.

As the result of the research conducted on the territory of the "Codrii" Reserve there have been collected the following species: *Telenomus corticatus* KOZLOV and KONONOVA, *T. aporus* KOPZLOV, *T. asperus* KOZLOV and KONONOVA, *T. othus* HAL., *T. harpyiae* MAYR, *T. acrobats* GIARD, *T. chloropus* THOMS., *T. heydeni* MAYR., *Teleas rugosus* KIEFF., *Trissolcus choaspes* NIXON, *T. festivae* VIKTOROV, *T. grandis* THOMS., *T. volgensis* VIKTOROV, *Gryon muscaeformis* NEES, *G. exculptus* FÖRST, *Arodofhagus fasciatus* ASHM., *Apegus rufus* KOZLOV and KONONOVA, *Tiphodites gerriphagus* MARCHAL.

As the result of the investigations conducted by VIKTOROV G. A. 1962, 1960; MASNER L., KOZLOV M. A., KONONOVA S. V. 1990 there were identified the hosts for 13 species of *Scelionidae*. In table 1 the list of *Scelionidae* species discovered in the "Codrii" Reserve is presented and their hosts according to the studied literature.

Table 1. The list of species and their host species according to Kozlov M.A. and KononovA S. V.
Tabel 1. Lista speciilor de scelionide şi gazdelor lor comform Kozlov M.A. şi Kononova S.V.

The species of *Scelionidae*	**The host species**	**Source of information**
Telenomus harpyiae MAYR	*Dicranura vinula* L.	MAYR, 1879; KIEFFER, 1912, 1926; КОЗЛОВ, 1967, 1971, 1972
T. acrobates GIARD	*Chrisopa perla* L., *Ch. formosa* BRAUER	GIARD, 1895; KIEFFER, 1926; PRINZIPI, 1947; КОЗЛОВ, 1967, 1971, 1978
T. chloropus THOMS.	*Eurygaste rintegriceps* PUT. *Eu. maura* L., *Eu. austriaca* SCHRANK, *Dolycoris baccarum* L., *Carpocoris fuscispinus* BOH., *Graphosoma liniatum* L., *Palomena prasina* L., *P. viridissima* PODA., *Aelia furcula* FIEB., *A. rostrata* BOH., *Piezodorus rubrofasciatus* FABR., *Eysarcoris ventralis* WESTW.	MAYR, 1879; СОКОЛОВ 1904; ASHMEAD, 1904; ВАСИЛЬЕВ 1913; KIEFFER, 1926; ОБРОВОЛЬСКИЙ, 1913; MANNINGER, 1934; NIXON, 1939; КУЛАКОВ, 1940, 1949; РУБЦОВ, 1944; МЕЙЕР, 1940, 1949; ЩЕПЕТИЛЬНИКОВА, 1958; ВИКТОРОВ, 1960, 1962, 1964, 1967, 1979; КОЗЛОВ, 1967, 1971, 1978

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T. heydeni MAYR.	*Palomena prasina* L., *Rhaphigaster nebulosa* PODA, *Eu. maura* L., *Arma custos* F., *P. viridissima* PODA.	KIEFFER, 1926; КОЗЛОВ, 1965, 1966, 1967, 1978; КОНОНОВА, 1973
Teleas rugosus KIEFF.	genus *Amara* BON., *Harpalus* LATR., *Zabrus tenebrioides* GZ.	KIEFFER, 1926
Trissolcus choaspes NIXON	*Aelia acuminata* L.	NIXON, 1939; КОЗЛОВ, ЛЕ, 1977, 1978
T. festivae VIKTOROV	*Eurydema ornata* L., *E. oleracea* L. In laboratory *Carpocoris pudicus* Poda	ВИКТОРОВ, 1964, 1967; КОЗЛОВ, 1968; БУЛЕЗА, 1973; КОЗЛОВ, ЛЕ, 1977, 1978
T. grandis THOMS	*Eurygaster integriceps* PUT., *Eu. austriaca* SCHRANK, *Eu. maura* L., *Dolycoris baccarum* L., *Carpocoris pudicus* PODA, *Aelia acuminata* L., *Ae. cognata* FiEb., *Ae. germari* KUESTER, *Eurydema ventralis* KOL. *Palomena prasina* L.	KIEFFER, 1926; NIXON, 1939; МЕЙЕР, 1940; ТАЛИЦКИЙ, 1940
T. volgensis VIKTOROV	*Eurygaster integriceps* PUT., *Dolycoris baccarum* L., *Carpocoris fuscispinus* BOH.	ВИКТОРОВ, 1964 А, 1967; КОЗЛОВ, 1968, 1971; КОЗЛОВ, ЛЕ, 1977, 1978
Gryon muscaeformis NEES,	*Coreus marginatus* L., *Gonocerus acuteangulatus* GZ	КОЗЛОВ, 1971, 1978; КОЗЛОВ, КОНОНОВА, 1990; MINEO, 1975
G. exculptus FÖRST	*Coreus marginatus* L.	КОЗЛОВ, 1971, 1978; КОЗЛОВ, КОНОНОВА, 1990; MINEO, 1975
Arodofhagus fasciatus ASHM.	*Mezira granulata* SAY.	
Tiphodytes gerriphagus MARCHAL	*Gerris* sp.	

For the species *Telenomus corticatus* KOZLOV and KONONOVA, *T. aporus* KOZLOV, *T. asperus* KOZLOV and KONONOVA, *T. othus* HAL., *Apegus rufus* KOZLOV and KONONOVA hosts have not been found yet.

As a result of study of the literature of speciality it was established that the *Scelionidae* parasite on the representatives of 16 genera, 3 orders (*Heteroptera, Neuroptera, Lepidoptera*) and 8 families (*Gerridae, Miridae, Pentatomidae, Blissinae, Chrysopidae, Lymantridae, Notodontidae* and *Lasiocompidae*).

In the Republic of Moldova there have been conducted research of the most important entomophagy of the *Braconidae, Heloridae, Tetrastichinae, Iichneunonidae* and other families by V. TALITSKII, V.S. KUSLITSKII, V. ADASHKEVICI and other entomologists. Within these researches there was partially studied the fauna of the *Scelionidae*. In 1990 there was published a preventive list of them, which contained 4 subfamilies, 23 genera and 120 species.

The study of the *Scelionidae* is necessary both taking into account their important role in regulating the number of various pests, and the elaboration of using them in the biological protection of plants. But the integral study of the problem (fauna, biology, trophic specialization and establishing the role of the species in regulating the number of pests) will allow a more profound knowledge about this group.

The protection of natural ecosystems and the conservation of their biodiversity is the best foundation for distinguishing and studying various biological means of control, which are the most favorable, the most acceptable and convenient from all points of view when it deals with the vitality of nature and the prosperity of human life.

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LES CHRYSOMÉLIDÉS DE LA ZONE VÂRVORU DE JOS (DÉPARTEMENT DOLJ)

AURELIAN LEONARDO ILIE

Abstract. The leaf-beetles from Vârvoru de Jos area (Dolj County). The paper includes the result of the entomological researches effectuated in Vârvoru de Jos area during 1999 – 2005. We identified 62 species. We remark the existence of 3 species relatively rare in the fauna of Romania and mentioned for the first time in the fauna of Oltenia: *Longitarsus fulgens* FOUDRAS, *Asiorestia crassicornis* FALDERMANN, *Cassida sanguinolenta* MULLER. There are also presented some ecological aspects of the species identified. The Central-Eeuropean species are predominant and almost a quarter of identified species are pests to the agriculture, forestry or medicinal plant cultures.

Key words: Vârvoru de Jos, Chrysomelidae, researches

Rezumat. Crisomelidele din zona Vârvoru de Jos (jud. Dolj). Lucrarea cuprinde rezultatul cercetărilor entomologice întreprinse în zona Vârvoru de Jos în perioada 1999 – 2005. S-au identificat 62 de specii. Se remarcă existenţa a 3 specii relativ rare în fauna României şi menţionate pentru prima dată în fauna Olteniei: *Longitarsus fulgens* FOUDRAS, *Asiorestia crassicornis* FALDERMANN, *Cassida sanguinolenta* MULLER. Sunt prezentate, de asemenea, câteva considerente ecologice ale speciilor identificate.Predomină speciile central-europene, iar aproximativ un sfert din speciile identificate sunt dăunătoare culturilor agricole, plantaţiilor forestiere sau culturilor de plante medicinale.

Cuvinte cheie: Vârvoru de Jos, Chrysomelidae, cercetări

INTRODUCTION

La zone Vârvoru de Jos appartiend à la plaine hâute de Deznăţui, composante de la plaine hâute piémontane. Rapportée à la surface du département Dolj, cette zone a une position central – ouestique et est caractérisée par des champs larges et lisses fragmentés par des nombreuses vallées avec une profondeur pas grande (40 – 50 m).

Le sol est brun – rougeâtre, avec une structure sablonneuse – argileuse.

La litière présente un recouvrement 100%, la grosseur varie entre 0,5 – 3 cm.

Le climat est tempéré et présente une nuance sembleble avec le climat continental. La température moyenne annuale est 10 – 11^{0}C et même plus en grand nombre. Les précipitations atmosphériques atteignent 500 - 550mm la moyenne annuale.

Les vents dominants proviennent du NE et S.

La végétation est représentée par des forêts constituées par chêne chevelu et autres espèces du chêne, à lesquelles s'ajoutent des rideaus protectrices d'acacia, peuplier canadien et petits groupes du pin.

MATERIEL ET METHODES

Pour la collecte des cafards on a utilisé le filet entomologique et la méthode „faucher'' complétée avec la collecte manuelle et les observations directes.

RESULTATS ET DISCUSSIONS

Les recherches entomologiques ont identifiés 62 espèces de chrysomélidés appartennant à 7 sousfamilles et 28 genres.

La liste des espèces:

Sousfamillie **CRIOCERINAE** LATREILLE, 1807

Oulema (Oulema) melanopus LINNAEUS, 1758
Lilioceris lilii SCOPOLI, 1763
Lilioceris merdigera LINNAEUS, 1758

Sousfamille **CLYTRINAE** KIRBY, 1837

Labidostomis longimana LINNAEUS, 1761
Lachnaia sexpunctata SCOPOLI, 1763
Clytra laeviuscula RATZEBURG, 1837
Smaragdina salicina SCOPOLI, 1763
Smaragdina aurita LINNAEUS, 1767
Smaragdina xanthaspis GERMAR, 1824
Coptocephala unifasciata SCOPOLI, 1763

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Sousfamille **CRYPTOCEPHALINAE** GYLLENHAL, 1813

Pachybrachis sinuatus MULSANT et REY, 1859
Pachybrachis fimbriolatus SUFFRIAN, 1848
Cryptocephalus (Burlinius) bilineatus LINNAEUS, 1767
Cryptocephalus (Cryptocephalus) bipunctatus LINNAEUS, 1758
Cryptocephalus (Cryptocephalus) aureolus SUFFRIAN, 1847
Cryptocephalus (Cryptocephalus) sericeus sericeus LINNAEUS, 1758
Cryptocephalus (Cryptocephalus) hipochaeridis hipochaeridis LINNAEUS, 1758
Cryptocephalus (Cryptocephalus) violaceus LAICHARTING, 1781
Cryptocephalus (Cryptocephalus) moraei LINNAEUS, 1758
Cryptocephalus (Cryptocephalus) octacosmus BEDEL, 1891
Cryptocephalus (Cryptocephalus) flavipes FABRICIUS, 1781
Cryptocephalus (Cryptocephalus) vittatus FABRICIUS, 1775

Sousfamille **CHRYSOMELINAE** LATREILLE, 1802

Leptinotarsa decemlineata SAY, 1824
Chrysolina (Menthastriella) herbacea DUFTSCHMID, 1825
Chrysolina (Erythrochrysa) polita LINNAEUS, 1758
Chrysolina (Colaphodes) haemoptera LINNAEUS, 1758
Chrysolina (Colaphosoma) sturmi WESTHOFF, 1882
Chrysolina (Stichoptera) sanguinolenta LINNAEUS, 1758
Chrysolina (Stichoptera) gypsophilae KuSter, 1845
Chrysolina (Craspeda) limbata limbata FABRICIUS, 1775
Chrysolina (Fastuolina) fastuosa SCOPOLI, 1763
Colaphus sophiae SCHALLER, 1783
Gastrophysa polygoni LINNAEUS, 1758
Plagiodera versicolora LAICHARTING, 1781
Chrysomela (Chrysomela) populi LINNAEUS, 1758
Gonioctena (Spartoxena) fornicata BRUGGEMANN, 1873
Phratora (Phratora) vitellinae LINNAEUS, 1758

Sousfamille **GALERUCINAE** LATREILLE, 1802

Galeruca (Emarhopa) rufa GERMAR, 1824
Galeruca (Galeruca) tanaceti LINNAEUS, 1758
Luperus flavipes LINNAEUS, 1767

Sousfamille **ALTICINAE** KUTSCHERA, 1859

Phyllotreta vittula REDTENBACHER, 1849
Phyllotreta atra FABRICIUS, 1775
Phyllotreta nigripes FABRICIUS, 1775
Phyllotreta nemorum LINNAEUS, 1758
Longitarsus (Longitarsus) jacobaeae WATERHOUSE, 1858
Longitarsus (Longitarsus) fulgens FOUDRASA, 1860
Longitarsus (Longitarsus) obliteratus ROSENHAUER, 1847
Altica quercetorum quercetorum FOUDRAS, 1860
Altica oleracea LINNAEUS, 1758
Asiorestia ferruginea SCOPOLI, 1763
Asiorestia crassicornis FALDERMANN, 1837
Crepidodera aurata MARSHAM, 1802
Podagrica fuscicornis fuscicornis LINNAEUS, 1767
Podagrica malvae malvae ILLIGER, 1807
Chaetocnema (Tlanoma) major JAQUELIN DU VAL, 1852
Chaetocnema (Tlanoma) tibialis ILLIGER, 1807

Sousfamille **CASSIDINAE** GYLLENHALL, 1813

Hypocassida subferruginea SCHRANK, 1776
Cassida (Odontionycha) viridis LINNAEUS, 1758

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Cassida (Lordiconia) canaliculata LAICHARTIND, 1781
Cassida (Cassida) vibex LINNAEUS, 1767
Cassida (Cassida) rubiginosa MULLER, 1776
Cassida (Cassida) sanguinolenta MULLER, 1776

La faune de la zone recherchée comprend en général des espèces communes. On remarque toutefois l'existence de celles – là, considérrées relativement rares dans la faune roumaine: *Longitarsus fulgens* FOUDRAS, *Asiorestia crassicornis* FALDERMANN, *Cassida sanguinolenta* MULLER.
Ces espèces sont aussi mentionnées pour la première fois dans la faune d'Olténie.

J'ai remarqué la reaction de l'espèce *Chrysolina sturmi* WEST par rapport à lumière. L'espéce, frequente dans la zone, vive sous les pierres or en terre, à minime profondeur. Autrefois découverté, le cafard avait la tendance de se retirer en terre. Cette observation est similaire avec celle effectuée par l'auteur dans la zone Tinca – Bihor pendant les années 2002 – 2003.

En ce qui concerne la biodiversité des espèces les sousfamilles dominantes sont Alticinae avec 16 espèces et 7 genres et Chrysomelinae (15 espèces et 8 genres). Elles sont suivies par Cryptocephalinae (12 espèces, 2 genres), Clytrinae (7 espèces, 5 genres), Cassidinae (6 espèces, 2 genres), Criocerinae (3 espèces, 2 genres) et Galerucinae (3 espèces, 2 genres).

La liste comprend aussi des espèces dangereuses a l'agriculture et sylviculture:

Oulema (Oulema) melanopus L., *Lilioceris lilii* Scop., *Leptinotarsa decemlineata* SAY, *Colaphus sophiae* SCHALL., *Gastrophysa polygoni* L., *Plagiodera versicolora* LAICH., *Chrysomela (Chrysomela) populi* L., *Gonioctena (Spartoxena) fornicata* BRUGG., *Phratora (Phratora) vitellinae* L., toutes les espèces du genre *Phyllotreta, Crepidodera aurata* MARSH et autres aux plantes médicinales: *Podagrica fuscicornis fuscicornis* L., *Podagrica malvae malvae* ILL., *Chrysolina (Menthastriella) herbacea* DUFT., *Chrysolina (Fastuolina) fastuosa* SCOP.

Du point de vue zoogéographique on remarque l' existence des espèces central – européennes (18) suivies par les espèces européennes (15), euro-sibériennes (10), Europe et Asie mineure (6), paléarctiques (6), euro-asiatiques (4), holarctiques (3).
En ce qui concerne les préférences écologiques des sousfamilles on constate:
La sousfamille Criocerinae a été rencontrée sur les plaines cultivées or avec végétation spontanée prouvant affinité pour lumière forte (héliophiles) et situées près de la fôret.

L'espèce *Lilioceris merdigera* L. vive seulement dans le fôret de la zone, ses hôte-plantes appartient au genre *Polygonatum* Miller. Toutes ces données prouvent aussi affinité pour humidité élevée.

Les sousfamilles Clytrinae et Cryptocephalinae ont des especès en général héliophiles, elles sont trouvées sur les plaines et les adrets avec exposition méridionale.

La sousfamille Chrysomelinae présente des représentants qui vivent dans les lieux humides et parfois ombreuses. La majorité des espèces sont hygrophiles.

Les espèces de la sousfamille Galerucinae sont mésophiles-mésohygrophiles. Elles ont été trouvées sous les pierres ou bien dans les buissons sur les collines ou dans la fôret.

La sousfamille Alticinae se caractérise par des espèces xérophiles, héliophiles. Elles ont été trouvées partout dans les endroits ensoleillés.

La sousfamille Cassidinae comprend des espèces en général hygrophiles. La seule exception est l'espèce *Hypocassida subferruginea* Schr. qui se trouve sur les plaines sèches. C'est une espèce xérophile.

J'ai effectué aussi des recherches concernant la relation „insectes - ennemis naturels''.

De cette manière, les œufs d'espèce *Gastrophysa polygoni* L. peuvent être dévorés par la fourmie noire (*Lasius fuliginosus* LINNAEUS, 1767) tandis que les larves et les adultes sont attaqués par la moineau friquet (*Passer montanus* LINNAEUS, 1758) et la moineau domestique (*Passer domesticus* LINNAEUS, 1766).

La forficule (*Forficula auricularia* LINNAEUS, 1826) se nourisse avec les larves de l'espèce *Leptinotarsa decemlineata* SAY, phénomène observé dans les cultures avec des pommes de terre.

Le lézard vert (*Lacerta viridis* LAURENTI, 1768) a une alimentation constituée aussi par des cafards appartenant à la famille Chrysomelidae: *Galeruca rufa* GERM., *Gastrophysa polygoni* L., des espèces appartenant au genre *Cassida*, etc.

On a observé aussi des nouveaux relations trophiques : *Lilioceris lilii* Scop. se nourisse avec des feuilles d'espèce *Solanum nigrum* LINNAEUS, 1758 devenant polyphague.

Cette observation confirme des résultats antérieurs similaires identifiés par l'auteur à Craiova pendant la période 1999 – 2001.

En ce qui concerne l'activité sexuelle entre deux espèces différentes, j'ai observé un accouplement entre un mâle *Chrysolina polita* L. et une fémelle *Chrysolina herbacea* DUFT.

CONCLUSIONS

La faune de la zone Vârvoru de Jos comprend 62 espèces, 3 espèces mentionnees pour la première fois dans la faune d'Olténie et aussi rares dans la faune Roumaine.

Les conditions écologiques rencontrées et les besoins écologiques de chaque sousfamille ou espèce ont influés directement la biodiversité et la dominance numérique.

Les fluctuations de l'abondance ont été realisées en fonction de la période du vol et l'écologie de chaque espèce.

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PRELIMINARY DATA ON THE ARACHNID FAUNA FROM THE TRIVALE FOREST

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Abstract. This paper presents an inventory of the epigeic fauna from the forest Trivale and some of this structural features. The paper has a preliminary character because some of the arachnids collected during one year does not represent the total number of the species which populated the researched area and does not answer all the questions that the study of this group asks. As a result of the study of the arachnid fauna from the forest Trivale 61 species and 19 families were identified. *Eurocoelotes falciger* (KULCZYNSKI, 1897), *Trichoncus hackmani* (MILLIDGE, 1955), *Centromerus albidus* (SIMON, 1929), are rare species for Romania. Regarding the number of the individuals we can say that the lycosid, gnaphosid and linyphiid species are dominant. Regarding the number of the species of each family we can say that the Liinyphiidae are in the first place, followed by Lycosidae and Gnaphosiaed. The zoogeographical analysis indicates the domination of the species which are widely spread, in the first place being the Palearctic elements followed by the Holarctic ones. In the same context well represented are the species being spread in a smaller area, especially the European ones. The presence of a singley species having limited spreadintg must be mentioned. This species is Eurocoelotes falciger, a South-Eastern European species. The ratio between sexes is aproximatively 1:1. The 10% difference favourable to males could be considered normal, because they have a bigger mobility, especially the lycosid species.

Key words: faunistics, araneae, spiders, Trivale forest.

Rezumat. Date preliminare asupra faunei de aranee din pădurea Trivale. Lucrarea de faţă prezintă un inventar al faunei epigee de aranee din pădurea Trivale şi câteva dintre particularităţile structurale ale acesteia. Lucrarea are un caracter preliminar, deoarece araneele colectate în cursul unui an nu reprezintă toate speciile care populează aria investigată şi nici nu răspunde la toate problemele pe care le ridică studiul acestui grup. În urma studiului realizat asupra arachnofaunei pădurii Trivale au fost identificate 61 de specii grupate în 19 familii. Dintre speciile colectate *Eurocoelotes falciger, Trichoncus hackmani* şi *Centromerus albidus* sunt specii rare pentru fauna României. Din punct de vedere al numărului de indivizi, dominante sunt speciile de lycoside urmate de gnaphoside şi linyphiide. Situaţia se inversează în ceea ce priveşte numărul de specii din fiecare familie unde pe primul loc apar linyphiidele, urmate de lycoside şi gnaphoside. Analiza zoogeografică a arătat dominanţa speciilor care au o răspândire largă, pe primul loc situându-se elementele palearctice urmate de cele holarctice. Tot în acest context, bine reprezentate sunt şi speciile cu o arie de răspândire mai mică, în special cele europene. Trebuie menţionată prezenţa unei singure specii cu răspândire mai restrânsă, Eurocoelotes falciger, specie sud-est europeană. Raportul dintre sexe este de aproape 1:1 diferenţa de 10 % în favoarea masculilor poate fi considerată normală, datorită mobilităţii mai mari a acestora, mai ales în cazul lycosidelor.

Cuvinte cheie: faună, araneae, păianjeni, pădurea Trivale.

INTRODUCTION

The faunistic research has an important role for the elaboration of the management plans, the preservation of biodiversity, especially in the zone where the anthropic impact is strong. The considerations represent the basis of this paper which tries to present an inventory of the epigeic fauna of spiders from the Trivale forest and some of its specific structural features. The paper has a preliminary character because the spiders collected during one year do not represent all the species which populate the researched area and does not solve all the problems regarding the study of this group. There are not data regarding the arachnid fauna of this area. Little information about the adjacent area of the arachnid fauna could be found in the papers of some authors (FHUN & NICULESCU-BURLACU, 1971, STERGHIU C., 1985), a reason for which the study is expected to present the first step towards the systematic study of arachnid fauna from the middle basin of the river Argeş. During the research the faunistic, qualitative aspect, more than the quantitative one was mainly followed.

MATERIAL AND METHOD

It belongs to a great forest unit of the middle Arges basin, being placed in the Getic Piedmont (Cotmeana's Piedmont), in the North West of Pitesti City. It lies in the region of the low hillocks of the terraces situated on the right side of the Arges River and Bascov River, from Valea Ursului, to the South of Pitesti. The ground varies from plat to rough. Its altitude is comprised between 290 metres (Arges'waterside) and 430 metres in Plaiul Foii. The floristic composition of the forest is not uniform on the entire surface. In the South-East there is a flat ground (The Proper Trivale Forest), the shrub being formed by species of *Quercus polycarpa* L., *Q. petraea* (MATT.) LIEBL., *Q. dalechampii* TEN., with few trees of *Q. frainetto* TEN. and Q. x psudodalechampii. In the highest part of the territory, the forest is formed by the following species: *Quercus petraea*, *Q. polycarpa*, while in the southern side, few samples of *Quercus frainetto* and some samples of *Quercus cerris* L. can be found. The undershrub is represented by the following species: *Crataegus monogyna* JACQ., *Ligustrum vulgare* L., *Rosa canina* L. The species *Poa nemoralis* L. is mixed with *Carex brizoides* L., *Campanula abietina* GRISEB., *Dactylis glomerata* L., *Genista tinctoria* L., *Veronica chamaedrys* L. etc. (ALEXIU V., 2005, POPESCU A., 1966).

The climate is temperate-continental with no excessive manifestation of the climatic factors because of the piedmontanus hills around. The average annual temperatures are comprised between 7^0C and 10^0C. The precipitations vary between 700 and 1000 mm/year.

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For our research we chose a zone covered with *Q. petraea* because the most part of the forest surface is covered with this species and other accompanying species.

The method of pitfall traps was used for the collection of the material. It is a frequent used method to capture the invertebrates which have an intense activity on the soil. This method is successful both quantitatively and qualitatively, because the effort made to capture is reduced in comparison with other methods (GREENSLADE, P. J. M., 1964, MUFF P., 2006, UETZ G. & UNZICKER J., 1976). There were used 500 ml plastic tumbler having 11.5 cm height and 9 cm wide. The 9 traps used were placed in a square shape at 10 m distance one from another in order to avoid the interferences. A solution of formaldehyde 4% (1/4 of tumbler) was used as a preserving liquid. A plastic funnel was introduced in each trap. It was placed with the small opening downward in order to stop the spiders to get out. This was necessary because the arachnids are very mobile. A little tin plate was placed 5 cm above the every trap in order to avoid the penetration of the rain water and impurities. The emptyings were effected once two weeks between the 1TH of April and the 10TH December 2003. The obtained material was sorted in the lab. It was determined and preserved in ethylic alcohol 70%.

RESULTS AND DISCUSSIONS

After collecting, sorting and determination the arachnologic material 732 individuals were obtained. 564 of them were identified as species and 168 were identified as genera because the species was impossible to be identified when individuals were youthful or deteriorated. For this paper only individuals determinated as species were taken into consideration.

For the faunistic viewpoint the studied arachnologic material is represented by 61 species grouped in 19 families (Table 1).

Table 1. The list of the species of arachnids collected in Trivale Forest with data regarding the geographic spreading
Tabel 1. Lista speciilor de aranee colectate în pădurea Trivale, cu date despre răspândirea geografică

Species	Male	Female	Youthful	Spread
ATYPIDAE				
Atypus affinis (EICHWALD, 1830)	1	0	0	Britain to Ukraine, North Africa
Atypus piceus (SULZER, 1776)	1	0	0	Europe to Moldova, Iran
DICTYNIDAE				
Cicurina cicur (FABRICIUS, 1793)	23	1	0	Europe to Central Asia
CORINNIDAE				
Phrurolithus festivus (C. L. KOCH, 1835)	4	2	0	Palearctic
AMAUROBIIDAE				
Amaurobius ferox (WALCKENAER, 1830)	17	8	2	Holarctic
Eurocoelotes falciger (KULCZYNSKI, 1897)	16	2	5	Sud-Eastern Europe
Eurocoelotes inermis (L. KOCH, 1855)	0	1	4	Europe
SEGESTRIIDAE				
Segestria senoculata (LINNAEUS, 1758)	0	1	0	Palearctic
DYSDERIDAE				
Dysdera crocata (C. L. KOCH, 1838)	1	1	0	Cosmopolit
Dysdera erythrina (WALCKENAER, 1802)	6	6	0	Europe to Georgia
Harpactea rubicunda (C. L. KOCH, 1838)	7	8	2	Europe to Georgia
ZORIDAE				
Zora spinimana (SUNDEVALL, 1833)	0	1	0	Palearctic
GNAPHOSIDAE				
Drassyllus pusillus (C. L. KOCH, 1833)	1	1	0	Palearctic
Drassyllus villicus (THORELL, 1875)	4	3	3	Europe
Haplodrassus silvestris (BLACKWALL, 1833)	7	10	4	Europe
Zelotes apricorum (L. KOCH, 1876)	13	7	2	Europe to Kazakhstan
Zelotes erebeus (THORELL, 1871)	16	12	0	Europe to Georgia
Zelotes subterraneus (C. L. KOCH, 1833)	1	1	0	Palearctic
CLUBIONIDAE				
Clubiona comta (C. L. KOCH, 1839)	0	1	0	Europe, Russia, North Africa
Clubiona terrestris (WESTRING, 1851)	0	1	0	Europe
LIOCRANIDAE				
Agroeca brunnea (BLACKWALL, 1833)	1	0	0	Europe, Russia
THOMISIDAE				
Ozyptila praticola (C. L. KOCH, 1837)	7	4	0	Holarctic
Xysticus cristatus (CLERCK, 1757)	0	1	0	Palearctic
Xysticus erraticus (BLACKWALL, 1834)	0	1	0	Europe, Russia

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Xysticus lanio (C. L. KOCH, 1835)	1	0	0	Palearctic
Xysticus luctator (L. KOCH, 1870)	14	6	3	Palearctic
SALTICIDAE				
Evarcha falcata (CLERCK, 1757)	0	2	0	Palearctic
LYCOSIDAE				
Arctosa lutetiana (SIMON, 1876)	39	6	11	Europe, Russia
Pardosa alacris (C. L. KOCH, 1833)	17	55	6	Europe
Pardosa amentata (CLERCK, 1757)	0	2	0	Europe, Russia
Pardosa bifasciata (C. L. KOCH, 1834)	0	1	0	Palearctic
Pardosa lugubris (WALCKENAER, 1802)	3	27	0	Palearctic
Pardosa monticola (CLERCK, 1757)	0	1	0	Palearctic
Pardosa paludicola (CLERCK, 1757)	0	1	0	Palearctic
Pirata piraticus (CLERCK, 1757)	0	1	0	Holarctic
Trochosa ruricola (DE GEER, 1778)	2	0	2	Holarctic, Bermunde
Trochosa spinipalpis (F. O. P.-CAMBRIDGE, 1895)	1	0	0	Palearctic
Trochosa terricola (THORELL, 1856)	28	11	7	Holarctic
PISAURIDAE				
Pisaura mirabilis (CLERCK, 1757)	1	1	0	Palearctic
AGELENIDAE				
Histopona torpida (C. L. KOCH, 1837)	0	1	0	Europe, Russia
MIMETIDAE				
Ero furcata (VILLERS, 1789)	1	1	0	Palearctic
THERIDIIDAE				
Robertus arundineti (O. P.-CAMBRIDGE, 1871)	2	1	0	Palearctic
Robertus lividus (BLACKWALL, 1836)	5	1	0	Holarctic
ARANEIDAE				
Gibbaranea bituberculata (WALCKENAER, 1802)	0	1	0	Palearctic
LINYPHIIDAE				
Centromerus aequalis (C. L. KOCH, 1841)	0	1	0	Europe
Centromerus albidus (SIMON, 1929)	1	2	0	Europe
Centromerus sylvaticus (BLACKWALL, 1841)	2	1	0	Holarctic
Dicymbium nigrum (BLACKWALL, 1834)	0	1	0	Palearctic
Diplostyla concolor (WIDER, 1834)	25	16	0	Holarctic
Micrargus apertus (O. P.-CAMBRIDGE, 1871)	1	0	0	Palearctic
Micrargus herbigradus (BLACKWALL, 1854)	1	0	0	Palearctic
Micrargus subaequalis (WESTRING, 1851)	2	0	0	Palearctic
Microneta viaria (BLACKWALL, 1841)	4	3	0	Holarctic
Palliduphantes pallidus (O. P.-CAMBRIDGE, 1871)	4	4	0	Palearctic
Tenuiphantes flavipes (BLACKWALL, 1854)	1	0	0	Palearctic
Tenuiphantes mengei (KULCZYNSKI, 1887)	2	0	0	Palearctic
Tenuiphantes tenebricola (WIDER, 1834)	1	0	0	Palearctic
Tenuiphantes zimmermanni (BERTKAU, 1890)	0	3	0	Europe, Russia
Trichoncus affinis (KULCZYNSKI, 1894)	0	3	0	Palearctic
Trichoncus hackmani (MILLIDGE, 1955)	0	1	0	Central, Northern Europe
Walckenaeria furcillata (MENGE, 1869)	1	1	0	Palearctic

After the analysis of this table some faunistic and zoogeographical observations regarding the arachnids fauna of the studied zone can be made.

From the faunistic viewpoint we mentioned the presence of the species *Eurocoelotes falciger* (KULCZYNSKI, 1897), a South-Eastern European species which is abundant in certain forest habitats is rarely quoted for the fauna of our country (NICULESCU-BURLACU F., 1968). *Trichoncus hackmani* (MILLIDGE, 1955) is another relatively rare Romanian species. It was firstly mentioned as a new species for Romania's fauna in 2005 (URAK I., 2005). *Centromerus albidus* (SIMON, 1929), a species which prefers forest biocoenosis, especially the beech forests. Some authors quoted it in cavernicolous medium too (DUMITRESCU & GEORGESCU, 1980).

Regarding the number of species (Fig. 1), the dominant families are represented by the following: Linyphiidae (27.87%), and Lycosidae (18.03%), followed by Gnaphosidae (9.84%) and Thomisidae (8.20%), the other families having a percentage less than 5%: Amaurobiidae (4.92%), Dysderidae (4.92%), Atypidae (3.28%), Clubionidae (3.28%), Dictynidae, Corinnidae, Segestriidae, Zoridae, Liocranidae, Salticidae, Pisauridae, Agelenidae and Mimetidae (each 1.64%).

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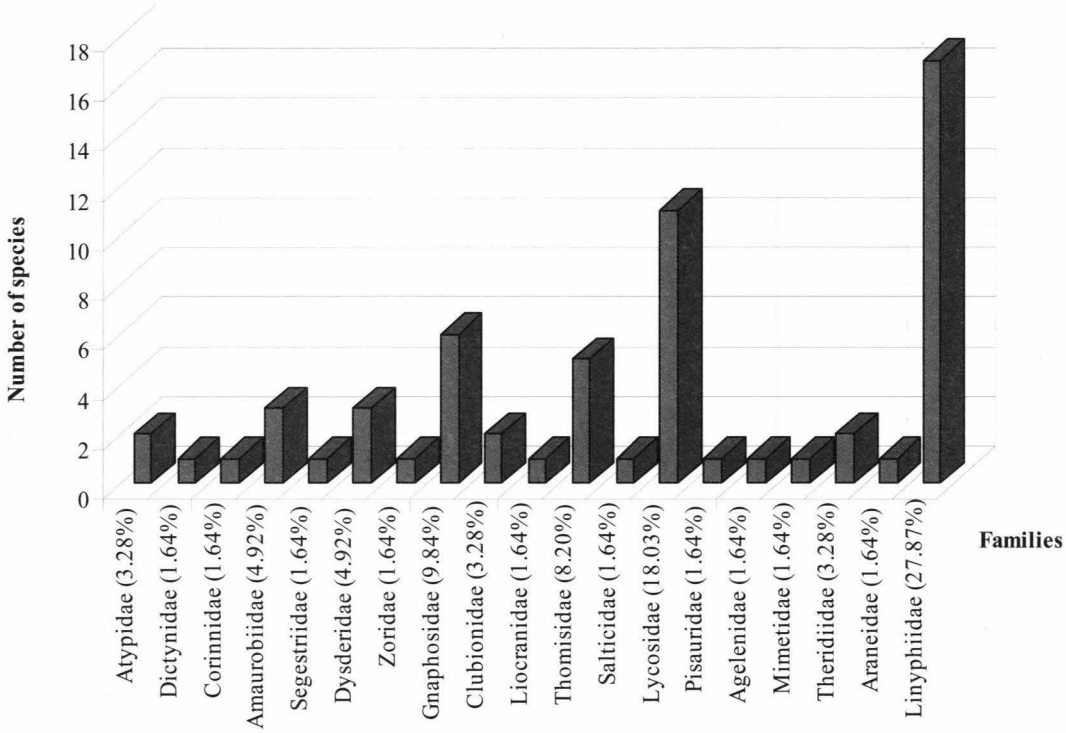

Figure 1. The distribution depending on families of the arachnids collected in forest Trivale (in parenthesis the procentage, as number of species for each family).

Figura 1. Distribuția pe familii a araneelor colectate în pădurea Trivale în funcție de numărul de specii din fiecare familie (în paranteză procentul ca număr de specii pentru fiecare familie).

From a quantitative viewpoint, as relative abundance (Fig. 2), supradominant are species of families Lycosidae (39.18%), followed by Gnaphosidae (15.07%), Linyphiidae (14.36%) and Amaurobiidae (9.75%). Dominant are families Thomisidae (6.56%) and Dyctinidae (4.26%). Subdominant, having a small number of individuals, are the families: Theriidiidae (1.60%), Corinidae (1.06%), Atypidae, Clubionidae, Salticidae, Pisauridae, Mimetidae (each 0.35%), followed by Segestriidae, Zoridae, Liocranidae, Agelenidae, Araneidae (each 0.18%). The following rule was considered when the families were classified: for complementary (subdominant) species are found under the axis A_S, between axis dominant species and above the axis A_D supradominant. The static axis $A_S = 5.26$ and the axis of dominance $A_D = 10.52$

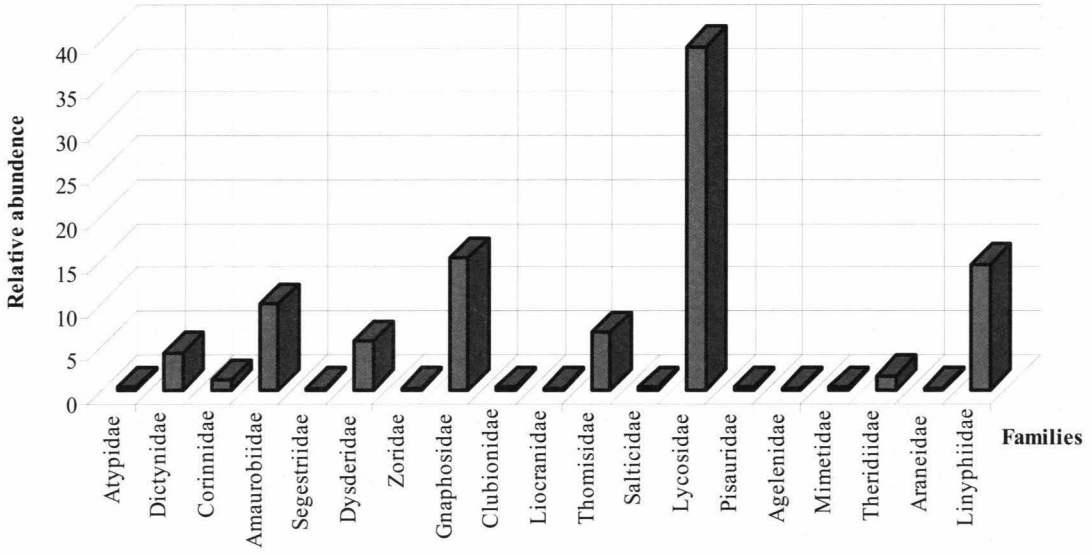

Figure 2. The distribution on families of arachnids collected in the forest Trivale depending on the relative abundance of species from each family (in parenthesis number of individuals of each family).

Figura 2. Distribuția pe familii a araneelor colectate în pădurea Trivale în funcție de abundența relativă a speciilor din fiecare familie (în paranteză numărul de indivizi din fiecare familie).

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In concordance with their geographical distribution the 61 species were grouped into 9 zoogeographical categories and two chorological complexes (Fig. 3). The best represented complex is that which groups the species having a wide spread (COS+HOL + PAL+WPA+ECA+EUS+ETU = 78.69%). This chorological complex is dominated by the Paleartic species (45.90%), especially lycosid and linyphiid species, followed by those Holartic (14.75%) and Euro-Siberian (9.84%).

The complex of the European species (21.31%, EUR+EEU) is dominated by the species which are spread all over Europe. In this chorological complex we have an only South-Eastern European species *Eurocoelotes falciger* a species seen in Romania and Bulgaria (LAZAROV et al, 2001, DIMITROV, 2002).

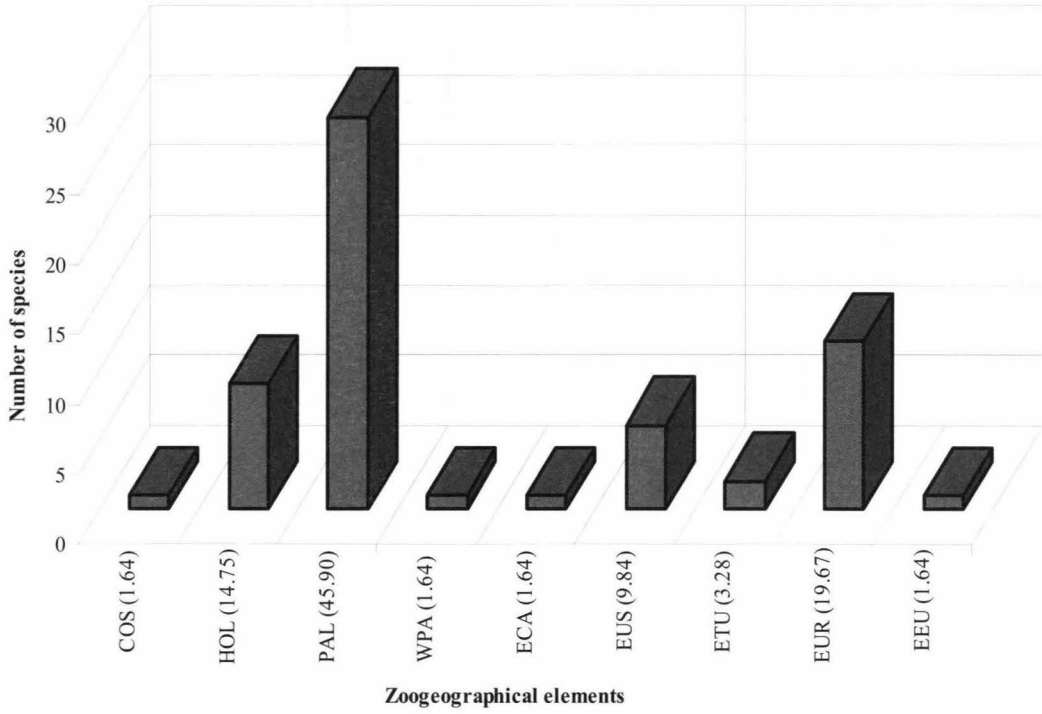

Figure 3. Zoogeographical distribution of the species of arachnids collected in the forest Trivale: COS – Cosmopolit, HOL – Holarctic, PAL – Palearctic, WPA – West Palearctic, ECA – Europeo-Centralasiatic, EUS – Europeo-Siberian, ETU – Europeo-Turanian, EUR – European, EEU – East-European (in parenthesis the percentage weight of each category).
Figura 3. Distribuţia zoogeografică a speciilor de aranee colectate din pădurea Trivale: COS – Cosmopolit, HOL – Holarctic, PAL – Palearctic, WPA – Vest Palearctic, ECA – Europeo-Centralasiatic, EUS – Europeo-Siberian, ETU – Europeo-Turanian, EUR – European, EEU – Est European (în paranteză ponderea procentuală a fiecărei categorii).

The latest observation regards the ratio between the two sexes (Fig. 4). As it could be observed the ratio between males and females is almost 1:1. The 10% of difference favourable to males could be considered normal, because of that the probability for them to be captured is higher in comparison with the females, especially lycosid species. Although the number of youthful individuals was bigger, we considered only those individuals that could be precisely determined as belonging to certain species.

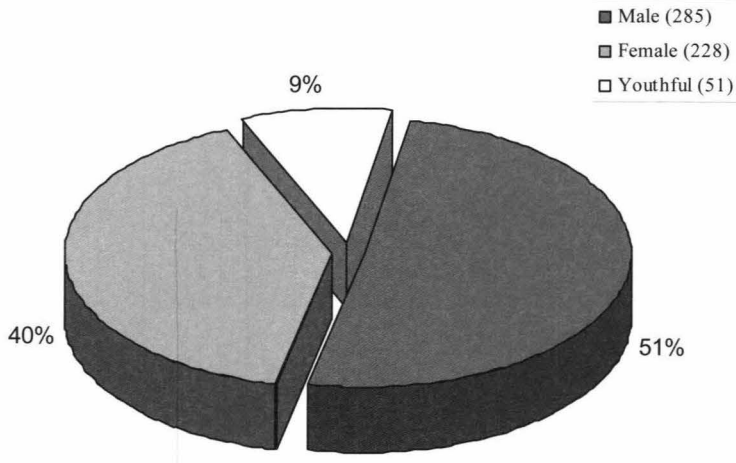

Figure 4. The ratio among the males, femele and juvenili.
Figura 4. Raportul dintre masculi, femele şi juvenili.

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CONCLUSIONS

This paper represents the first step towards a methodical study of the fauna of arachnids from the middle basin of the river Argeş. It could be registered in the category called "list of capture". Because such studies have never been performed in this area, we could say that it helps the completion of data regarding the spreading of the arachnids in Romania, because all the collected species could be considered to be a first time appearance in the studied area.

There were identified 61 species grouped into 19 families. Only 3 species of those 61 could be considered rare for the Romanian fauna: *Eurocoelotes falciger*, *Trichoncus hackmani* and *Centromerus albidus*. From a number of individuals viewpoint and the number of species we found out that the dominant families are Lycosidae, Linyphiidae and Gnaphosidae.

From the analyses of the zoogeographic data we as certained the presence of a big number of wide spread species, dominant being the Palearctic species followed by holarctic species. In the same context, the species with a small area of spreading are also well represented, especially the European ones. We mentioned the presence of a single species having a limited area of spreading: *Eurocoelotes falciger* South-Eastern European species.

Due to the method used the majority of the species are active right next to the soil or on the soil. There are also arboric species which reach the soil when they move from one tree to another. The pitfall traps method, wich are interception traps, permit the capture of bigger number males because the probability of capture increases as the insects mobility increases. It could be observed that the ratio between sexes is aproximative 1:1. The 10% difference is acceptable for ecological research.

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CHARACTERISTICS OF THE FEEDING PROCESS OF THE *Lymantria Dispar* LARVAE REARED WITH BEECH LEAVFS

CONSTANTIN NEŢOIU, TĂUT IOAN, MARCEL OCTAVIAN BĂDELE, MARIUS SORIN NICĂ

Abstract. *Lymantria dispar* is one of the most common butterfly which produces important economic and ecological damages in Romania's forests.Usually it appears in oak stands and in stands with oak mixed with other broadleaf species, but, in the past few years it developed significant outbreaks also in poplar, salix and beech stands. The paper presents the characteristics of the feeding process of the *Lymantria dispar* larvae reared in laboratory conditions in order to calculate the critical numbers used for next year population level estimation. Larvae eeding process has been analyzed by larval sex and larval instars, determining the quantity of leaves that larva eats in a time unit. With statistical methods we established the relations between food quantity and larval sex and instars. We also analyzed the excrements resulted in feeding process in order to determine the quantity of food used by larvae in physiological process.

Key words: *Lymantria dispar,* larvae, beech, food, ratio

Rezumat. Caracteristicile procesului de hrănire a larvelor de *Lymantria Dispar* **crescute cu frunze de fag.** *Lymantria dispar* este una din insectele defoliatoare care produce cele mai importante pagube economice şi ecologice în pădurile din ţara noastră. De obicei, apare în arborete de cvercinee sau amestec de cvercinee cu diverse foioase, dar fiind un dăunător polifag, în ultimii ani, a dezvoltat gradaţii semnificative şi în arborete de plop, salcie şi nu în ultimul rând în făgete. In lucrarea de faţă s-a studiat procesul de hrănire al larvelor, în condiţii de laborator, ca un prim pas în determinarea numerelor critice pe baza cărora se întocmeşte prognoza anuală şi se stabilesc suprafeţele ce trebuie combătute. Procesul de hrănire s-a analizat pe sexe şi vârste larvare, determinându-se cantitatea de frunziş consumat de larve în unitatea de timp. Prin aplicarea testelor statistice s-a stabilit modul cum variază cantitatea de hrană consumată de omizi în funcţie de sexul şi vârsta acestora. De asemenea, s-a analizat şi cantitatea de excremente rezultate în urma procesului de hrănire în scopul determinării indicelui de utilizare al hranei, ca un proces fiziologic important al speciei.

Cuvinte cheie: *Lymantria dispar,* larve, fag, raţia de hrană

INTRODUCTION

Lymantria dispar is one of the defoliating species of insects which, along the time, has produced numerous gradations in the quercinee forests in Romania, sometimes extending itself in the mixed forests of quercinee with the beech. It is the case of gradations in the period 1963-1964, when *Lymantria dispar infested* about 100 thousand hectares in the forests mixed with beech in the Danube narrow zone. (Orşova Forest District (F.D.), Berzeasca F.D., Moldova Nouă F.D., Mehadia F.D. and. Băile Herculane F.D.), without producing significant defoliations in the pure beech stands from the immediate nearness of these. Nevertheless, in the last time, more precisely, beginning with the generation 2004-2005, strong infestations have been also recorded in beech forests, initially, in the forests from Orşova – Berzasca – Herculane zone, and beginning with the generation 2005-2006, in the pure beech or mixed forests from north–west of the country (Ulmeni Forest District and Satu Mare Forest District). Total defoliations were recorded on about 2,500 hectares (NETOIU C., TAUT I., 2006) in some pure beech forests, strongly infestated from Orşova – Berzasca – Herculane zone, within Domogledd and Portile de Fier National Parks, in ther years 2005 and 2006.

Up to the present, researches referring to the activity of the defoliator *Lymantria dispar in beech forests have not been carried out in Roumania and also abroad, such damages being cited only in the specialized literature* (STEFANESCU M., 1980).

For the effectuation of the prognosis works in the years 2004 -2005, in the lack of the critical numbers specific to the beech, there were assimilated critical numbers, previously established for quercinee (DISSESCU G, 1966), which, in some cases, have lead to the superestimation or subestimation of the probable percentage of defoliation.

The study of characteristics of the feeding process of larvae of *Lymantria dispar* with leaves of beech has permitted the determination of the food ratio and the quantity of excrements eliminated by caterpillars, depending on sex and larval-stage of the caterpillars, and implicitly, the determination of the food use index by caterpillars. The food ratio, which represents the amount of food consumed by a larva along its entire period of development, beside the foliar biomass of the tree, constitutes the basic parameter in the calculation of critical numbers, on the basis of which the probable percentage of defoliation is determined. The knowledge of the amount of excrements eliminated by caterpillars in the feeding process in a certain period of time (24 hours), may help to the estimation of the population of existing caterpillars, at a given moment, in the stand (WELLENSTEIN G., 1978).

MATERIAL AND METHODS

With a view to elaboration of some methods and technologies of prognosis of the defoliator in the beech stands or beech mixed with quercinee, there were effectuated, in laboratory conditions, individual rearings of caterpillars to establish the food ratio, which, afterwards, will be the basis for the determination of the critical numbers for *Lymantria dispar* in the beech forests.

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To establish the food ratio of the caterpillars, as a main element in the calculation of critical numbers, we have made rearings of caterpillars in laboratory, in special vessels, and the caterpillars were given fresh food, daily. There were measured the amount of leaf consumed daily, using measurements before and after the consumption, the time (in days) necessary from one stage to the other, the amount of excrements for each caterpillar and the sex ratio (TOMESCU R, 1994).

In this sense, there were collected egg-masses from the infested beech forests, which were kept in laboratory, untill the caterpillars hatched. Then, each caterpillar was set in a vessel and the fresh food (leaves of beech) was given, daily; From 110 caterpillars, thus reared in vessels, 46 reached the stage of pupation, the sex ratio being 1:1. In the course of the development of caterpillars, there was observed that, at the passing from the first-stage to the second-stage, and from the second-stage to the third-stage, approximately 60% of caterpillars died, the probable cause being later adaptation to the conditions of light, temperature and humidity in which they were reared.Data referring to the food ratio were statiscally processed, by the variance analysis, in order to point out the influence of sex of caterpillars and the larval - stage on the amount of food consumed. (ANOVA-MANOVA Test).

RESULTS AND DISCUSSIONS

The individual rearing of the caterpillars in laboratory with fresh leaves of beech (daily changed) has offered the possibility of observing the daily feeding rhythm, on larval stages and sexes, at the passing from one larval-stage into the other, a pause in feeding of 1- 2 days was observed Fig. 1A and 1B).

The female larvae need about 35-45 days to reach the maturity, with a foliage consumption of 600-850 square cm (approximately 25-30 mature leaves of beech), and the males reach the maturity in 28-35 days, fter they have consumed 50-200 square cm of foliage (approximately 5-7 mature leaves of beech). As concerns the maximum feeding period, from the above shown figures, one is observed that the male larvae begin the ignificant consumption of foliage after 12-15 days from the eclosion, at a time when the larvae pass into the third-stage larva and the females after 15-20 days, when they, too, pass into the third-stage larva.

On the whole, there can be find that the female caterpilllars consume a bigger amount of foliage in a longer time, unlike the males which consume less food in a shorter time.

Data referring to the food ratio were processed according to the double analysis of variance (ANOVA-MANOVA), taking into account, as factors of influence on feeding, the sex and the instar of the caterpillars, and as a dependent variable, the food consumed, expressed in the surface of foliage (square cm of leaf (Table 1).

Table 1.The results of the variance analysis concerning the food ratio of the caterpillars reared with beech leaves
Tabel 1. Rezultatele analizei variantei privind ratia de hrana a omizilor crescute cu frunze de fag

Efect	SS	f	M.S	F	P
Sex	343100	1	343100	125.128	0.0000***
instar	1769404	1	353881	129.060	0.0000***
Sex x instar	1821237	5	364247	132.841	0.0000***
Error	690979	5	2742	-	-

From the above table, one may observe that the sex and the larval-stages of the caterpillars influence significantly the food ratio of the caterpillars.

In the first five - larval stages of the caterpillars no significant differences were found in the feeding of the caterpillars in those two sexes, however, due to the fact that the female caterpilalrs pass, too, through the sixth-stage larva, on the whole, there are very significant differences between sexes. (Fig. 2).

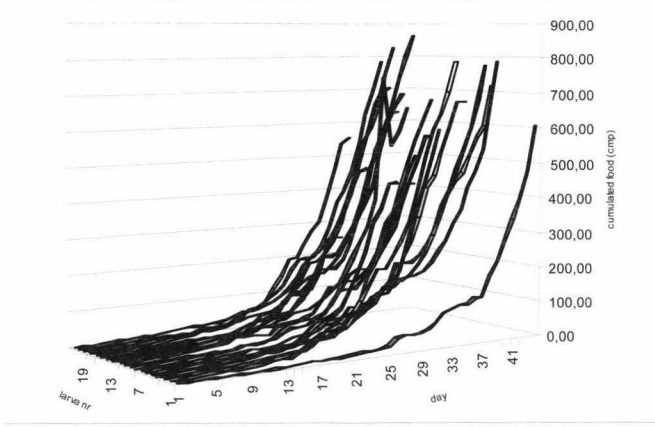

Figure 1A. The daily cumulative consumption of food of the caterpillars from which female butterflies eclosed.
Figura 1A. Consumul zilnic, cumulativ de hrana al larvelor din care au eclozat fluturi femeli

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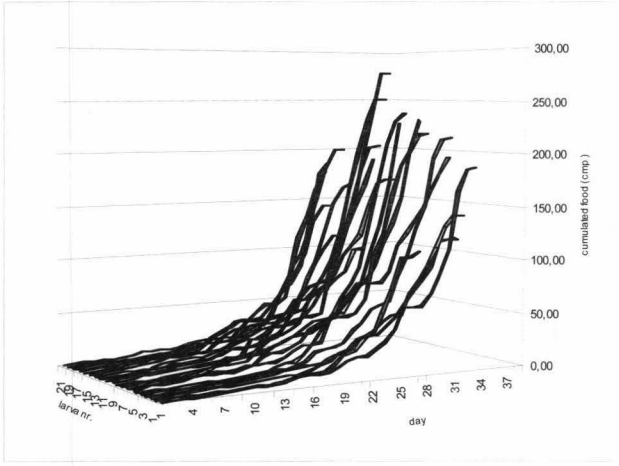

Figure 1B. The daily cumulative consumption of food of the caterpillars from which male butterflies eclosed.
Figura 1 B. Consumul zilnic, cumulativ de hrană al larvelor din care au eclozat fluturi masculi

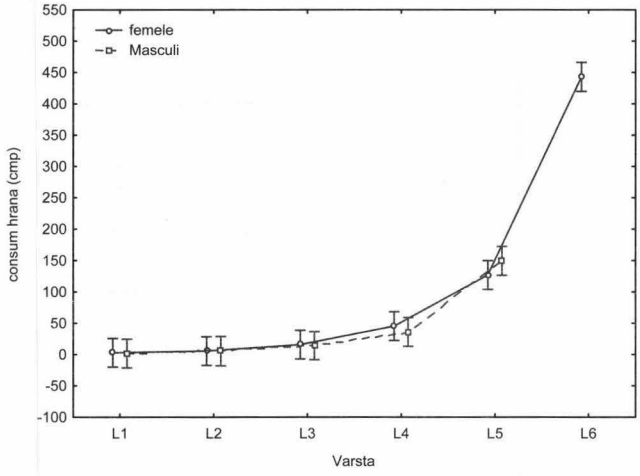

Figure 2. The variation of the average food consumption of the caterpillars on sexes and larval –stages
Figura 2. Variaţia consumului mediu de hrană al omizilor pe sexe şi vârste larvare.

Table 2. The analysis of the limit differences between the average food consumption of the caterpillars depending on the sex and the larval – stage of the caterpillars
Tabel 2. Analiza diferenţelor limită dintre consumul mediu de hrană al omizilor în funcţie de sexul şi vârsta larvelor

Efect	Average (cmp)	FL1	FL2	FL3	FL4	FL5	FL6	ML1	ML2	ML3	ML4	ML5
FL1	2.80		0.86543	0.41627	0.00751	0.00000	0.000	0.94215	0.87188	0.47456	0.03649	0.00000
FL2	5.48			0.51976	0.01217	0.00000	0.000	0.80877	0.99504	0.58648	0.05436	0.00000
FL3	15.66				0.06118	0.00000	0.000	0.37599	0.52062	0.91480	0.19880	0.00000
FL4	45.35					0.00000	0.000	0.00606	0.01299	0.04566	0.55424	0.00000
FL5	126.86						0.000	0.00000	0.00000	0.00000	0.00000	0.15511
FL6	442.96							0.0000	0.00000	0.00000	0.00000	0.00000
ML1	1.66								0.81577	0.43051	0.03054	0.00000
ML2	5.38									0.58664	0.05642	0.00000
ML3	13.99										0.15986	0.00000
ML4	36.00											0.00000
ML5	149.37											

FL1 – female larval instar 1, ML1 – male larval instar 1

In the first three - stage larva, both in the larvae from which male butterflies eclosed, and those from which female butterflies resulted, the food consumed by the caterpillars does not significantly differe among them, the marked difference is observed, beginning with the fourth-stage larva. The weight of the consumption realized by the male larvae until the fourth-stage larva is sensibly equal with that realized by the female larvae until the fifth-stage larva (about 20% from the total ratio of each category of larvae: males-females).

In the fifth-stage larva, before pupation, the male larvae reach to consume more than the female larvae of the same instar (Fig. 3), but, unlike the male larvae, those female ones continue the feeding also in the sixth-stage larva, so that, per total, the female

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larvae consume more food than the male ones. Also, in the last - stage larva of each of those two categories of larvae (fifth-stage larva for males and sixth-stage larva for females), the larvae consume about 70% from the total ratio of food, which, on average, reach to be about 200 square cm for the male larvae and about 600 square cm for the female larvae (Fig. 4).

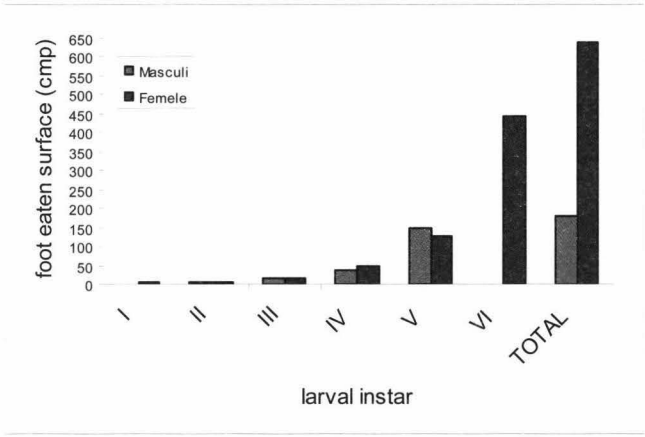

Figure 3. Food average ratio of the caterpillars, on larval - stages and sexes
Figura 3. Rația medie de hrană a omizilor pe vârste şi sexe.

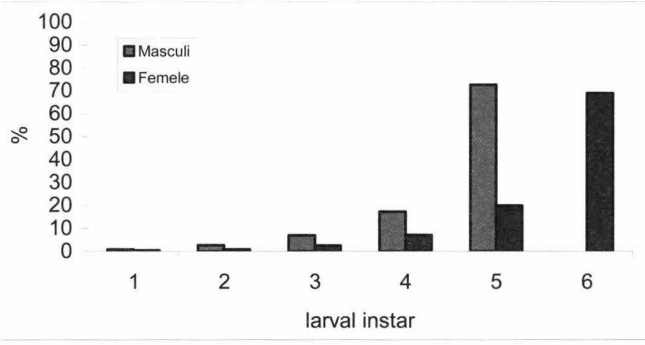

Figure 4. The food ratio percentage of the caterpillars on sexes and larval-stages
Figura 4. Procentajul rației de hrană a omizilor pe sexe şi vârste.

Data concerning the excrements eliminated, as a result of the feeding of larvae in laboratory, have lied in calculating the correlation between the amount of food consumed and the amount of excrements eliminated. (Fig. 5).

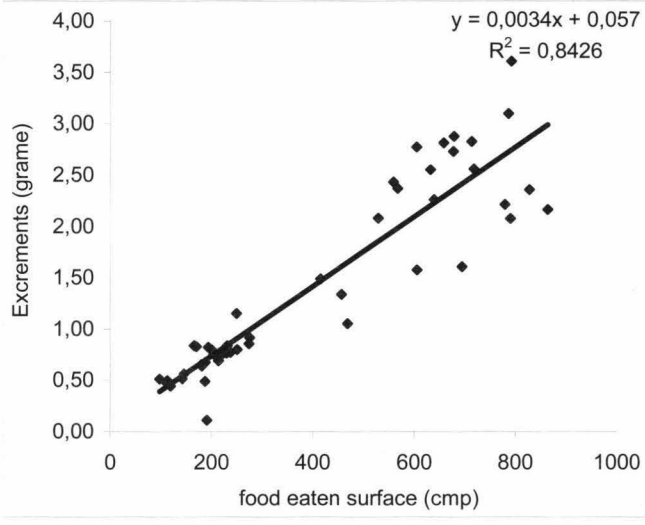

Figure 5. The relation between the amount of consumed food and the amount of excrements eliminated by caterpillars
Figura 5. Relația dintre cantitatea de hrană consumată şi cantitatea de excremente eliminată de omizi.

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The existing significant correlation between those two characteristics will be used in the future to the determination of the existing population of caterpillars, at a given moment on trees, and to the amount of foliage consumed until that moment by the respective population.

Effectuating the ratio between the amount of excrements produced by each larva and the amount of foliar mass consumed, expressed in dry weight (g), has resulted the index of food dissipation in the process of catabolism of larvae. This index calculated for those two categories of larvae (males and females) does not differ significantly in the male larvae (0.686) to those female ones (0.678), though, the total amount of food consumed is much bigger in the case of the female larvae (Fig 6).

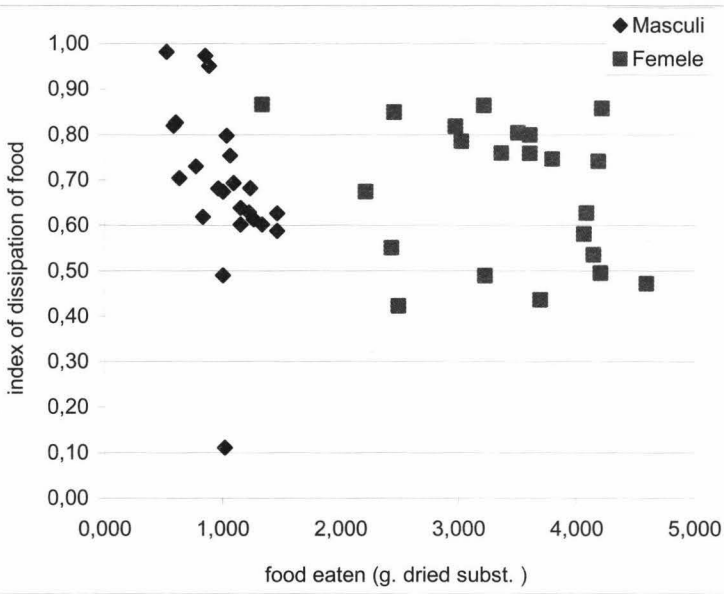

Figure 6. The dissipation index of the consumed food by caterpillars
Figura. 6. Indicele de risipire al hranei consumate de omizi.

individual rearing of the caterpillars in laboratory with fresh foliage of beech has offered the possibility of observing the daily rhythm of feeding, on larval-stages and on sexes. As a result of the data obtained, there was found that the female caterpillars consume a bigger amount of foliage in a longer time, unlike the male ones, which consume less food in a shorter time. From the statistical processing of our data has resulted the fact that, in the first fifth-stages of the caterpillars, there were not found significant differences in the feeding of larvae, on those two sexes, but, due to the fact that the female caterpillars also pass through the sixth-stage larva, on the whole, there are very significant differences between sexes. The female larvae need about 35-45 days to reach the maturity, with a consumption of foliage of 600-850 square cm (approximately 25-30 mature leaves of beech), and the male ones reach the maturity in 28-35 days, after they consumed 150-200 square cm foliage (approximately 5-7 mature leaves of beech).

The proportion of the food consumption, on larval-stages, for those two categories of larvae, thus vary:

	Male larvae,	*female larvae*
Larvae of 1 -3 th stage	*10%*	*4%*
Larvae of 4th stage	*17%*	*7%*
Larvae of 5th stage	*73%*	*19%*
Larvae of 6th stager	-	*70%*

At the same time, the average food consumption of those two categories of caterpillars, on the whole cycle of development, expressed in surface and dry mass grames, thus is shown :

	Square cm of leaf	*dry mass grams*
Males	*201*	*1,068*
Females	*639*	*3,395*

The study of the feeding process of the larvae of *Lymantria dispar,* represents a first step with the purpose of determining the critical numbers on the basis of which, the works of prognosis are effectuated. A prognosis of the defoliation as exactly as possible leads to the elimination or the reduction of important economic and ecological damages that can be caused by the attacks of the defoliator *Lymantria dispar* in the beech forests.

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FAUNISTIC AND SYNECOLOGICAL RESEARCHES OF GRASSHOPPERS (INSECTA, ORTHOPTERA) FROM THE SCENTIFIC RESERVES OF THE REPUBLIC OF MOLDOVA

NADEJDA STAHI

Abstract. In the present paper are used the entomologic materials from five natural scientific reserves of the Republic of Moldova: "Codrii", „Plaiul Fagului", „Stepa Bugeacului", „Prutul-de-Jos" and „Pădurea Domnească". The faunistical researches are frame in actual orientations of biological variety and conservation from different zones from our republic which are a few studied. The faunistic dates of order Orthoptera are very poorly known (NICOLAESCU, DERJANSCHI, 2001, STAHI, 2005).

Key words: Orthoptera, natural scientific reserve, Republic of Moldova

Rezumat: Cercetarea sinecologică şi faunistică a ortopterelor (Insecta: Orthoptera) din rezervaţiile ştiinţifce ale Republicii Moldova. În lucrarea de faţă este folosit materialul entomologic colectat din cinci rezervaţii ştiinţifice ale Republicii Moldova: Codrii, Plaiul Fagului, Stepa Bugeacului, Prutul-de-Jos, Pădurea Domnească. Cercetările faunistice se încadrează în orientărie actuale de cunoaştere a biodiversităţii şi conservării genofondului din diferite zone din ţara noastră mai puţin studiate. În ceea ce priveşte ordinul Orthoptera, datele faunistice cunoscute sunt foarte puţine (NICOLAESCU, DERJANSCHI, 2001, STAHI, 2005).

Cuvinte cheie: Orthoptera, rezervaţie ştiinţifica, Republica Moldova

INTRODUCTION

The Orthoptera order is a large group of insects which includes the Grasshoppers, Locusts, Groundhoppers, Crickets, Bush-crickets, Mole-crickets and Camel-crickets as well as some lesser groups. The grasshoppers represent one of the most important insects, because they cause big damages either in agriculture or forests.

In this paper we present entomologic materials which were collected from the following natural scientific reserves of the Republic of Moldova: "Codrii", „Plaiul Fagului", „Stepa Bugeacului", „Prutul-de-Jos" and „Pădurea Domnească".

MATERIAL AND METHODS

The investigations were done in 2005 and 2006, especially in August and September. Sampling was made with a sweep-net, collecting in grass and individual search. In plane with pure grasses there were the geo-philous species (they have a small size and the same colour like earth) which are predominant; the collection was carefully effectuated with hand.

The identification of the species was made according to: UVAROV (1927), KNECHTEL (1959), BEI-BIENCO (1964), AVAKEAN (1968, 1981).

The synecological calculations were carried out in accordance with ecology and analitic coefficients and Cekanovski-Sorensen ecological indexes of similarity.

DESCRIPTION OF THE SITES

The „Codrii" Scientific Reserve is situated in the centre of the Republic of Moldova, at 49 km away from the city of Kishinev, and contains 12300 ha including the following zones: the protective zone and the buffer and transit zone. The central headquarters of the "Codrii" Scientific Reserve is situated near the Lozova village, Straseni district.

The Vegetation of „Codrii" is composed of the genera: *Fraxinus* L., *Carpinus* L., *Sorbus* L., *Quercus* L., *Carex* L., *Aegopodium*L., *Stellaria* L. etc. (POSTOLACHE, 1995).

The "Plaiul Fagului" Scientific Reserve is situated on N-W of the "altitude of the Central of Moldova" near the Radenii-Vechi village, Ungheni district. The vegetation of this reserve is represented by: the families: Asteraceae, Poaceae, Fabaceae, Lamiaceae, Rosaceae, Scrophulariaceae, Ranunculaceae, Brassicaceae, Cyperaceae, and the genera: *Fraxinus* L., *Carpinus* L., *Fagus* L., *Corylus* L., *Swida* Opiz., *Rubus* L., *Euonymus* L. etc.

The „Pădurea Domnească" Scientific Reserve comprises the Balatina and Călineşti forests and is situated on the meadowlands of the middle Prut River (185 km north of Chisinau). The total area is 6039 ha. The area of natural woods is 3054 ha and it includes the oak tree zones (*Quercus robur* L.), the poplar zones (*Populus alba* L., *P. nigra* L.), silky willow zones (*Salix alba* L.) and osier plots (*S. triandra* L., *S. viminalis* L.). The flora includes 633 genera of vascular plants, 58 species and 2 varieties of lichens. The collection was effectuated only from planes which often are under water and the vegetation is formed of *Phragmites australis* Cav. and *Calamagrostis epigeios* L.

The „Stepa Bugeacului" Scientific Reserve is situated between Bugeac and Cicur-Mingir villages, Cimislia district and the vegetation is represented by *Festuca valesiacea* Gaudin, *Poa angustifolia* L. etc.

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The „Prutul-de-Jos" Scientific Reserve has a surface of 626 ha and 2/3 of the reserve's surface is occupied by Beleu lake waters. The rest - 1/3 of the territory has got reed thickets, salces (*Salix alba* L., *S. fragilis*, *S. viminalis* L., *S. triandra* L.) and holm meadow herbs. In the north and north - east of the lake the high tide and the low tide is big and there is taking place the accumulation of aluvial deposits, creating favourable conditions for the development of the *Phragmites australis* Cav., *Typha angustifolia* L., *Scirpus lacustris* L., *Bolboschoenus maritimus* L. etc.

REZULTS AND DISCUSSIONS

As a result of determining the entomological materials collected from different reserves of the Republic of Moldova (Codrii, Plaiul Fagului, Stepa Bugeacului, Prutul-de-Jos, Pădurea Domnească) were identified 55 species of grasshoppers. A richer fauna of Orthoptera was found out in the "Codrii" Scientific Reserve, with 29 species, and a poor fauna was found out in „Pădurea Domnească", with only 3 species (but fauna of grasshoppers of this reserve wasn't studied so well so this dates aren't definitive).

Gryllus campestris (LINNE 1758) was collected in all those five reserves, but *Metrioptera bicolor* (PHILIPPI 1830), *Oechanthus peluscens* (SERVILLE 1831), *Chorthippus biguttulus* (LINNE 1761) and *Ch. brunneus* (THUNBERG 1815) were found in four reserves. The species *Poecilimin affinis* (FRIVALDSKY 1868), *Omocestus minutus* (BRULLE 1832) and *Chorthippus mollis* (CHARPENTIER 1825) were found in three reserves respectively.

The *Mecostethus* genus with the large Marsh Grasshopper *Mecostethus grossus* (Linnaeus, 1766) collected from „Plaiul Fagului" are new genus and species for the fauna of the Republic of Moldova. This species is distributed in European and Asiatic parts of the former U.R.S.S. and in Europe. *Mecostethus grossus* (L.) preferred meadows, which are periodically flooded each winter.

The results of the indexes of dominance in those five reserves are given in Tab. 1.

Table 1. The index of dominance of the grasshopper's species from scientific reserves of the Republic of Moldova: Codrii (C), Plaiul Fagului (PF), Stepa Bugeacului (SB), Prutul-de-Jos (PJ) and Pădurea Domnească (PD).
Tabelul 1. Indicele de dominanță a speciilor de ortoptere din rezervațiile științifice ale Republicii Moldova: Codrii (C), Plaiul Fagului (PF), Stepa Bugeacului (SB), Prutul-de-Jos (PJ) și Pădurea Domnească (PD).

Family	Species	Scientific reserves				
		C	PF	SB	PJ	PD
BRADYPORIDAE	*Ephippiger ephippiger* LATREILLE 1825	0.9	0.3	-	-	-
TETTIGONIIDAE	*Pholidoptera aptera* FABRICIUS, 1793	-	0.5	-	-	-
	Phaneroptera falcata SCOPOLI 1763	4.4	1.2	-	-	-
	Phaneroptera spinosa BEI-BIENKO, 1954	0.9	-	-	-	-
	Leptophyes punctatissima Bosc 1792	3.9	1.2	-	-	-
	Leptophies bosci FIEBER 1853	10.2	9.2	-	-	-
	Leptophies albovittata KOLLAR 1833	4.4	1.6	-	-	-
	Pholidoptera griseptera DE GEER 1773	6.3	20.8	-	-	-
	Isophia gracilis Brunner v. WATTENWYL 1882	0.9	-	-	-	-
	Isophia costata BRUNNER v. WATTENWYL 1878	-	0.7	-	-	-
	Barbistis sericaudus FABRICIUS 1793	3.3	-	-	-	-
	Poecilimon ukrainicus BEY-BIENKO, 1951	0.9	-	-	-	-
	Poecilimon afinis FRIVALDSKY 1868	0.9	0.1	-	1.2	-
	Meconema thalassima FABRICIUS 1793	1.9	-	-	-	-
	Conocephalus fuscus FABRICIUS 1793	1.5	2.2	-	-	-
	Conocephalus discolor THUNBERG, 1815	0.9	-	-	-	-
	Tettigonia viridisima LINNAEUS 1758	-	0.1	-	-	-
	Metrioptera brachiptera LINNAEUS 1745	-	-	2.5	-	-
	Metrioptera roeselii HAGENBACH 1822	1.5	-	-	-	-
	Metrioptera bicolor PHILIPPI 1830	0.9	0.8	0.8	0.4	-
	Platycleis vittata CHARPENTIER, 1825	-	-	3.3	0.7	-
	Platycleis tesselata CHOPARD. 1922	-	-	0.8	0.4	-
	Platycleis intermedia SERVILLE 1839	-	-	3.3	0.4	-
	Rhacocleis germanica HERRICH-SCHAEFFER, 1840	0.5	-	-	-	-
OECANTHIDAE	*Oecanthus pelucens* SCOPOLI 163	1.9	1.4	7.4	3.8	-
GRYLLIDAE	*Gryllus campestris* LINNAEUS 1758	2.9	0.9	3.3	5.3	4.6
TETRIGIDAE	*Tetrix tenuicornis* SAHLBERG, 1891	-	-	-	0.7	40.9
	Tetrix bipunctata LINNAEUS 1758	-	0.3	-	-	-
	Tetrix subulata LINNAEUS 1761	0.5	-	-	-	-
	Tetrix depresa BRISOUT 1848	0.9	-	-	-	-
ACRIDIDAE	*Acrida hungarica* HERBST 1786	-	-	-	9.1	-
	Myrmeleotetix maculatus THUNBERG 1815	-	-	1.7	1.2	-

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Omocestus viridulus LINNAEUS 1761	0.9	-	2.5	1.2	-
Omocestus minutus BRULLE 1832	0.48	-	-	-	-
Omocestus rufipes ZETTERSTEDT, 1821	-	1.9	2.5	-	-
Stenobothrus lineatus PANZER 1796	-	-	-	3.1	-
Pezotetrix giornai ROSSI 1794	-	-	-	1.2	-
Podismopsis poppuisi MIRAM, 1908	0.5	-	-	-	-
Parapleurus alliaceus GERMAR 1817	-	-	-	-	54.5
Pararcyptera microptera FISCHER WALDHEIM, 1833	-	-	-	0.4	-
**Mecostethus grossus* LINNAEUS, 1766	-	0.1	-	-	-
Euthystira brachyptera OCSKAY, 1826	1.5	-	-	-	-
Oedipoda caerulescens LINNAEUS 1758	0.9	-	-	1.9	-
Paracinema tricolor bisignata THUNBERG 1815	-	0.3	-	3.1	-
Dociostaurus maroccanus THUNBERG 1815	-	-	-	0.7	-
Chortippus loratus FISCHER de WALDHEIM 1846	-	-	-	4.2	-
Chortippus biguttulus LINNAEUS 1761	22.7	27.1	13.3	6.8	
Chortippus dorsatus ZETTERSTEDT 1821	-	0.2	-	3.1	-
Chortippus brunneus THUNBERG 1815	15.5	18.1	10.7	43.1	-
Chortippus pullus PHILPPI 1830	-	0.9	22.3	-	-
Chorthippus vagans EVERSMANN 1848	-	-	-	0.7	-
Chortippus longicornis LATREILLE 1804	-	5.9	-	1.8	-
Chorthippus mollis CHARPENTIER 1825	6.3	5	-	3.8	-
Euchorthippus pulvinatus FISCHER de WALDHEIM 1846	-	-	25.6	-	-
Calliptamus italicus LINNAEUS 1758	-	-	-	2.3	-

Legendă: C – Codrii; PF – Plaiul Fagului; SB – Stepa Bugeacului; PJ – Prutul de Jos; PD – Padurea Domneasca; * - specie nouă pentru Republica Moldova

Note: C – Codrii; PF – Plaiul Fagului; SB – Stepa Bugeacului; J – Prutul de Jos; PD – Padurea Domneasca; * - a new species for Republic of Moldova

The structure of dominance is presented in Table 2. As is known there are five groups of dominance: eudominant species (with percentages over 10 %), dominant species (5.1 - 10 %), subdominant species (2.1 - 5 %), recedent (sporadical) species (1.1 – 2 %), subrecedent (subsporadical) species below 1 %. Within these groups of dominance the number of species, of course is variable.

Thus, the number of eudominant species varied between one species (*Chortippus brunneus* THNB.) in "Prutul de Jos" Reserve with 4.0% and four species in "Stepa Buceagului" Reserve (*Chortippus biguttulus* L., *Chortippus brunneus* THNB, *Chortippus longicornis* LATR., *Euchorthippus pulvinatus* F.-W.) with 28.57% (Tab.1. and Tab. 2).

The number of dominant species varied between one species (*Oecanthus pelucens* Scop.) in "Stepa Buceagului" Reserve) with 7.14%, and three species in "Prutul de Jos" Reserve (*Chortippus biguttulus* L., *Chortippus brunneus* THNB., *Chortippus pullus* PHIL.) respectively with 12.0% (Tab.1. and Tab. 2).

The number of subdominant species varied between one species (*Gryllus campestris* L.) in "Pădurea Domneasca" Reserve with 33,33%, and 7 species in "Prutul de Jos" Reserve (*Oecanthus peluscens* SCOP., *Stenobothrus lineatus* PANZ., *Paracinema tricolor bisignata* THNB., *Chortippus loratus* F.-W., *Chortippus dorsatus* ZETT., *Chorthippus mollis* CH., *Calliptamus italicus* L. with 28. 0 %.(Tab.1. and Tab. 2).

Recedent and subrecedent species have importance in the coenosis, because they contribute to the increase of diversity, but their number of individuals is small. It is known that in every ecosystem the number of the recedent and subrecedent species is big. The cumulative number of recedent and subrecedent species varied between 3 ("Stepa Buceagului" Reserve) and 19 ("Codrii" Reserve) (Tab.1. and Tab. 2).

Table 2. The structure of dominance and procentual representation of the material, collected in those five natural reserves.

Tabelul 2. Structura dominanţei şi reprezentarea procentuală a materialului colectat în cele cinci rezervaţii.

Name of reserves	Ed	D	SD	R	SR	T sp and %
Codrii	3	2	5	5	14	29
%	**10.34**	**6.89**	**17.24**	**17.24**	**48.27**	**99.98**
Plaiul Fagului	3	2	2	5	12	24
%	**12.5**	**8.33**	**8.33**	**20.83**	**50.00**	**99.99**
Stepa Buceacului	4	1	6	1	2	14
%	**28.57**	**7.14**	**42.85**	**7.14**	**14.24**	**99.94**
Prutul de Jos	1	3	7	6	8	25
%	**4.0**	**12.0**	**28.0**	**24.0**	**32.0**	**100.0**
Pădurea Domnească	2	0	1	0	0	3
%	**66.66**	**0**	**33.33**	**0**	**0**	**99.99**

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Legendă: ED = eudominant; D = dominant; SD= subdominant; R= recedent (sporadic); SR= subrecedent
Note: ED = eudominant; D = dominant; SD= subdominant; R= recedent; SR= subrecedent

The Cekanovski-Sőrensen ecological indexes of similarity of grasshoppers from scientific reserves of the Republic of Moldova are represented in Tab. 3. The Cekanovski-Sőrensen indexes are smaller in „Codrii" – „Pădurea Domnească" – 0.06, and bigger in „Stepa Bugeacului" – „Prutul-de-Jos" – 0.37.

Table 3. The Cekanovski-Sorensen ecological indexes of similarity of grasshoppers from scientific reservations of the Republic of Moldova.
Tabelul 3. Indicele lui Cekanovski-Sorensen de similitudine ecologică a speciilor de ortoptere din rezervațiile științifice ale Republicii Moldova.

Rezerves	Codrii	Plaiul Fagului	Stepa Bugeac	Prutul de Jos	Pădurea Domnească
Codrii	-	0.35	0.22	0.26	0.06
Plaiul Fagului	0.35	-	0.27	0.29	0.07
Stepa Bugeac	0.22	0.27	-	0.37	0.11
Prutul de Jos	0.26	0.29	0.37	-	0.14
Pădurea Domnească	0.06	0.07	0.11	0.14	-

CONCLUSIONS

1. In the scientific reserves of the Republic of Moldova „Codrii", „Plaiul Fagului", „Stepa Bugeacului", „Prutul-de-Jos" and „Pădurea Domnească" were collected 55 species of grasshoppers which belong to 6 families and 34 genera. On the whole, family Acrididae is richer in genera with 16 genera, and family Tettigoniidae whith 13 genera.

2. The *Mecostethus* genus with *Mecostethus grossus* (LINNAEUS, 1766) collected from „Plaiul Fagului" are new genus and species for the fauna of the Republic of Moldova.

3. There was established that *Chortippus brunneus* THNB. and *Chortippus biguttulus* L. are the eudominant species in four reserves, but the species *Leptophies bosci* FIEB. and *Pholidoptera griseptera* DE GEER were eudominant only in Codrii and Plaiul Fagului reserves.

4. The Cekanovski-Sőrensen ecological indexes of similarity of grasshoppers from scientific reserves of the Republic of Moldova is smaller in „Codrii" – „Pădurea Domnească" – 0.06, and bigger in „Stepa Bugeacului" – „Prutul-de-Jos" – 0.37.

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IMPACT OF WIND DISASTER IN HIGH TATRAS IN NOVEMBER 2004 ON CARABID COMMUNITIES

ŠUSTEK ZBYŠEK

Abstract. At the night of 14 November 2004, a major part of Norway spruce forests in the southern slopes of High Tatras, at the altitudes of about 850 to 1200 m, were destroyed by wind exceeding 200 $km.h^{-1}$. During next two years, the timber was harvested in the major part of the area affected. In a minor part, the timber has been let in situ in order to allow study of succession of biota without any human intervention. In addition a considerable part of the harvested area was burned in 2005, possibly from speculative reasons. Study of the disaster impacts on the Carabid communities was possible as late as after finishing of harvesting. It started in 2007 in six study plots: intact mature Norway spruce forest as a reference plot, one plot with timber let in situ for study reasons and in four plots with harvested timber, among which two were also burned. The first results show that the less affected plot was that with preserved timber. It has completely preserved the original species composition and any penetration of the xenocoenous, xero- and heliophilous species has not been observed. Only abundance of species decreased to about 30% of abundance in the intact forest. In all plots with removed timber, the original species composition was affected. Except of *Carabus violaceus* and *C. glabratus*, which were tolerant to deforestation or even profited from it, the original species occurred here only occasionally and invasion of xenocoenous species (mostly *Amara* spp., *Notiophilus biguttatus*, *Bembidion lampros*, *Poecilus cupreus*) stared here. Its intensity was much higher in the burned plots and was still enhanced by mowing the secondary vegetation in one re-afforested plot. In contrast to expectations, there were not observed invasion od *Pseudoophonus rufipes*, an extremely expansive and abundant species, and of other heliophilous species.

Key words: Carabidae, wind disaster, High Tatras, ecology

Rezumat Consecinţele catastrofei de vânt din Tatra Înaltă din noiembrie 2004 asupra cenozelor de carabide. În noaptea de 14 noiembrie 2004 o mare parte a molidişurilor în valea Popradska kotlina în Tatra Înaltă au fost distruse de un vânt cu viteza de peste 200 km pe oră. În cursul urmatorilor doi ani, triunchiurile căzute au fost îndepărtate din majoritatea suprafeţei afectate. O mică parte a fost lăsată pe loc pentru a se putea studia succesiunea Biotei pe suprafeţele cu şi fără intervenţie umană. În cursul lucrărilor de exploatare a lemnului o mare parte a suprafeţei afectate a fost incendiată, probabil din motive speculative. Studiul consecinţelor catastrofei asupra faunei de pe suprafaţa solului a fost posibil abia după terminarea lucrărilor. Colectarea carabidelor a început abia în anul 2007, în şase staţionare: molidişul seminatural intact ca staţionar de referinţă, un staţionar cu lemnul lăsat in situ şi patru staţionare cu lemn colectat, din care două au fost ulterior afectate de foc. Primele rezultate arată că cel mai puţin afectată a fost cenoza de pe suprafaţa cu lemnul lasat in situ păstrând, toate speciile din staţionarul de referinţă, dar cu număr scăzut de indivizi (la 30% de numărul din staţionarul de referinţă), însă fără invazia speciilor xenocene heliofile. În celelalte staţionare, numărul speciilor tipice pentru păduri a fost redus, cu excepţia speciilor *Carabus violaceus* şi *C. gabratus*, care se întâlnesc numai ocazional. În aceste staţionare au apărut un număr ridicat de specii heliofile, mai ales din genul *Amara* precum şi *Notiophilus biguttatus*, *Bembidion lampros* şi *Poecilus cupreus*. Contrar aşteptărilor, nu s-a constatat invazia speciei *Pseudophonus rufipes* - specie extrem de expansivă şi abundentă, precum şi a celorlalte specii heliofile .

Cuvânte cheie: carabide, vânt catastrofal, Tatra Înaltă, ecologie

INTRODUCTION

At the night of 14 November 2004, a major part of Norway spruce forests in the southern slopes of High Tatras, at the altitudes from about 850 to 1200 m, was destroyed in an about 16 km long and 4 km wide strip by wind reaching a velocity of up to 200 km per hour. In two subsequent years the fallen timber was removed from the major part of the area affected. There were let only sparse individuals of pines and larches, which have survived the catastrophe. Such a catastrophe occurred there in a similar extent already in early 20th century as a consequence of planting unsuitable ecotypes of Norway spruce in mid 19th century. In spite of the fact that the forests destroyed were of the artificial origin, they have already reached an advanced succession stage, could not be considered as pure monocultures and were protected in the framework of the Tatra National Park. Beside this their species composition as such was not in any discordance with the potential composition of vegetation, because of the rain shadow caused by extensive Carpathian mountain ranges situated westerly of High Tatras, as well as by the High Tatras themselves. The resulting deficiency in humidity does not allowed the beech-fir forests, which would represent the natural potential vegetation at these altitudes, to develop here (Michalko 1985) and existence of extensive Norway spruce stands is to be considered natural in such conditions. The same phenomenon also occurs in the eastern slopes of Carpathians in Romania (CĂLINESCU 1944).

This catastrophe offers, however, an exceptional occasion for long termed observations of succession of biota in the area affected and its ability to restore its original composition. From this reason, a minor part of the stands destroyed have been let *in situ* in order to compare succession on the areas without any human intervention and in those, where the timber was almost completely removed and the area was let to further autonomous succession and those which have been artificially afforested, mostly with trees more resistant to wind (ashes, larches). The situation has also been complicated by the fact that during the timber removing a major part of the area affected was still damaged by fire, which arose perhaps unintentionally due to negligent tourists, but highly probably was founded intentionally, from

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speculative reasons, by the lobbies interested in timber exploitation, massive investments and building activity around the existing sport and recreation resorts and in reduction of protection degree of the High Tatra National Park.

Such observations are of a high significance, because impacts of artificial or natural catastrophic deforestation of forest fauna were studied mostly at lower altitudes (MAGURA et al. 2003, ŠUSTEK 1984a, b) or on areas of a much lesser extent ŠUSTEK & ŽUFFA (1985, 1986). In adition the recent investigation of alpine carabid communities indicate, that strategy and habitat preference of some species can considerably change along the range of their altitudinal distribution (ŠUSTEK 2005). The aim of this contribution is to compare the present state of Carabid communities in the intact spruce forests and in the affected area in the sites with different management regime.

METHODS

The beetles were pitfall-trapped using the half-liter plastic jars filled with 5% formol. Six traps were installed in a line in center of each study plot in distances of about five meters. They are emptied in one-month intervals. The study plots were selected by the staff of the Investigation Station of the State Silviculture Enterprise of the High Tatra National Park and serve for simultaneous investigations of abiotic factors and succession of biota. The plots were selected so that they include one intact mature Norway spruce stand westerly of the area affected, as a reference plot, one plot with timber let *in situ*, two plots with removed timber and two plots with removed timber and secondarily burned. In this study, two one-month samples from June-July and July-August 2007 are used.

The ecological data on species were taken from BURMEISTER (1939), HŮRKA (1996), ŠUSTEK (2000) and THIELE (1977).

The hierarchical classification of communities was carried out by the unweighted average linkage method using the indices of Jaccard and Ružička. The reciprocal ordering was used for non-hierarchic classification of the communities. All calculations were carried by means of the NUMCLAS program. The direct ordination was made on the basis of vegetation and humidity preferences of species. An original 4-degree semiquantitative scale was used for characterization of vegetation cover preference, while an 8-degree semiquantitative scale was used for humidity preference (ŠUSTEK 2004). The score of individual communities was calculated as arithmetic mean of preference of all species weighted by their abundance.

Sampling Sites Specification

The sampling sites are situated in the center of the affected strip, five sites are in the affected area subjected to different management regime and, partly additionally affected by fire. One site, situated westerly of the affected strip in an intact spruce forests serves as reference plot. The plots were selected by the staff of the Research Station of the State Forest Management Office of the Tatra National Park and serve to simultaneous investigation of other organisms and abiotical processes.

Vyšné Hágy – 49° 07′ 25.6" N, 20° 07′ 12.5" E, altitude 1260 m, southern slope, declination about 20°, a mature continuous stand of 80-90 years, the ground covered mostly by raw humus and needles, locally by mooches and *Vaccinium myrtillus,* (coverage not higher than 20-30%) and individual young spruces. Reference plot.

Danielov dom - 49° 07′ 22.4" N, 20° 09′ 46.3" E, altitude 1080 m, southern slope, declination about 20°, originally a mature continuous stand of 80-90 years, the fallen timber completely removed, only about 1-1.5 m long trounces remained, in the plot individual mature larches and sparsely distributed young spruces also remained, the whole area covered by *Calamagrostis* spp. (coverage 80-90%) and individually by *Vaccinium myrtillus* or *Vaccinium vitis idea.* still not re-afforested.

Tatranské Zruby, lower plot – 49° 07′ 49.6" N, 20° 11′ 53.8" E, altitude 1005 m, almost flat, declination 2-3°, originally a mature continuous stand of 80-90 years, the fallen timber completely removed, only about 1-1.5 m long trounces let, individual mature larches also survived, the plot was completely burned, now is densely covered by about one meter high stand of *Chamaenerion angustifolium* (100%), recently re-afforested by ashes and larches (not higher than 40-50 cm), around which the spontaneous vegetation is cut.

Tatranské Zruby, upper plot – 49° 08′ 4.0" N, 20° 11′ 31.2" E, altitude 1100 m, southeastern splote, declination 20-30°, originally a mature continuous stand of 80-90 years, the fallen timber completely removed, only about 1-1.5 m long trounces let, individual mature larches rarely survived, the plot was completely burned, now is densely covered by about one meter high stand of *Chamaenerion angustifolium* (100%), still not re-afforested.

Nový Smokovec – Vodný les – 49° 08′ 8.1" N, 20° 12′ 27.5" E, altitude 1015 m, a little southerly opened valley of a creek on southern slope, originally a mature continuous stand of spruces of 80-120 years, locally with young spruces up to 3 m, with admixed willows and alders along the creek, the fallen timber completely removed, only about 1-1.5 m long trounces let, the whole area covered by *Calamagrostis* spp. (coverage 80-90%), locally *Rubus* spp. and *Vaccinium myrtilus.* The plot lies on margin of the burned area. Still not re-afforested.

Tatranská Lomnica – Jamy - 49° 09′ 18.4" N, 20° 14′ 51.3" E, altitude 1060 m, a strongly undulated, mostly southerly and southeasterly oriented terrain, declination varying from 5-25°, originally a mature continuous stand of 80-90 years, individual pines and young spruces survived, the timber let *in situ*, only a narrow corridor cut along a former little path to allow to entry the area interior. The traps were situated along this path. The herbaceous vegetation consists of little patches of grasses or the soil surface covered by needles.

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RESULTS

General Characteristic of Species Composition

In all six sites 34 species were recorded (Tab. 1). They split in two groups – the first includes stenotopic forests species distributed in highlands, at elevations of about 300-1200 m, but some of them reaching also the subalpine zone (*Carabus violaceus, Pterostichus foveolatus, Cychrus caraboides*) or occurring also in lowland forests (*Carabus hortensis, Carabus violaceus, Cychrus caraboides*). All of them are unable to fly, except of *Trichotichnus laevicollis*).

Table 1. Survey of species, their ecological parameters and activity abundance in six sampling plots in Norway spruce forest in High Tatras affected by gale disaster in November 2004

Tabelul 1. Lista speciilor, paramertre ecologice ale lor şi activitatea abundeşei la şase staţionare în molidişurile din Tatra Înaltă distruse de vânt la Noiembrie 2004

	Fly ability	Veg. cov.	Humidity	Vyšné Hágy	Jamy	Danielov dom	Tatranské zruby upper	Tatranské zruby lower	Vodný les
Agonum sexpunctatum (LINNAEUS, 1758)	F	1	5				1	1	
Amara aenea (DE GEER, 1774)	F	1	3			2	6	1	
Amara eurynota (PANZER, 1797)	F	1	3			1	2	21	1
Amara familiaris (DUFTSCHMIDT, 1812)	F	1	3			3		1	1
Amara nitida STURM, 1825	F	1	3						1
Anisodactylus binotatus (FABRICIUS, 1792)	F	1	6				1	2	
Amara erratica (DUFTSCHMIDT, 1812)	F	1	3			102	8	6	14
Bembidion lampros (HERBST, 1784(	F	1	3				4	26	
Calathus micropterus DUFTSCHMIDT, 1812	N	4	3	9					
Carabus auronitens FABRICIUS, 1792	N	4	4	18	1	1	3		
Carabus glabratus PAYKULL, 1790	N	4	5	7	15	47	4	8	5
Carabus hortensis LINNAEUS, 1758	N	4	4					1	
Carabus linnei DEJEAN, 1826	N	4	5	17	25	1		7	
Carabus violaceus LINNAEUS, 1758	N	4	5	29	10	40	1	2	3
Cychrus carabaoides (LINNAEUS, 1758(	N	4	5	8					
Harpalus affinis (SCHRANK, 1784)	F	1	3						1
Harpalus quadripunctatus (DEJEAN, 1829)	F	1	4					2	
Loricera caerulescens (LINNAEUS, 1758)	F	2	4						5
Microlestes maurus (STURM, 1827)	F	1	2					1	
Molops piceus (PANZER, 1793)	N	4	4	7			1	2	1
Notiophilus biguttatus (FABRICIUS, 1779)	F	1	4	4			1	4	5
Poecilus cupreus (LINNAEUS, 1758)	F	1	4			1	5	17	
Pseudoophonus rufipes (DE GEER, 1774)	F	1	4			1	2		
Pterostichus aethiops (PANZER, 1797)	N	4	5	3	9	1	1		2
Pterostichus burmeisteri (HEER, 1801)	N	4	5	17	16	2	1		5
Pterostichus foveolatus DUFTSCHMIDT, 1812	N	4	5	44	4			1	1
Pterostichus niger (SCHALLER, 1783)	F	4	6						1
Pterostichus nigrita (FABRICIUS, 1792(	F	2	8						2
Pterostichus oblongopunctatus (FABRICIUS, 1787)	F	4	5			1	1	3	
Pterostichus strenuus (PANZER, 1797)	F	2	7						1
Pterostichus unctulatus DUFTSCHMIDT, 1812	N	4	5	208	25	28	8	1	2
Trechus amplicollis FAIRMAIR, 1859	N	4	5						4
Trechus latus Puzeys, 1847	N	4	5						1
Trichotichnus laevicollis DUFTSCHMIDT, 1812	F	4	5	1	1				1
Number of individuals				372	106	231	50	107	57
Number of species				13	9	14	17	19	20
Diversity index H′				2.35	2.72	2.00	3.65	3.34	3.75
Dominance concentration index D				0.34	0.17	0.28	0.10	0.14	0.11

Explanations:
Flying ability: N – non-flying species, F – flying species.

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Gradient of preference of vegetation cover: 1 – heliophilous open landscape species, 2 – eurytopic species, 4 – stenotopic forest species.
Gradient of humidity preference: 1 – extremely xerophilous species, 8 – extremely hygrophilous species.
Explicații:
Abilitate de zbor: N – specii nu zburatoare, F – specii zburatoare
Gradientul preferinței acoperișului vegetal: 1 – specii heliofile a peisajului deschis, 2 specii euritopice, 4 specii stenotope de pădure.
Gradientul preferinței umedității: 1 – specii extreme de xerofile, 8 specii extreme de higrofile

The second group includes species having their optimum occurrence in open landscape in lowlands and reaching to the highlands up to ca. 1000-1200 m. Only one of them, *Amara erratica*, is a rather montane species, and three (*Pterostichus nigrita, Pterostichus strenuus, Loricera caerulescens*) are eurytopic species indifferent to vegetation cover. All of these species are able to fly. Most of species of both groups are more or less mesohygrophilous. Only four species (*Pterostichus niger, Pterostichus nigrita, Pterostichus strenuous and Anisodactylus binottatus*) are hygrophilous or polyhygrophilous), whereas only one species (*Microlestes maurus*) is strongly xerophilous.

There have not been found any alpine species known to occur abundantly in High Tatra in the zone of dwarf pine stands, subalpine and alpine meadows (*Carabus sylvestris* PANZER, 1793, *Calathus metallicus* DEJEAN, 1828, *Trechus striatulus* PUTZEYS 1847, *Pterostichus morio carpathicus* KULT, 1947),

Presence and Abundance Changes between the Reference Site

The community in the reference site consists of 12 species, among 12 are stenotopic forests species and one (*Notiophilus biguttatus*) is eurytopic. There was not recorded any xenocoenous species. Except of *Calathus micropterus* and *Trichotichnus laevicollis* all species occurring in the intact stand occurred in the sites damaged, but their abundance strongly decreased in most of them (Tab. 1). Only two species, *Carabus glabratus* and *Carabus violaceus* were not visibly affected by damaging or removing of the tree cover, or in the site Danielov dom (not affected by fire) they were even favored by elimination of competition of similarly sized congeners.

The community in the site with fallen timber let *in situ* was poorer in number of species (9) and exhibited a lower cumulative abundance (106 ind.). However, most species occurred in similar numbers of individuals (Tab. 1) Only abundance of *Pterostichu unctulatus* and *Pterostichus foveolatus* dropped suddenly to about 10% of their abundance in the reference site. On the contrary this community has not still been penetrated by any xenocoenous species.

The community in the site with removed timber but not affected by fire consisted of 14 species with cumulative abundance of 231 individuals. Seven among them were common with the reference site, but except *Carabus glabratus* and *C. violaceus*, they survived here in much lower numbers of individuals (Tab. 1). These species together represented 61% of individuals. The species not found in the reference site was *Pterostichus oblongopunctatus*, a frequent forests species of lowlands and middle altitudes. These species together represented 61% of individuals. Six species were open landscape species. Most abundant of them was *Amara erratica* representing 44% of all individuals. Its presence is obviously a consequence of deforestation, but as it is a montane species. Therefore its occurrence can not be interpreted negatively from the so zoological viewpoint. Only the remaining five species (*Amara aenea, Amara eurynota, Amara familiaris, Poecilus cupreus, Pseudoophonus rufipes*) can be considered as expressively xenocoenous.

The next three sites (both in Tatranské Zruby, Vodný Les) consisted of a relatively large number of species (17; 19 and 20, respectively), but cumulative abundance of all species was much lower (50; 107 and 57 ind., respectively) than in the reference plot. The species occurring in the reference site nine species survived there little, representing about one quarter of species (6; 5 and 6, respectively) but they occurred here always individually only. Besides this there were recorded two forest species (*Carabus hortensis* and *Pterostichus oblongopunctatus*) not occurring in the reference plot or in the moderately affected plot with laying timber. Major part of the community consisted of open landscape, xenocoenous species (7, 9 and 5 species, respectively). Their cumulative abundance represented 56%, 70% and 31.6% of all individuals. Beside it, in the site Vodný les three polyhygrophilous species (*Pterostichus niger. Pterostichus nigrita, Pterostichus strenuus*), also occurred in small number of individuals, due to a narrow alluvium of a creek running through this site.

Hierarchical Classification and Ordination of the Communities

The hierarchical classification based on presence/absence data (Jaccard´s coefficient) forms two clusters (Fig. 1). The first cluster, at dissimilarity level of 0.3, joins the communities from the reference site and site with laying timber. The second cluster, at dissimilarity level of 0.55, joins three communities from deforested sites. The community from Vodný Les takes an isolated position in the dendrogram, joing to the cluster at dissimilarity level of 0.65. This structure of dendrogram reflects absence of xenocoenous species in the reference site and in the site with laying timber, a high proportion of xenocoenous species in the affected sites and occurrence of some hygrophilous species in the site Vodný les.

The hierarchical classification based on non standardized quantitative data (Ružička´s index) (Fig. 2) forms two clusters at dissimilarity level of 0.9. The core of the first cluster consists of the community from the reference site and from the site with laying timber. Presence of community from the deforested site Danielom Dom in this cluster

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results from a high abundance of *Carabus glabratus* and *Carabus violaceus* as a common feature with the first two communities and from a high abundance of *Amara erratica* as a feature different from other affected sites. The core of the second cluster includes communities from both burnt sites, to which the community from Vodný les joins. It reflects high proportion of xenocoenous species, a low abundance of *Amara erratica* in all three communities and presence of hygrophilous species and a slightly increased level of surviving of some forest species.

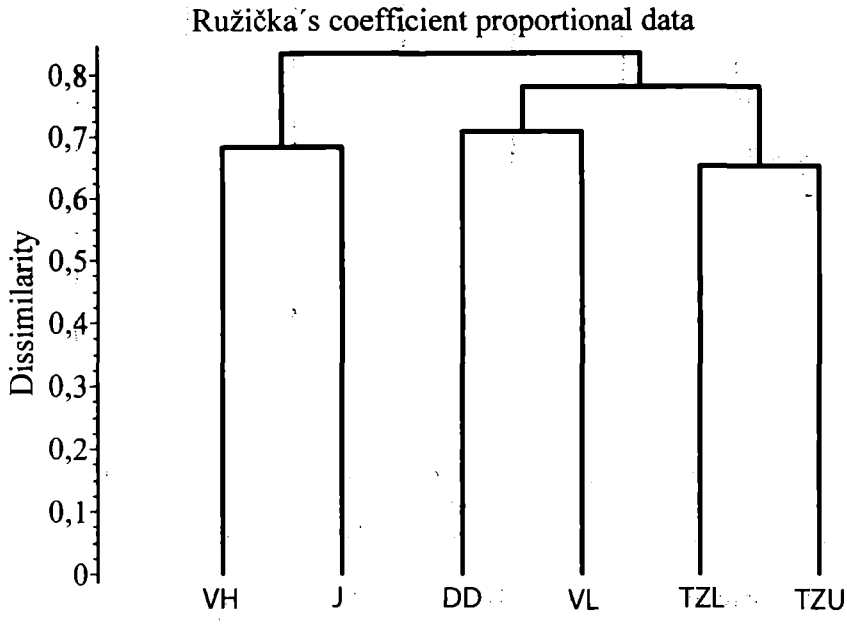

Figure 1. Hierarchical classification of the communities according to presence absence data (Jaccard's coefficient).
Figura 1. Clasificarea ierarhică a cenozelor după prezenţă şi absenţă a lor (coeficientul lui Jaccard)

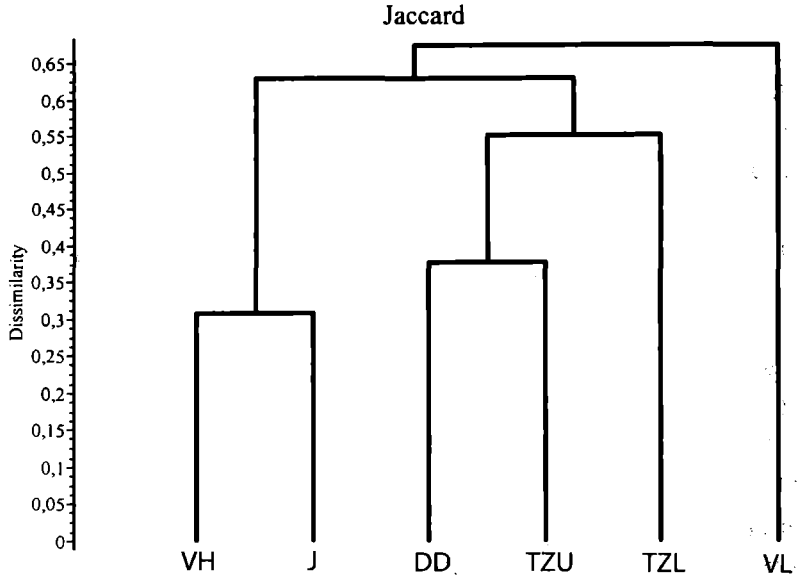

Figure 2. Hierarchical classification of the communities according to non-standardized abundance data (Ružička's coefficient).
Figura 2. Clasificarea ierarhică a cenozelor după abundenţă nestandartizată (coeficientul lui Ružička)

The hierarchical classification using standardized quantitative data (relative abundance, Ružička's index) (Fig. 3) form three separate clusters at dissimilarity level of 0.68-0.70. The first includes the communities from the reference site, the second from the deforested and burnt site in Tatranské Zruby, the third the sites from Danielov Dom and Vodný les. The two former. The second cluster reflects mainly the increased representation of *Amara erratica, Poecilus cupreus, Bembidion lampros* and, while the third increased representation of *Poecilus cupreus, Bembidion lampros* a slightly higher degree of surviving of *Carabus violaceus, Carabus glabratus and Pterostichus burmeisteri.*

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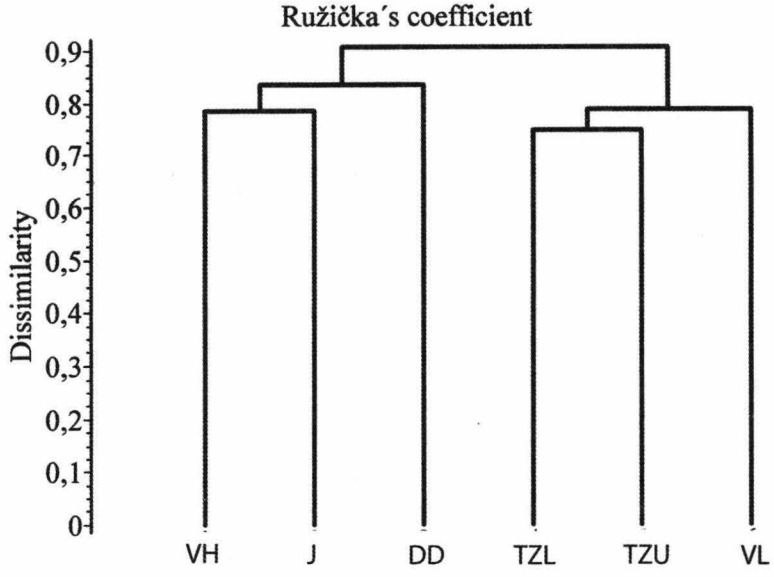

Figure 3. Hierarchical classification of the communities according to standardized (relative abundance) data (Ružička´s coefficient).

Figura 3. Clasificarea ierarhică a cenozelor după abundență estandartizată (abundență relativă, coeficientul lui Ružička)

The diagram of reciprocal ordering (Fig. 4) has the same interpretation. There arise three clear groups of communities: 1 and 2 – reference site and site with laying timber, 4 and 5 – both burn sites from Tatranské Zruby and 3 and 6 – Danielov Dom and Vodný les. Thus along the first ordination axis are clearly separated the communities from sites with removed timber, while along the second axis the communities from the deforested sites affected secondarily by fire and exposed to a slightly stronger invasion of the heliophilous, open landscapes species are separated the not burnt ones.

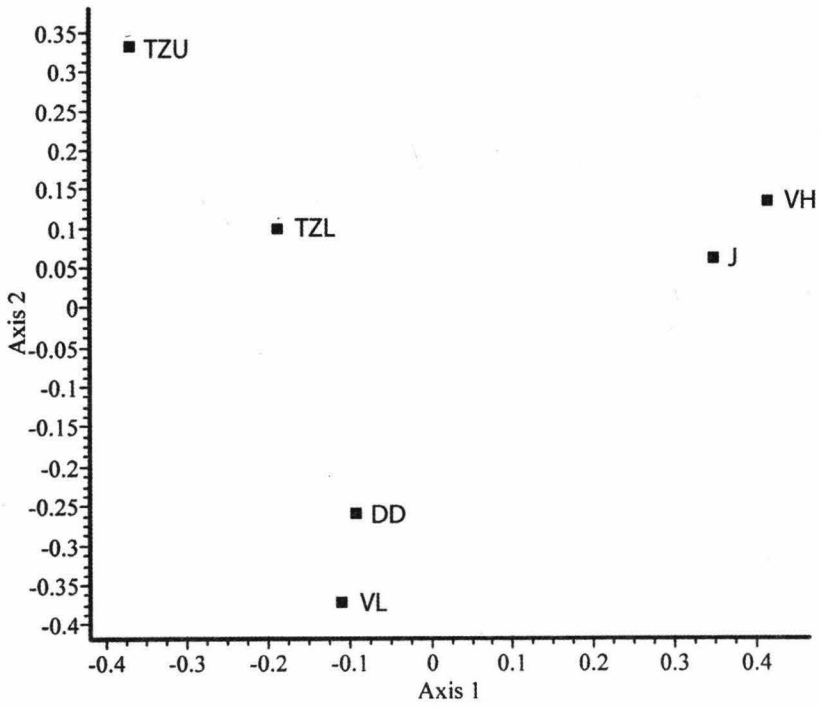

Figure 4. Diagram of reciprocal ordering (VH – Vyšné Hágy, J – Jamy, D – Danielov Dom, TZL – Tatranské Zruby lower, TZU – Tatranské Zruby upper, VL – Vodný les).

Figura 4. Diagram de ordinație după algoritmul "reciprocal ordering (VH – Vyšné Hágy, J – Jamy, D – Danielov Dom, TZL – Tatranské Zruby staționarul de jos, TZU – Tatranské Zruby staționarul de sus VL – Vodný les).

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Structural Changes in the Communities

The non-flying species highly predominate in the community in the reference site and on the site with laying timber (Fig. 5). The quantitative representation of flying species is even negligible (Fig. 6). In the communities if all deforested sites proportion of the non-flying and flying species is balanced (Danielov Dom) or the flying species represent even 2/3 of all species. The quantitative representation of both groups remains approximately balanced in Danielov dom and Vodný les, while in both communities in Tatranské Zruby proportion of individuals of flying species increases even to ¾.

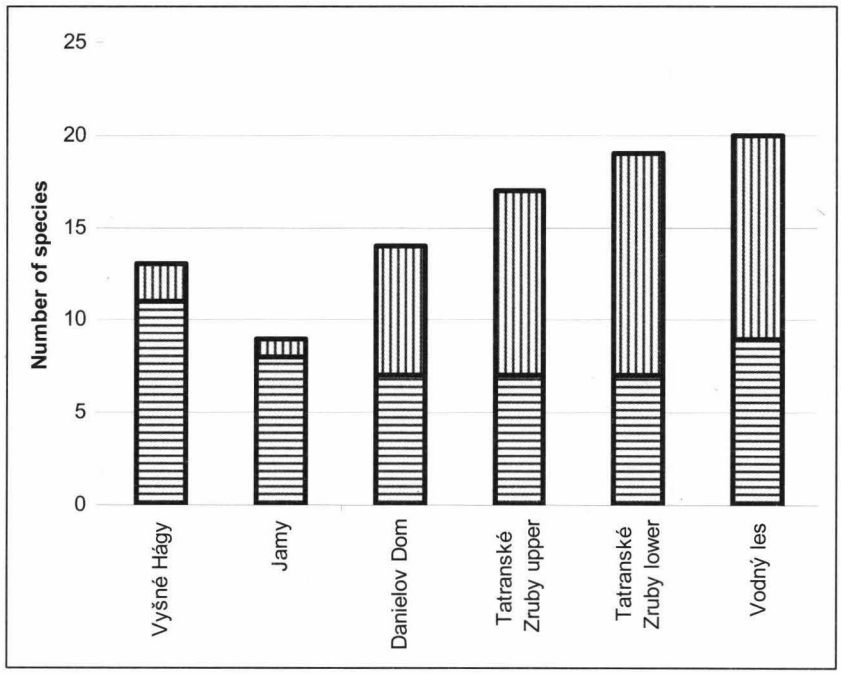

Figure 5. Number of flying (vertical hatching) and non flying species (horizontal hatching) in individual localities.
Figura 5. Numărul speciilor zburătoare (rețea verticală) şi nezburătoare (rețea orizontală) in staționarele individuale

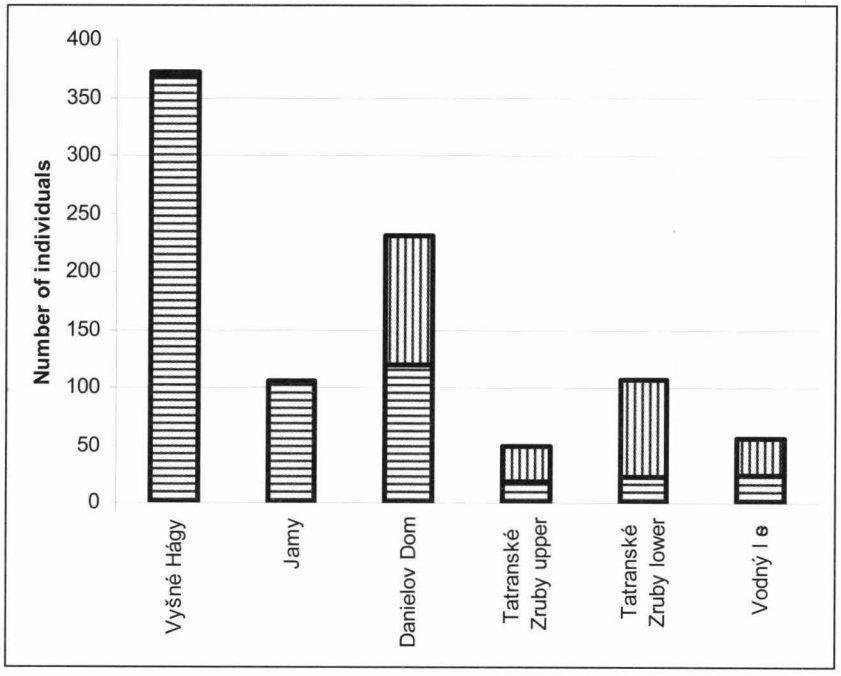

Figure 6. Number of individuals of flying (vertical hatching) and non flying (horizontal hatching) species in individual localities.
Figura 6. Numărul indiviziilor zburatoare (rețea verticală) şi nu zburatoare (rețea orizontală) in staționarele individuale

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The changes of proportion of forest and opened landscape species on one hand and of species with different preference of humidity is reflected in direct ordination of the communities (Fig. 7). In the right top corner is closely situated the community from the reference site and site with laying timber, where are no open landscape species, eurytopic species are represented negligibly and all species are mesohygrophilous with slightly increased requirements for humidity. In the center there are communities from other deforested, where the open landscape species predominated quantitatively and their presence shifts the communities along the humidity gradient about by one degree. Influence of secondary damaging by fire is shown by shifting of both communities from Tatranské Zruby lower along the vegetation cover gradient and also slightly to more xerophilous communities.

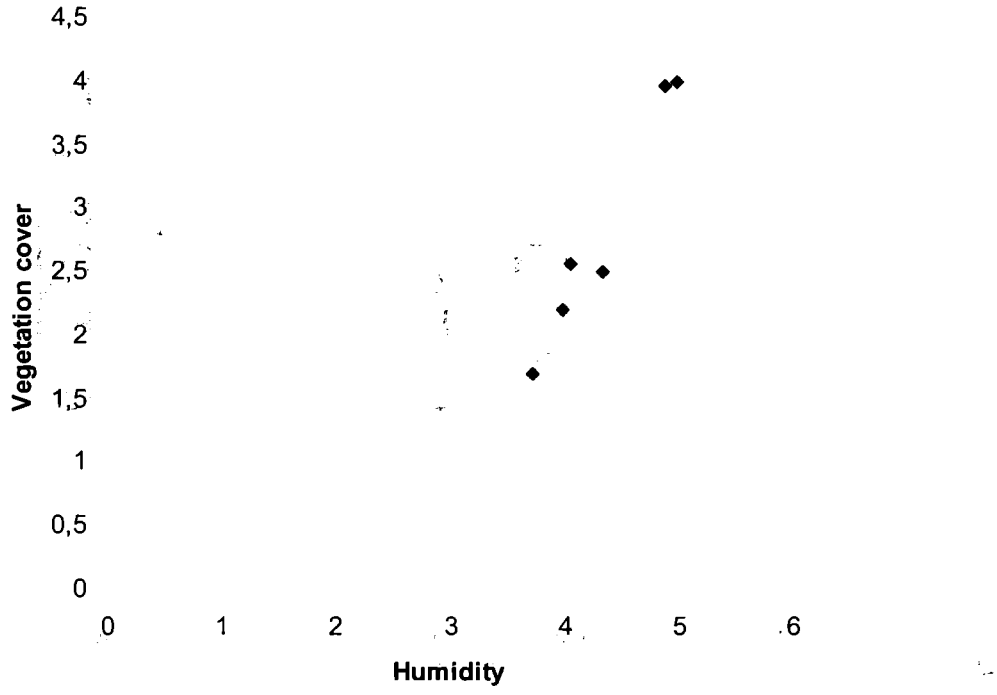

Figure 7. Direct ordination of the communities according preference of species for humidity and vegetation cover.
Figura 7. Ordinația directă a cenozelor după preferința lor pentru umiditate și acoperișul vegetal

DISCUSSION AND CONCLUSIONS

The result obtained so far indicate clearly that wind disaster strongly affected structure of Carabid communities. However ,as such it has not affect species composition as such. It resulted only in a considerable decrease of abundance of individuals of species. The much more destructive factor was removing of the laying timber from the major part of the area affected and the damaging of litter and upper layer of soil where the forest Carabids develop and search for cover. However, even under such conditions a considerable part of original stenotopic species survives being replaced by open landscape species with higher invasive power. Still more destructive was the fire damaging secondarily the soil surface. Whereas in the non-burned sites were invaded to considerable by *Amara erratica*, a montane species, the burned sited were invaded more by species typical of fields, meadows and ruderals in lowland and middle altitudes. Their invasion is also an affect cutting the secondary herbage vegetation in one of the sites in Tatranské zruby, which has already been artificially re-afforested. Iinvasion of these, however, was not so massive, as it would happen in lower altitudes (e. g. Šustek 1984). There was not observed even any strong invasion of *Pseudoophonus rufipes,* very expansive and abundant field species, which undertakes intensive migrations in warm night by the turn of July and August.

The most sensitive species to deforestation were *Pterostichus unctulatus* followed by *Carabus linei, Carabus auronitens, Calathus micropterus, Pterostichus foveolatus* and *Pterostichus burmeisteri.* On the contrary, *Carabus glabratus* and *Carabus violaceus* exhibites a considerable tolerance to deforestation. The tolerance degree of individual species can not be, however, generalized. It can be illustrated by *Pterostichus foveolatus*, which was relatively sensitive in this case, at altitudes of 1000-1100 m, but which successfully survives in subalpine meadows at altitudes of 1700-2000 m, in more humid climate.

The obtained results confirm rightfulness of opinions of nature protectors, who demanded to let the fallen timber in situ. On other hand, they show that the communities in the damaged areas have preserved at least some original species and still are able to restore its original structure autonomously.

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DIVERSITY AND ECOLOGICAL ASPECTS OF THE SPECIES OF CARABIDAE (COLEOPTERA, CARABIDAE) IN THE SUGAR BEET CROP ECOSYSTEM FROM THE LOCALITY OF TRUSESTI (BOTOŞANI COUNTY)

VARVARA MIRCEA, GĂLUŞCĂ SIMONA

Abstract. The present paper deals with some ecological aspects concerning the epigeic ground beetles from the sugar beet crop ecosystem of the Truşeşti locality (Botoşani County). It presents the alpha diversity of the ground beetles, the variation of the relative abundance, the Shannon index of the coenosis, evenness, and the main ecological requirements of the species, the general characteristics of the coenosis of ground beetles as concerns the classes of ecological requirements. reproduction, moisture, biotopes, food and geographical distribution.

Key words: Sugar beet crop, Carabidae, alpha diversity, relative abundance, dominance, Shannon index, evenness, main ecological requirements.

Rezumat. Diversitatea şi aspecte ecologice ale speciilor de carabide (Coleoptera, Carabidae) în ecosistemul culturii de sfeclă de zahăr din localitatea Truşeşti, judeţul Botoşani. Lucrarea cuprinde diversitatea taxonomică epigee a Ordinului Coleoptera şi a speciilor de carabide epigee din ecosistemul culturii de sfeclă de zahăr din localitatea Truşeşti (Judeţul Botoşani). Pentru colectarea materialului entomologic (Truşeşti) s-au folosit 12 capcane Barber cu lichid conservant şi protejate împotriva precipitaţiilor. S-au efectuat opt colectări, extrăgându-se 96 de eşantioane (8 x 12 capcane, mai –august, 2000). Din fauna epigee s-au colectat indivizi aparţinând la 6 ordine de insecte şi 10 familii de coleoptere. Din totalul coleopterelor epigee colectate, două familii sunt eudominante: Carabidae (87,56 %) şi Tenebrionidae (10.81 %). Alfa diversitatea speciilor de Carabidae a fost formată din 24 de specii, totalizând, în patru luni de colectare, 2356 exemplare (22,98% din total), comparativ cu localitatea Leţcani, (Judeţul Iaşi) cu 26 specii, 6782 indivizi (66,16 %) (1981); (19 specii, 1113 indivizi, (10,86 %), Leţcani, 1982). Valoarea indicelui Shannon a fost 1,67, iar echitabilitatea 36 %.(Truşeşti, 2000); 2,17; 46 % (Leţcani, 1981); 1,67; 51 % (Leţcani,1982). Cenoza de carabide a ecosistemului sfeclei de zahăr în localitatea Truşeşti, anul 2000, s-a caracterizat prin predominarea speciilor cu reproducere în primăvară, (50 %), mezofile, (54,16 %), cu preferinţe pentru biotopii de culturi şi culturi-stepă (54,17%), pantofage şi zoofage (87,50%), distribuite preponderent geografic în Palearctic şi vest Palearctic (70,83%).

Cuvinte cheie: cultura de sfeclă de zahăr, carabide, abundenţa relativă, dominanţa, indexul Shannon, echitabilitatea, principalele cerinţe ecologice.

INTRODUCTION

Objective nature (ecosphere, biosphere, ecobioms and ecosystems) are governed by objective laws. The fundamental law in ecology is the unity and interaction between organisms and environment. There are natural and artificial ecosystems. According to the philosophical principle that in the objective and subjective nature, nothing can exist without a cause, it is absolutely logical that there should exist an unity and interaction between the components of an ecosystem (biotope and biocoenosis). The biotope, by its natural characters (geographical position, climate, soil), determines the kind of a biocoenosis.

Agrocoenoses have proceeded from natural ecosystems (deforestation of forests, the fallowing of steppe) and there was modified,for example, the moisture of soil. According to their ecological valences (historically formed), the species live in certain ecosystems. In the prefered biotopes, the species may be eudominant or dominant, expressed by the number of individuals of a species. All ecological factors act together in interaction.

In Moldavia, there were two phases in knowing the species of ground beetles: The first phase had a faunistic character and the second one, modern and of perspective, an ecological one. In Moldavia, there were known aspects of the activity of ground beetles in natural ecosystems (deciduous and coniferous forests) and agroecosystems:autumn wheat, maize, potatoes, clover, sugar beet.

MATERIAL AND METHODS

The present paper is based on the personal scientific material of ground beetles collected by one of the authors (GĂLUŞCĂ SIMONA, 2000).

The most used, classical and standard method in collecting the ground beetles is the use of pitfalls with preseving liquid and protected from rainfalls. This method permits the qualitative and quantitative collection of the material in a given period of time established by the researcher in order to obtain data on a series of parametres such as: The relative abundance of the species, their constancy and dominance, the diversity of the population of carabids, the dynamics of the whole population in connection with the natural characteristics of biotops, comparisons among collecting sites and discussions on the results.

The site from which the material was collected was Truşeşti (South part of Botoşani County)

The material was collected in the year 2000: May, June, July, August .

For the collection of the individuals of carabids, 12 pitfalls were used, as an optimum,in order to collect the subrecedent, recedent, subdominat, dominant and eudominant species of Carabidae. The sugar beet crop was bordered by a forest and by a maize crop.

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Each soil pitfalls had a volume of 700 cubic centimetres; 7 centimetres in diameter and 10 centimetrers in height,being protected from rainfalls .

The pitfalls were placed in the sugar beet crop ecosystem at the beginning of the month of May (the year 2000). The pitfalls were set on three rows, each row having four pitfalls.The distance among rows and pitfalls was five metres.

As preserving liquid we used a saturated solution of salt (250 grames per one litre of water). Each pitfall contained 300 mililitres solution.

The pitfalls functioned 90 days in the ecosystem (2000)(May, June,July and August).

THE COLLECTING OF THE MATERIAL

In the temperate area, the climate influences the activity of the ectothermic invertebrates. In order to follow the seasonal variation of the specific composition, the variation of diversity, and the number of the individuals belonging to each species, we have collected the material twice a month.

The first collecting was carried out about at the middle of each month, and the second one at the end of each month. The material was collected from each pitfall, recording the main data. (site, number of the pitfall, collecting date). In the whole period, eight collectings were made, that is 96 samples.

SCIENTIFIC DETERMINATION OF THE MATERIAL

The determination of the species, their nomenclature, were done according to FREUDE, HARDE , LOHSE 1974.

AIM AND THE OBJECTIVES OF THE PAPER

Moldavia, by its zoogeographical position and its pedo-climatic characteristics, is a zoogeographical region of Romania.The northern counties of Moldavia (Suceava, Botoşani) have some particular characteristics.For example, their climate is cooler. The aim at collecting the material was to give the answeres at a number of objectives at the level of the Carabidae family in the ecological context of the North Moldavia in the concrete conditions of the sugar beet crop ecosystem, that is:

The taxonomic diversity of the epigeic insects: Coleoptera Order at the level of families, and of the Carabidae family in the year 2000; (genera, species, the index of diversity, evenness).

Knowledge of the concrete values of the relative abundance of the species of Carabidae in the sugar beet crop in the south part of Botoşani County;

Knowledge of the concrete values of some ecological parametres of the species of Carabidae in the concrete conditions of the sugar beet crop ecosystem in Botoşani County (dominance, the Shannon index, evenness).

The characterisation of the coenosis of Carabidae in the sugar beet crop ecosystem, relating to: the type of reproduction, preference for moisture , preference for biotope, food regime, the classes of the geographical distribution of the species.

For the characterization of the carabid coenoses in general (carabid communities) we have used the following parametres: relative abundance, ecological requirements (time of reproduction, preference for moisture, biotope, food and geographical distribution), the Shannon diversity index, evenness, similitude per cent between localities.

Nomenclature of the species was used according to: FREUDE, HARDE , LOHSE 1974 .

To characterize the coenosis of ground beetles from the sugar beet crop ecosystem and other ecosystems , referring to the season of reproduction, preferences for humidity, biotopes, food regime, geographical distribution,we used our personal observation in the field and information from literature.(PETRUSENKO, C. B. 1970), (PETRUSENKO, C.B & PETRUSENKO O. A. 1972), (TURIN and colab. 1991, 2003), (NECULISEANU 1991, 2003), (ŠUSTEK 2000). We also used some information and verifications received from ŠUSTEK and NECULISEANU, 2003.

RESULTS OBTAINED

In what follows, we present the results and their interpretation in the subunit discussions.

Table 1. The taxonomic diversity (orders) of the epigeic insects in the sugar beet crop, Truşeşti (County Botoşani, 2000)

	Names of the orders	Individuals collected	%
A	Gryllodea	223	7.06
B	Orthoptera	21	0.66
C	Heteroptera	202	6.39
D	Coleoptera	2692	85.22
E	Hymenoptera	17	0.54
F	Diptera	4	0.13
	Total individuals	3159	100.00

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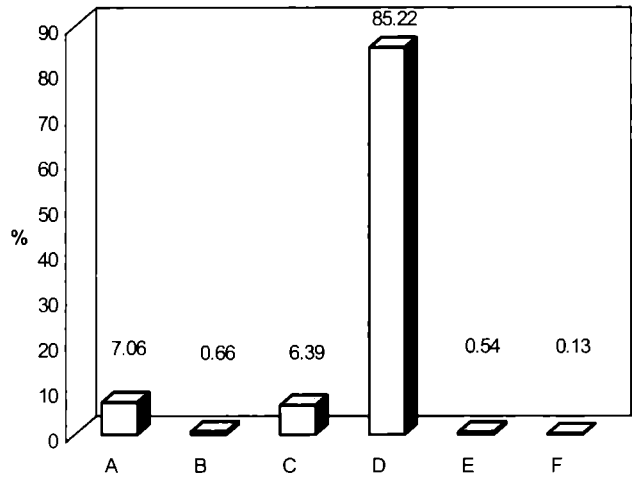

Figure 1. Percentage representation of the orders of epigeic insects collected from the sugar beet crop, Truşeşti, 2000. (Legend in table 1)

Figura 1. Reprezentarea procentuală a ordinelor de insecte epigee, colectate din cultura de sfeclă de zahăr, Truşeşti, 2000 (Legenda în tabelul 1)

Table 2. The taxonomic diversity (families) of the epigeic coleopterans in the sugar beet crop ecosystem, Truşeşti (Botoşani County), 2000

Tabel 2. Diversitatea taxonomica (familii) a coleopterelor epigee în ecosistemul culturii de sfeclă de zahăr, Truşeşti (Judeţul Botoşani), 2000

	Names of families	Individuals collected	%
A	Carabidae	2357	87.56
B	Tenebrionidae	291	10.81
C	Scarabaeidae	13	0.48
D	Chrysomelidae	13	0.48
E	Silphidae	7	0.26
F	Cantharidae	5	0.19
G	Coccinellidae	2	0.07
H	Curculionidae	2	0.07
I	Histeridae	1	0.04
J	Dermestidae	1	0.04
	Total	2692	100.00

Table 3. The specific diversity of the epigeic species of ground beetles (Carabidae) in the sugar beet crop, Truşerşti (Botoşani County, 2000)

Tabel 3. Diversitatea specifica a speciilor de carabide în cultura de sfeclă de zahăr, Truşeşti (Judeţul Botoşani), 2000

	Names of the species	Individuals collected	%	CLs D
1	*Carabus cancellatus tuberculatus* (DEJEAN)	8	0.34	SR
2	*Carabus besseri* (F.W.)	3	0.13	SR
3	*Broscus cephalotes* (LINNÉ)	19	0.81	SR
4	*Anisodactylus signatus* (PANZER)	**146**	**6.20**	**D**
5	Anisodactylus binotatus (FABRICIUS)	1	0.04	SR
6	*Ophonus sabulicola* (PANZER)	1	0.04	SR
7	*Metophonus puncticeps* (STEPHENS)	2	0.08	SR
8	*Metophonus azureus* (FABRICIUS)	1	0.04	SR
9	*Pseudophonus rufipes* (DE GEER)	**863**	**36.63**	**ED**
10	*Pseudophonus griseus* (PANZER)	2	0.08	SR
11	*Harpalus calceatus* (DUFTSCHMID)	14	0.59	SR
12	*H. aeneus* (FABRICIUS)	4	0.17	SR
13	*H. distinguendus* (DUFTSCHMID)	**1229**	**52.16**	**ED**

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14	*H. latus* (LINNÉ)	2	0.08	SR
15	*H. tardus* (PANZER)	1	0.04	SR
16	*Poecilus cupreus* (LINNÉ)	10	0.42	SR
17	*P. striatopunctatus* (DUFTSCHMID)	1	0.04	SR
18	*P. lepidus* (LESKE)	1	0.04	SR
19	*Pterostichus melas* (CREUTZER)	4	0.17	SR
20	*Pt. melanarius* (Illiger)	9	0.38	SR
21	*Calathus fuscipes* (GOEZE)	2	0.08	SR
22	*Dolichus* halensis (SCHALLER)	5	0.21	SR
23	*Brachinus crepitans* (LINNÉ)	19	0.81	SR
24	*Brachinus explodens* (DUFTSCHMID)	9	0.38	SR
	Total	2356	99.96	

Legend. SR= Subrecedent (Subsporadic), D= Dominant, ED= Eudominant
Legenda. SR= Subrecedentă (Subsporadică), D = Dominantă, ED= Eudominantă

Table 3. Main ecological requirements of the species of Carabidae in the sugar beet crop ecosystem, Truşeşti (Botoşani County), 2000
Tabel 3. Principalele cerințe ecologice ale speciilor de Carabidae în ecosistemul culturii de sfeclă de zahăr, Truşeşti (Județul Botoşani), 2000

	Name of the species	1	2	3	4	5
1	*Carabus cancellatus* (ILLIGER) 1798	Sp	M	F	Z	Pl
2	*Carabus besseri*	A	M	St,Cr	Z	EstE
3	*Broscus cephalotes* (LINNE) 1758	Sp	X	St,Cr	Z	E
4	*Anisodactylus signatus* (PANZER) 1797	Sp	M	Cr	P	Pl
5	*A. binotatus* (FABRICIUS) 1787	Sp	M	St	P	Wp
6	*Ophonus sabulicola* (PANZER)1796	A	M	Cr, St.	Fit	Es
7	*Metophonus puncticeps* (STEPHENS) 1828	A	M	Cr	Fit.	Wp
8	*Metophonus azureus* (FABRICIUS) 1775	A	M	Cr,St	Fit	Wp
9	*Pseudophonus rufipes* (DE GEER)1774	A	M-X	Ols	P	Wp
10	*P. griseus* (PANZER) 1797	A	M-X	Ols	P	Pl
11	*Harpalus aeneus* (FABRCIUS) 1775	Sp	M-X	Cr	P	Pl
12	*H. calceatus* (DUFTSCHMID) 1812	A	M-X	St	P	Pl
13	*H.distinguendus* (DUFTSCHMID) 1812	Sp,S	M	Ols	P	Pl
14	*H. latus* (LINNE) 1758	A	M	F, St	P	Pl
15	*H.tardus* (PANZER) 1797	Sp	M-X	St	P	Es
16	*Poecilus cupreus* (LINNE) 1758	Sp	M	Cr	Z	Wp
17	*Poecilus striatopunctatus* (DUFTSCHMID) 1812	Sp	H-M	Cr	Z	Wp
18	*P. lepidus* (LESKE) 1785	A	M-X	Cr	Z	Es
19	*Pterostichus melas* (CREUTZER) 1799	Sp	M-X	F	Z	Ec
20	*Pt. melanarius* (Illiger) 1798	Sp	M	F,Cr	Z	Wp
21	*Calathus fuscipes* (GOEZE) 1777	A	M	Eu	P	Wp
22	*Dolichus halensis* (SCHALLER) 1783	A	M	Cr	P	Pl
23	*Brachinus crepitans* (LINNE) 1758	Sp	M-X	St,Cr	Z	Wp
24	*Brachinus explodens* (DUFTSCHMID) 1812	Sp	M-X	St,Cr	Z	E.md

1 = Reproduction type; 2 = Moisture preference; 3 = Biotope preference; 4 = Food regime; 5 = Zoogeographical distribution
Legend: Sp = Spring; A = Autumnal; S = Summer; M = Mesophilous; H-M = Hygro-mesophilous; M-X = Mesoxerophilous; X = Xerophilous; F = Forest; St = Steppe; Eu = Eurytopic; Ols = Open landscape; Cr = Crops; Z = Zoophag; P = Pantophag; Fit= Phytophag; Wp = West Palaearctic; Pl = Palaearctic; E = European; Em = Euromediterranian; Ec = Eurocaucasian; Es = Eurosiberian; EstE = East - European;

1 = Tipul de reproducere; 2 = Preferință umiditate; 3 = Preferință biotop; 4 = Regimul de hrană; 5 = Răspândirea geografică
Legenda: Sp =Primăvara; A = Toamna ; S = Vara; M = Mesofilă; H-M = Hygro-mesofilă; M-X =Mesoxerofilă; X= Xerofilă; F = Pădure; St = Stepă; Eu = Eurytopic; Ols =Camp deschis; Cr = Culturi; Z = Zoofag; P = Pantofag; Fit= Phytofag; Wp = West Palaearctic; Pl = Palaearctic; E = European; Em = Euromediterranian; Ec = Eurocaucasian; Es= Eurosiberian; EstE = Est- European;

Table 4. Types of reproduction of the species of carabids in the sugar beet crop ecosystem, Truşeşti (130 county Botoşani), 2000
Tabel 4. Tipurile de reproducere ale speciilor de carabide în ecosistemul culturii de sfeclă de zahăr, Truşeşti (Județul Botoşani), 2000.

	A	B	C	D
No of species	12	11	1	24
% of total	50.00	45.83	4.17	100.00

Legend: A =.Spring; B=Autumnal; C = Spring- Summer, D = Total species
Legenda: A = Primăvara; B =Toamna; C = Primăvara -Vara, D = Total specii

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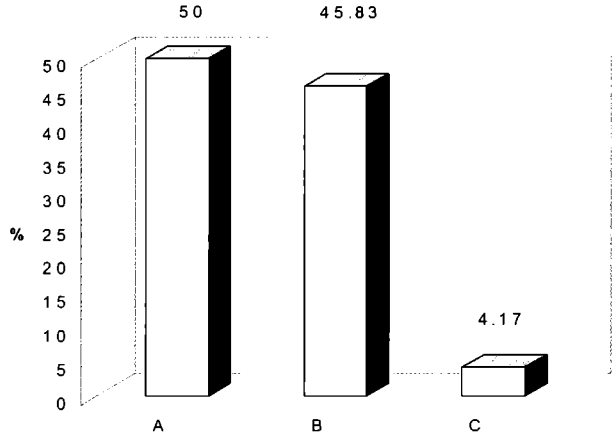

Figure 2. Percentage representation of the reprodoction types of the species of carabids in the sugar beet crop Truşeşti, 2000. (Legend in Table 4)

Figura 2. Reprezentarea procentuală a tipurilor de reproducere ale speciilor de carabide în cultura de sfeclă de zahăr, Truşeşti, 2000 (Legenda în tabel 4)

Table 5. General moisture preferences of the species of carabids in the sugar beet crop ecosystem, Truşeşti (Botoşani County), 2000

Tabel 5. Preferinţele faţă de umiditate ale speciilor de carabide în ecosistemul culturii de sfeclă de zahăr, Truşeşti (Judeţul Botoşani), 2000

	A	B	C	D	E
No of species	13	9	1	1	24
% of total	54.16	37.50	4.17	4.17	100.00

Legend: A. Mesophilous; B. Meso-xerophilous; C. Higro-mesophilous, D Xerophilous; E= Total species
Legenda: A. Mesofile; B. Meso-xerofile; C .Higro-mesofile, D Xerofile; E= Total specii

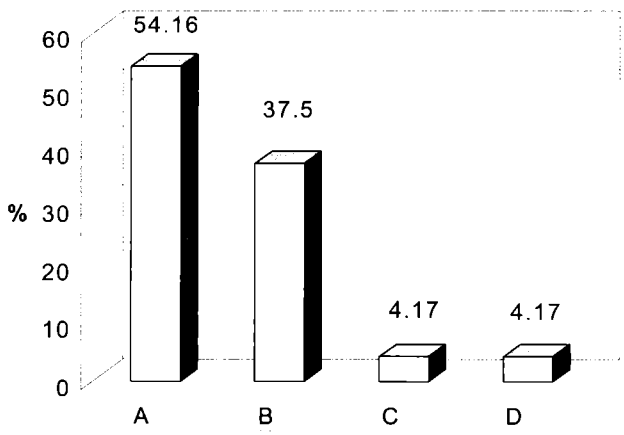

Figure 3. Percentage representationof the moisture preferences of the species of carabids in the sugar beet crop, Truseşti, 2000. (Legend in table 5).

Figura 3. Reprezentarea procentuală a preferinţelor faţă de umditate ale speciilor de carabide în cultura de sfeclă de zahăr, Truşeşti, 2000 (Legenda în tab. 5)

Table 6. General biotope preferences of the species of carabids in the sugar beet crop ecosystem, Truşeşti (Botoşani County), 2000

Tabel 6. Preferinţele generale faţă de biotopi ale speciilor dse carabide în ecosistemul culturii de sfeclă de zahăr, Truşeşti (Judeţul Botoşani), 2000

	A	B	C	D	E	F	G	H	I
No of species	6	7	3	3	2	1	1	1	24
%	25.00	29.16	12.50	12.50	8.33	4.17	4.17	4.17	100.00

Legend: A. Crops- Steppe; B Crops, C. Open landscape, D.Steppe, E Forest, F. Forest –Steppe; G. Forest-crops; H. Eurytopic; I = Total species
Legenda: A.Culturi- stepă; B Culturi, C. Câmp deschis, D. Stepă, E Pădure, F. Pădure – stepă; G.Pădure-culturi; H. Eurytopic; I = Total specii

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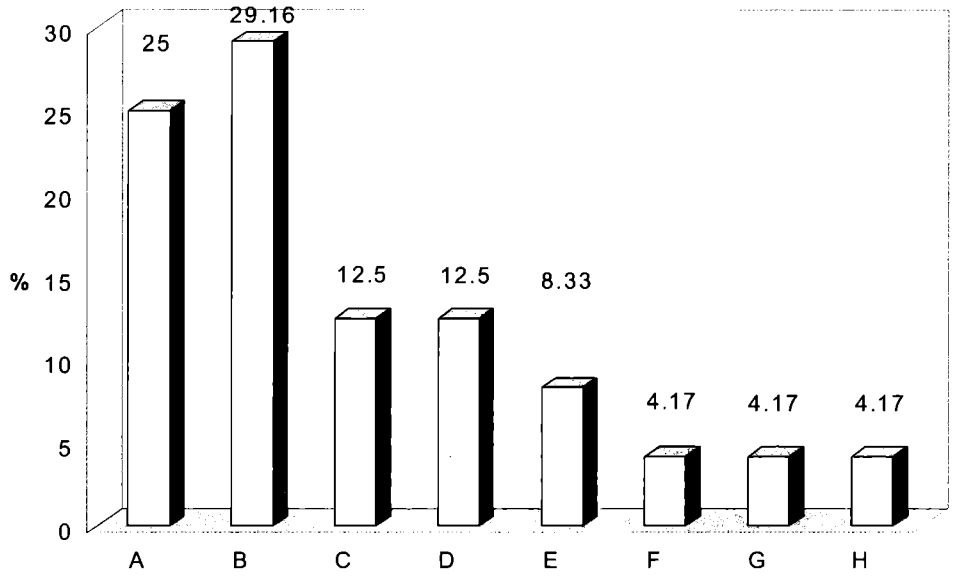

Figure 4. Percentage representation of the general biotope preferences of the species of carabids in the sugar beet crop, Truşeşti, 2000. (Legend in Table 6).

Figura 4. Reprezentarea procentuală a preferinţelor generale fată de biotopi ale speciilor de carabide în cultura de sfeclă de zahăr, Truşeşti, 2000 (Legenda în tabel 6).

Table 7. General trophic regime of the species of carabids in the sugar beet crop ecosystem, Truşeşti (Botoşani County), 2000

Tabel 7. Regimul trofic general al speciilor de carabide în ecosistemul culturii de sfeclă de zahăr, Truşeşti (Judeţul Botoşani), 2000

	A	B	C	D
No of species	10	11	3	24
%	41.67	45.83	12.50	100.00

Legend: A. Zoophags; B. Pantophags; C . Phytophags D. Total species .Legenda: A. Zoofagi; B. Pantofagi; C. Phytofagi D. Total specii

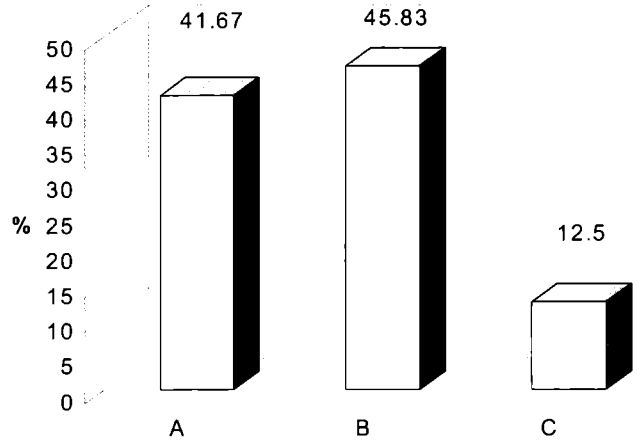

Figure 5. Percentage representation of the general trophic regime of the carabids in the sugar beet crop, Truşeşti, 2000. (Legend in Table 7).

Figura 5. Reprezentarea procentuală a regimului trofic general al carabidelor în cultura de sfeclă de zahăr, Truşeşti, 2000. (Legenda în tabel 7)

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Table 8. General geographical distribution of the species of carabids in the sugar beet crop ecosystem, Truşeşti (Botoşani County), 2000

Tabel 8. Răspândirea geografică generală a speciilor de carabide în ecosistemul culturii de sfeclă de zahăr, Truşeşti (Judeţul Botoşani), 2000.

	A	B	C	D	E	F	G	H
No of species	8	9	1	1	3	1	1	24
%	33.33	37.50	4.17	4.17	12.50	4.17	4.17	100.0

Legend: A. Palearctic; B. West Palearctic; C. European; D Euro-mediterranean; E. Eurosibirian; F.Eurocaucasian; G. East European; H= Total species

Legenda: A. Palearctic; B. West Palearctic; C. European; D Euro-mediterranean; E. Eurosibirian; F.Eurocaucasian; G. Est European; H= Total specii

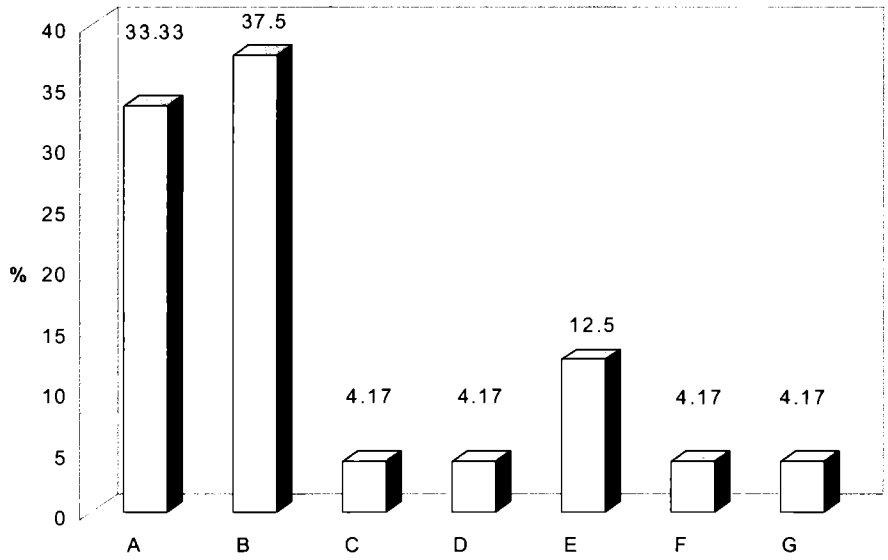

Figure 6. Percentage representation of the general geographical distribution of the species of carabis in the sugar beet crop, Truşeşti, 2000. (Legend in Table 8).

Figura 6. Reprezentarea procentuală a răspândirii geografice generale ale speciilor de carabide în cultura de sfeclă de zahăr , Truşeşti, 2000. (Legenda în tab. 8)

DISCUSSIONS

By its geographical position within Romania (East part), Moldavia is a zoogeographical Region of Romania. Scientific papers referring to the ecological aspects of ground beetles in the forest and agricultural ecosystems were published by VARVARA and his collaborators.

Forests: VARVARA(2005). Agricultural ecosystems: winter wheat crops ecosystem: VARVARA (1991), VARVARA and BULIMAR (2002); Clover crop ecosystem: VARVARA and BRUDEA (1983), TURCULET and VARVARA (2007); maize crop ecosystem: VARVARA and BRUDEA (1999), Potatoes crop ecosystem: VARVARA, DONESCU and DASCALU (1999), VARVARA (2004); sugar beat crop ecosystem: VARVARA and ANDRIESCU (1986).

Our observation from the quoted papers showed that the number of species of Carabidae presented in those ecosystems, as well as the number of specimens of Carabidae, the value of the Shannon diversity index and evenness which characterise the coenosis of Carabidae present local variations as a result of the concrete ecological determinism.

The 12 pitfalls functioned 90 days in the sugar beat crop ecosystem (May-August included, the year 2000), and there were collected 96 samples with a total number of 3159 individuals of insects, belonging to 6 Orders of insects (Table no 1). The biggest number of individuals belonged to the Order of Coleoptera (2692 individuals (85.22 %), followed by the Orders: Gryllodea (223 individulas (7.06 %) and Heteroptera (202 individuals (6.39 %). The percentages of other three Orders (Orthoptera, Hymenoptera and Diptera) were under one per cent (Table no 1 Fig. no.1).

The Order Coleoptera was represented by individuals belonging to ten families.(Table no 2). The biggest number of individuals belonged to the Family of Carabidae (2356 individulas (87.56 %).The second family was Tenebrionidae (291 individuals (10.81 %) The percentages of the other eight families were under one per cent .

The number of species belonging to the alpha diversity of the family Carabidae in the sugar beet crop ecosystem from different localities is, of course, variable.From our observation made in three years (Leţcani, (1981, 1982) and Truşeşti (2000), the alpha diversity varied between 19 species (Leţcani, 1982) and 26 (Leţcani, 1981). In the Truşeşti locality it was

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represented by 24 species.Of those 24 species, two species are eudominant and one species is dominant. They are. ***Harpalus distinguendus*** (1229 individuals (52.14 %), ***Pseudophonus rufipes*** (863 individulas (36.61 %), **Anisodactylus *signatus*** (148 individulas (6.28 %). The percentages of the other 21 species were under one per cent. (Table no 3).The species ***Poecilus cupreus*** was subrecedent because of the diminished humidity of the soil in the summer of the year 2000.

The synthetic relations between the number of species and the number of individuals (total and for each species) in the coenosis of Carabidae are made evident by the Shannon index.The values of this index obtained by us are included between the normal limits of variation of this index (1.50 and 3.50). Thus, in the Leţcani locality (1981) it was 2.17 (26 species, evenness 46 %), 1982, 2.20 (19 species, evenness 51 %), in the Truşeşti locality, it was 1.67 (24 species , evenness, 36 %. The number of species and especially the value of evenness influences the value of the Shannon index. In the case of the Truşeşti locality, in the conditions of the summer of the year 2000 with low precipitations, the evenness was 36 %, because the total number of individuals of those three species (***Harpalus distinguendus, Pseudophonus rufipes*** and ***Anisodactylus signatus)*** represented 95.03 % of the whole coenosis of Carabidae.

The similitude index between those three localities shows that between the localities Leţcani (1981) and Leţcani (1982) there was a similitude of 71 %. The index of similitude between Truşeşti and Leţcani 1981 and 1982 was 38 %.

Referring to main requirements of the ground beetles to the main ecological factors (reproduction, moisture, preferred biotopes, food regime and geographical distribution), we have made classifications. "One main reason for sorting and classifying is to focus our minds on patterns that suggest underlying causes" These classifications are included in tables (Tables 4 - 8) and illustrated in Figures. (2 – 6).

Generally speaking, on the basis of conclusions published by us and collaborators in the papers quoted above and also on the basis of the present material collected from the sugar beet crop ecosystem (the year 2000), the coenosis of Carabidae may be characterised as being composed of species reproducing dominantly in Spring (50 %), followed by Autumnal species (45.83 %), mesophilous species (54.16 %) followed by meso-xerophilous species (37.50 %) (the summer of the year 2000 having less precipitations than normal)

Referring to the preferred biotopes (Table no 6, Figure. no 4), the coenosis is formed of 8 classes of species: (crops-steppe; crops, open landscape, steppe, forest, forest –steppe; forest-crops; and eurytopic). Of those, the species of Carabidae which live in crops, crops- steppe, open land scape and steppe, in total 19 species (79,17 %) form the coenosis of Carabidae.

The food regime of the species of carabids in the sugar beet crop is predominantly pantophagous and zoophagous , that is 11 species (45.83 %) and 10 species (41.67 %) are zoophagous .(Table no 7, Fig. no 5).

With reference to the geographical distribution of the species of carabids found in the sugar beet crop of Truşeşti, the results are shown in Table no 8 and in Fig. no 6. In general, the majority of species are West Palaearctic, Palaearctic and Eurosibirian. (9 species (37.50 %), 8 species (33.33 %) 3 species (12.50).

CONCLUSIONS

The alpha diversity of epigeic ground beetles in three localities of Moldavia with sugar beet crops varied between 19 species and 26.

The Shannon index had values between 1.67 and 2.17.

95.83 % of the species have their reproduction în Spring and Autumn.

54.16 % of the species are mesophilous and 37.50% are meso-xerophilous.

The pantophagous species predominate followed by the zoophagous species.

19 species (79.17 %) in the coenosis of Carabidae prefere to live in crops, crops- steppe, open land scape and steppe.

The majority of species are West Palaearctic, Palaearctic and Eurosibirian.

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L'IMPORTANCE DES OISEAUX UTILLES DANS L'AGRICULTURE, ILLUSTRÉE SUR LE MATERIAL DU MUSÉE ZOOLOGIQUE DE CLUJ-NAPOCA

DELIA CEUCA

Abstract. This paper aims at showing the indirect help some birds give to agriculture, by the fact that they capture and eat the pests that harm the agricultural cultures and the fruit bearing trees. Even though the extant legislation contains general measures for bird protection, there is no official concrete form for helping the birds.

Mots clef: oiseau, l'agriculture, les chenilles, le spectre trophyque

Rezumat. Importanţa păsărilor folositoare în agricultură, ilustrată pe materialul Muzeului Zoologic din Cluj-Napoca. Lucrarea are ca temă preţuirea ajutorului indirect, dat de unele păsări agriculturii, prin capturarea şi consumarea dăunătorilor plantelor cultivate şi pomilor fructiferi. Aceasta mai ales, că, deşi legislaţia existentă conţine măsuri generale de protecţia păsărilor, nu există nici o formă oficială concretă prin care păsările să fie ajutate.

Cuvinte cheie: păsări, agricultură, omizi, spectru trofic

INTRODUCTION

Dans les plusieurs pays, aussi chez nous, existent des usines qui travaillent pour préparation des diverses poisones necessaires pour détruire les animaux nuisibles. De plusieur fois, le prix de fabrication des cettes préparates est plus élevée, mais les modalitées de combattre, difficiles d'appliqué. Par cet motif, est necessaire, d'évaluer et d'aider l'avifaune qui se nourisse avec des insectes et pétits mammifères nuisibles, parce que par l'action de nourriture, donnent un conssiderable aide à l'agriculture. (I.CĂTUNEANU, 1951).

MATHÉRIEL ET MÉTHODES

Sur la base des dattes du littérature de spécialité, on a été annalysée le spectre trophyque des oiseux qui ont le régime alimentaire les insectes et les pétits mamifères nuisibles pour l'agriculture. Toutes les especes énumérees, éxistent dans la collection du Musée Zoologique de Cluj-Napoca, et portent un nombre d'inventaire.

RÉSULTATES ET DISSCUTIONS

En ce qui conçeille l'avifaune des forêts des hêtre, qui est utile pour l'homme, on peut rémarqué *Erithacus rubecula, Dendrocopos major, Sitta europaea* des especes, qui par la modalité de procurer la nourriture sont utilles pour l'homme. De hautes altitudes déscendes édans les zones avec des vergers, *Troglodytes troglodytes* et *Buteo buteo.* Dans des champs, on peut remarqué, la présence et l'activité particulièrement utile des especes *Alauda arvensis* et *Galerida cristata.* Par des bocages , qui offrent aussi des abris, on peut voir *Remiz pendulinus* qui est utile par le consumation des insectes en touts les stades de développement. Aussi, importent de rémarqué c'est la contribution indirecte qui ont l'unes des oiseaux au quelles, les adultes se nourrirent avec des céréales, et les juveniles se nourrirent seulement avec des larves des insectes. Par éxemple *Carduelis carduelis*, c'est une especе plus utile parce que l'adulte se nourrire avec des semances des chardons, et ou des plantes parazites et les juveniles sont alimentées avec des insectes, pous des feuilles et avec des larves des eux. Aussi *Alauda arvensis* utilize pour la nurriture des pétits, insectes, dans l'état adulte completant son menu, avec vérdure. (I.CĂTUNEANU, 1951).

En ce qui conçeille l'état des oiseau de proie, éxiste une mentalité différente. Existent des zonnes ou, on donnent des médailles pour la distruction de cette cathégorie des oiseaux, ou on peut perdre le droit de chassure, si n'on détruire pas chaque anné une pourcentage des oiseaux de proie. On peut intervenir, aussi l'intoxication avec des pésticides ou des poisons pour détruire les loups. Méttent en considération, la situation que la réproduction des loups est tres lente, la garde de l'équilibre écologique est incérte. (I.BORDEIANU , 1978).

Des recherches éffectués sur le comportamment alimentar des oiseaux de proie de jour, ont prouvent que la nuriturre de *Buteo buteo* est formée 95 % rongeures, cet pourcent réprséntent jusqu'a 4000 sourises de champ, de forêt, rats, hamsters. Les especes de *Strix*, dêscendes, aux bases altitudes, peut consume jusqu'a 2000 de rongeurs par anné, mais la chouette *Athene noctua*, peut mange jusqu'a 1400 rongeurs aussi des insects nuisables. *Tyto alba* qui préfère les abrits près des établissements hummanes, peut attende la pérformance de trois chattes en ce qui conçeille la capture de rongeurs (DRUGESCU C. 1994).

Aussi, important pour rémarqué c'est la contribution indirècte qui ont l'unes des oiseaux qui se nourrient avec de céréales, en état adulte, on donnent à leurs pétits, seulement avec des larves des insectes. Cettes sont les especes des *Motacilla, Carduelis, Coturnix, Emberiza, Alauda.*

Des préocupations pour la protéction des oiseux, ont été faits au temp de Ştefan cel Mare. La protéction d'unes des especes par une „livre'' émise de Petru cel Tânăr sec. XVI, monsieur du Ţara Românească, „le fauçon a été la

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protégé, tout l'anné pour pouvoir capturé et utilisé aux chasses d'aristocratie. Les qui attrapent cettes oiseaux ou détrire des leurs nids, ont été punis durement''.

On connaît l'apporte qui l'espece *Falco tinnunculus* apporte par la capture des touts petits rongeurs éxtremment dangeureuses pour l'agriculture. Aussi on fondé des sociétes locales pour la protéction des oiseux. Avec un programme imprimé, comme par éxemple „La société pour la protéction des annimaux utiles et des oiseaux de village Jugu, département Muscel 1898'' (DRUGESCU C. 1994).

Les lois actuelles, aident par les programmes et aussi par des projéts que les manifésstations dangeureuses pour les oiseux, on fait limité au maximum possible. La dégradation des millieuxes naturélles, la chasse illégale, ou l'unes des accidentes, faits que cettes aides naturelles pour l'homme, on ne pas toujours profité de connditions optimes pour leurs vie. Excepté les normes de protéction en ce qui conçeille la conservation du millieu et spécialement pour des oiseaux, qui se trouvent dans les lois actuelles, on imposent aussi des normes en plus rélativemment simples, qui doivent empêché la dégradation numérique des especes utilles pour l'homme. Cette, parce que, une messure pour l'aide des oiseux, n'éxiste pas, officialement, comme a été méntioné dans le volume (MUNTEANU D. et al.1999). Quesque on peut faire dans cette situation, dans laquelle l'aide pour cettes oiseaux c'est practiquement une méssure éfectuée antériorement de l'application de lois.

D'entres les méthodes qui on peuvent énumerée, l'éloignement des dangeres au qui les oiseux sont soumettres dans leurs millieu naturelle, par l'interdise de capturation et commercialisation des oiseux sauvages de la faune autohtone, qui bien est interdite, on est practiqué sens restrictions. Plusieurs fois, au places des grandes villes, on peut voir des éxemplaires de faune autochtone, éxposés pour comércialisation. Aussi on peut ajouté, la chasse ilégale, ainsi que l'unes des inévitables accientes, qui on peut se produire. En même temps, l'inssufficiente éducation des enfantes, on y fait de la pure curriosité, de frapper, de punir les oiseux, de cueillir les oeufs, ou les détruire leurs nids.

Pour des recherches scientifiques on peut punir des oiseux seulement avec une autorisation. Au cause que les collections muséales actuelles sont sufits de riches avec de l'avifaune roumaine, la capture et la tuer des nouveaux éxemplaires, n'a pas reson. Aussi on peut dit la réstriction de l'areal par la disstruction des millieuxes de vie, et la dégradation des écosisthèmes naturalles au cause de la polluer de millieu (MUNTEANU D. et all., 1999).

Comme les normes de protèction directes, on peut énumeré des autres actions bénefiques aux quelles l'homme peuve participé. Donc, on peut appliqué dans les arbres de vergers et des zonnes avec de la végetation arborescente, des nids artificielles à la quelle propreté, il faut éffectuer en automne. Aussi, on peut montér des creuxes artifficieles et même des boîtes. Pour les oiseaux de proie qui se nutrissent avec des rongeurs si dengereuses pour l'agriculture, on montée des supports en forme de T, sur laquelles elles se reposent, observent la proie.

Pour la période froide d'hiver, dans laquelle le réserver alimentaires sont plus diminuées l'avifaune de petits taille et utile pour l'homme el quelle ne part au pays chaudes, est necessaires d'aider de survivre, ajutant avec la nuriture d'origine annimale et protéique, comme des morceux de graisse, ou des troncs d'arbres tombées et remplises avec graisse de cochonne et sémunces.

Nr	L'espece et. nr. d'inv.	Sorte de plate consommée	
1.	*Melanocorypa calandra* (L.) 03.0.7.35.02.6	- des insectes consumées par les adultes et jouvenils	
2.	*Galerida cristata* 03.0.7.35.02. 2	- des insectes	
3.	*Alauda arvensis* 03.0.7.35.02.1	- des insectes - millpieds	- des larves des insectes pour pétits
4.	*Certhia familiaris* 03.0.7.35.19.1	- des insectes de fissure des arbres - des oeufs des insects - des larves - crysalides	
5.	*Sitta europaea* 03.0.7.35. 10.1	- des insectes de fissure des arbres - des oeufs des insects - des larves - crysalides	
6.	*Sturnus vulgaris* 03.0.7.35.14.2	- *Grylotalpa vulgaris* - des çigales - des larves, - des chenilles	
7.	*Parus major* 03.0.7.35.11.1	- Curculionidae - *Rhynchites baccus* - *R. betulae* - *Magdalis pruni* - *Phylobius,* - *Balanimus*	

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		- Cerambicidae - *Agaphantia* - *Phytoecia* - *Oberea* - Buprestidae - Ipidae - en automne détruire les nids de *Aporia crategi* et *Euproctis chrysorrhoea* - en hiver consommé des oeufs de *Ocneria dispar*	
8.	*Parus caeruleus* *03.0.7.35.11.3*	- des insectes - des oeufs - des larves - crysalides - tue des crysalides presqu'a sa dimension	
9.	*Parus lugubris* *03.0.7.35.11.5*	- des chenilles - des insectes adultes	
10.	*Parus palustris* *03.0.7.35.11.6*	- des insectes - des larves et des fleures et les bourgeons des arbres fruitières	
11.	*Hirundo rustica* *03. 0.7.35.17.2*	- des insectes (600-1000 /jour)	- des larves des insectes pour des petits
12.	*Coturnix coturnix* *03.0.7.19.4*	- les adults: des insectes, céreales	- larves des insectes pour des pétits
13.	*Carduelis carduelis* *03.0.7.35.16.1*	- les adults: des semences de chardone et plantes parazites	- les juveniles: des larves des insectes, insectes, des pous végetales
14.	*Aegithalos caudatus* *03.0.7.35.11.7*	- des insectes - des larves - des chenilles - des oeufs d'insectes	
15.	*Remiz pendulinus* *03.0.7.35.42.1*	- des insectes - des larves - des crysalides	
16.	*Regulus ignicapillus* *03.0.7.35.21.1*	- des insectes - des larves - des oeufs d'insectes	
17.	*Erithacus rubecula* *03. 0.7.35.05.13*	- des insectes dans les touts les états de dévepoppément - des vers - des araignée - des chenilles - des saututerelle	
18.	*Emberiza calandra* *03.0.7.35.07.13*	- des insectes – au pritemps et en été, des semences, des plantes sauvages	
19.	*Emberiza citrinella* *03.0.7.35.07.12*	- des insectes, d'éscargots, des sémences	
20.	*Troglodytes troglodytes* *03.0.7.35.22.1*	- des insectes - des larves - des oeufs d'insectes	
21.	*Picus viridis* *03.0.7.34.01.2*	- des pétits fourmis *Lasius, Myrmica* - des fourmis rouges *Camponotus* - des larves de *Melolontha melolontha* - des vers - des millpieds - des çigales - des éscargots	
22.	***Picus canus*** 03.0.7.34.01.1	- des fourmis - des insectes dans touts le états de développement	
23.	***Dendrocopos major*** 03.0.7.34.01.8	- des insectes xilofages	
24.	***Dendrocopos leucotos*** 03.0.7.34.01.4	- seulement des insectes *Rhaghum* - la grande fourmi noire *Camponotus herculeanus*	

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25.	***Dendrocopos minor*** 03.0.7.34.01.6	- des insectes - des crysalides - des cafards - des fourmis - des mouches
26.	***Dendrocopos medius*** 03.0.7.34.01.7	- des insectes dans touts le états de développement – des cafards - des larves - des crysalides
27.	***Asio otus*** 03.0.7.38.01.3	- 95 % animaux nocifs, *Mus musculus* - *Apodemus sylvaticus* - élimine des pelates avec des morceaux osseuses des especes avec qui se nourrises
28.	***Athene noctua*** 03.0.7.38.01.4	- *Mus musculus* - *Apodemus sylvaticus*
29.	***Strix uralensis*** 03.0.7.38.01.1	- des souris de champ - des lièvres
30.	***Tyto alba*** 03.0.7.38.01.7 - specie vulnerabilă -	- *Mus musculus* - *Apodemus sylvaticus* - des taupes, des insectes
31.	***Falco tinunculus*** 03.0.7.17.02.1	- *Mus musculus* - *Apodemus sylvaticus* - des insectes - des cafards - des chenilles - des papillons - des larves de guêpes - des larves de mouche - des sauterelle
32.	***Buteo buteo*** 03.0.7.17.01.13	- des sauterelle - *Mus musculus* - *Apodemus sylvaticus*

CONCLUSIONS

En conclusions, l'aides des oiseaux est une facteur très immportante pour l'agriculture parce que par avec la conntribution des cettes annimaux, l'homme peut obtenir des avantages en ce qui çonceille la récolte sans investition financiere.

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OBSERVATIONS AND TREATMENTS IN THE CASE OF FALLING ILL OF SOME SPECIES IN CONSTANTA AQUARIUM

ADRIANA CHIOREAN, SOARE STANCIOIU, ELENA DUMITRESCU

Abstract. In this material, the authors describe some diseases (four) often meet into aquariums, describe the parasite, the symptomatology and the clinic evolution as a consequence of an induced treatment.

Keywords: diseases, freshwater fishes, Aquarium, Constanta, Roumania.

Rezumat. Observaţii şi tratamente în cazul îmbolnăvirii unor specii de peşti din acvariul constănţean. In acest material, autorii au descris cateva (4) boli frecvent intalnite in acvarii, descriindu-se parazitul, simptomatologia si evolutia clinica ca urmare a tratamentului indus.

Cuvinte cheie: boli, pesti dulcicoli, Acvariu, Constanta, Romania.

INTRODUCTION

Since the fish fall ill easily and are often parasitized by agents belonging to the most various groups, the study of these parasites has a major importance, theoretically and practically.

In establishing the diagnosis, for most of the fish diseases, the symptomatology cannot be considered to be specific, but only informative, since the diagnosis requires investigations in a laboratory.

Although in aquarium conditions (closed circuit, limited space), and with all the prophylactic measures that are taken, the fish fall ill more frequently compared with the fish living in their natural habitat.

SUBJECTS AND METHODS

As subjects we had the freshwater aborigine fish, the marine fish and the exotic freshwater fish in Constanta Aquarium.

The methods we used in order to determine the parasites and the bacteria were the parasitologic analysis, microscopic examinations, inseminations in selective culture environements.

RESULTS

After having analysed seven different species of fish, from different families, we have discovered the following diseases:

THE "ICH" or WHITE SPOT DISEASE

This disease is caused by a ciliate protozoan, *Ichthyophthirius multifiliis*, Fuoquet. The body is round shaped, lenticular, with a diameter of 0, 5-1 mm. The entire surface of the body is covered with short cilia. This parasite usually does not live on the body, but in the derm and epidermis, which makes its control even harder.

Depending on the water temperatures, the protozoan reaches the adult stage as follows:

~ in 2 days for 25-28°C

~ in 3-4 days for 21-24°C

~ in 6-8 days for 16-22°C

After this period, the adult parasite leaves its host, the fish, and falls on the bottom of the tank where, in 2-6 hours it forms a cyst inside of which a series of binary divisions develop. (OTEL V. & CONSTANTIN GH. 1989; RADULESCU I. et al., 1976).

The symptoms presented by the Aquarium fish which contacted this disease were: the white spots on their entire body surface, and in more advanced stages, the fish had the flippers clutched and herded together on the corners of the basins, convulsively breathing.

The disease affected fish in the *Ilyphessobrycon callistus* belonging to the *Characidae* and the *Platydoras costatus* from the *Doradidae*.

The prognostic is serious, if not very serious, since the disease has caused massive infestations.

THE LERNEA / THE ANCHOR WORM DISEASE

It is produced by the copepod *Lernea cypriniacaea*.

Only the females infect the fish, which have a 9-22 mm long, slime, coffee-coloured body. The anterior part has 4 forked excrescents, while the posterior part has two ovigenous sacks. After the insemination, the males remain on the body surface for 2-3 days, and then they die, while the females pass to the parasitary life, invading the skin of the fish. The parasite introduces its anterior part inside the muscular system of the fish, causing inflammations, congestions

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and bleedings and often, even bacterian infections, which eventually leads to the necrosis of the adjacent tissue. (MUNTEANU GABRIELA & BOGATU D. 2003; MUNTEANU GABRIELA ET ALL., 2000).

The parasite infected four specim en of goldfish (*Carassius auratus gibellio*) and two specimen of carp (*Cyprinus carpio*), which were collected from the Danube, near Crisan , Tulcea, in July.

The diagnosis can be established through observations with the naked eye.

THE COLUMNARIS DISEASE

This disease is caused by *Flexibacter columnaris*, a bacterium from Myxobacteriales Order. From the specialized literature, it appears that the disease breaks out at 20°C water temperature.

The fish infested with this disease (sturgeons from the *Acipenseridae*, specimen of about 1 metre length, more precisely, three *Huso Huso* and one *Acipenser güldenstaedti*) presented cartilage tissue destruction and as a consequence, they showed remaining bleeding spots, which could be easily invaded by some other parasites.

The diagnosis has been established by microscopic examination of scrapings from the infested areas, and insemination in selective culture environments.

The prognostic is serious.

THE GYRODACTYLUS DISEASE

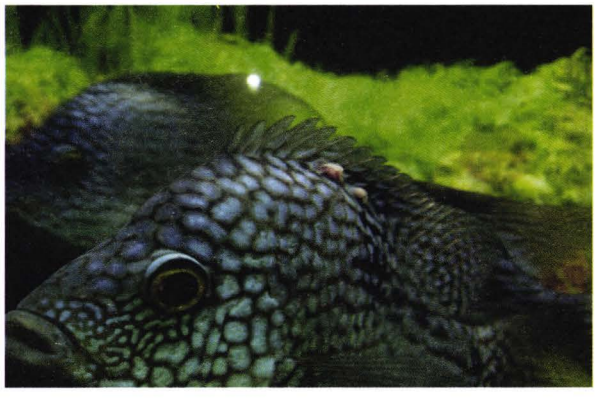
It is a disease caused by the monogenetic flatworm *Gyrodactilus*. A major identifying characteristic of this parasite is their organ of attachment, the hapter. This is at the posterior end and it has 2 pairs of anchors and a number of 16 hooklets around the periphery. Other identifying characteristics include the presence or absence of "eye spots". (OPREA M., RALEX C., RICARDO D. 1997).

In our Aquarium, this parasite affected the *Cichlasoma cianogutattum* species from the *Cichlids*. The parasite is localized at skin level, in the dorsal muscle (picture 1) and in the bronchial system (picture 2).

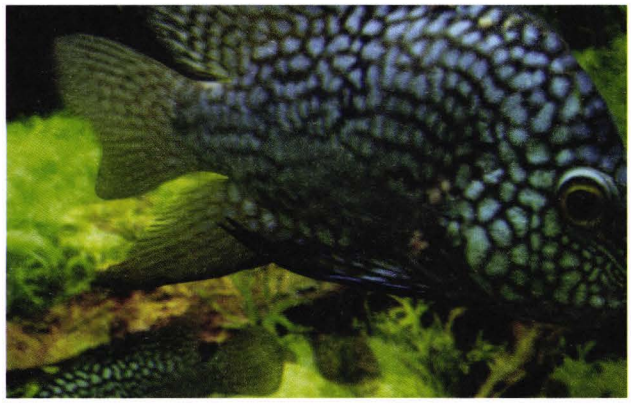
The diagnosis has been set by microscopic examination of fresh scrapings from the bronchi and from the tegument.

The prognostic is favourable.

Cichlasome nigrofasciattum, into Constanta Aquarium, with girodactylus disease localised in the dorsal muscle (picture 1) and into the branhial system (picture 2) (photos by Adriana Chiorean).



Picture 1



Picture 2

CONCLUSIONS

We have identified 4 diseases which affected the exotic fish and also the marine and the freshwater aborigine fish.

The established diagnosis started from less severe in the case of Lernea disease to severe in the case of Columnaris disease and even to very serious because of the massive infestations in the case of the White Spot disease.

The treatments that have been applied to the infested specimen consisted in the use of different medications, depending on the type of disease, as follows:

- in the case of **the White Spot (Ich) disease**, we appealed to the 3-4 days treatment with mineral green (malahit) and we added 1 ml at every 10 litres of water, directly into the aquarium, followed by partially changing of the water. Some other times we used 20-30 minutes baths in another tank, with a different concentration: 1 ml / 1 litre of water. The results were not satisfactory, most of the fish dying. In the specialized books, there are some other treatments that are indicated in case of the Ich disease, for example, the aureomycin with a concentration of 13mg/litre. But in reality, the parasites localized in the tegument are not affected by these products, and the parasites free swimming in the water respond to potassium permanganate. For this reason we can say that there an efficient treatment has not been found so far, but the scientists are trying to find a vaccine.

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- with **the Lernea disease**, we appealed to short baths with sodic chloride, 8g/ 1 litre of water, but the treatment was not efficient because the diagnosis was was established too late. Despite this, two specimen of crucian carp and only one carp survived.

- in the case of **the Columnaris disease**, the treatment we have applied was the administration of oxytetracycline in the food, in doses of 100mg/ kilo/ fish, for two weeks.

- with **the Gyrodactylus disease**, we appealed to long baths with sodic chloride, alternated with long baths with potassium permanganate in a concentration of 1%. The results were good, all the infested specimen were cured.

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THE HERPETOFAUNA OF THE LOWER HYDROGRAPHICAL BASIN OF CRISUL ALB, THE DISTRICT OF ARAD (ROMANIA)

SEVERUS-DANIEL COVACIU-MARCOV, ALFRED-ŞTEFAN CICORT-LUCACIU, VIOREL LAZĂR, NOÉMI SZEIBEL, LAVINIA BALAJ

Abstract. We have studied the geographical spread of the herpetofauna in 42 places from the lower hydrographical basin of the river Crisul Alb, in the district of Arad. In this region we have identified 14 species of amphibians: *Salamandra salamandra, Triturus alpestris, Triturus dobrogicus, Triturus cristatus, Triturus vulgaris, Bombina bombina, Bombina variegate, Pelobates fuscus, Bufo bufo, Bufo viridis, Hyla arborea, Rana ridibunda, Rana dalmatina, Rana temporaria,* as well as 9 reptile species: *Emys orbicularis, Lacerta agilis, Lacerta viridis, Podarcis muralis, Anguis fragilis, Elaphe longissima, Coronella austriaca, Natrix natrix, Natrix tesselata*, and hybrids between *Bombina bombina* and *Bombina variegata.* We have also identified populations of *Rana* kl. *esculenta.*

Key words: herpetofauna, lower basin of Crişul Alb

Rezumat. Herpetofauna bazinului inferor al Crişului Alb, judeţul Arad, România. Am studiat răspândirea geografică a herpetofaunei în 42 de localităţi din bazinul hidrografic inferior al râului Crişul Alb din judeţul Arad. În regiune am identificat 14 specii de amfibieni: *Salamandra salamandra, Triturus alpestris, Triturus dobrogicus, Triturus cristatus, Triturus vulgaris, Bombina bombina, Bombina variegata, Pelobates fuscus, Bufo bufo, Bufo viridis, Hyla arborea, Rana ridibunda, Rana dalmatina, Rana temporaria,* 9 specii de reptile: *Emys orbicularis, Lacerta agilis, Lacerta viridis, Podarcis muralis, Anguis fragilis, Elaphe longissima, Coronella austriaca, Natrix natrix, Natrix tessellata* şi hibrizi între *Bombina bombina* şi *Bombina variegata*, precum şi populaţii de *Rana* kl. *esculenta.*

Cuvinte cheie: herpetofaună, bazinul inferior, Crişul Alb

INTRODUCTION

Sporadic data about the herpetofauna of the Arad district can be found in several books from *Fauna R.P.R.*, about amphibians and reptiles (FUHN, 1960, FUHN & VANCEA, 1961). In the last decade, two scientific books have been published. These refer either to amphibians or the herpetofauna as a whole, including also some regions from the district (COGALNICEANU et al., 2000, GHIRA et al., 2002, IFTIME, 2005).

Two articles referring explicitly to the herpetofauna of some regions from Arad district have been published recently (COVACIU-MARCOV et al., 2005 a, 2006 a). The importance of the study concerning the structure and the geographical spread of the herpetofauna is very important, as this is the starting point in protecting the amphibians and the reptiles (GHIRA et al., 2002). In Romania, the geographical spread of the herpetofauna continues to be unknown, as compared to the western Europe (GASC et al., 1997), despite the fact that in the latest years a series of studies over this issue have been carried out (ANDREI, 2002, COVACIU-MARCOV et al., 2000, 2002, 2003 a, b,c, 2004, 2005 a, b, 2006 a, b, GHIRA et al., 2002, GHIURCA et al., 2005, GHERGHEL & ILE, 2006, Lazar et al., 2005, STRUGARIU et al., 2006 a, b). In this way our objective has been to establish the structure and the geographical herpetofauna of the lower hydrographical basin Crisul Alb in the district of Arad.

MATERIAL AND METHODS

The region under question is located in the center-western of Arad district, overlapping the lower hydrographical basin of the river Crisul Alb, in the downstream area of Ineu. Most of the region is made of fields, belonging to the lower field of the river Cris, and in the south-eastern part there is a sector of the Zarandului Mountains. The maximum altitude in the area is 798 m, on the peak Highis (TUFESCU, 1986) The most important tributary of Crisul Alb here is the Cigher, which drains a large part of the northern slope of the Zarandului Mountains (FEY et al., 2001).

The study has been made between 2002 and 2006. We have observed the herpetofauna from 42 regions (table 1), and each of it supposing trips in different biotopes. The method consists in some visual crosswise lines (COGALNICEANU, 1997). The animals have been established directly most of the times, without catching them. We examined them directly (BROWN, 1997) and when it came to catching some types, our team used bare hands. In the aquatic period the amphibians have been caught with a square rake, or using a round net, on long metal sticks. After being established, the animals were released in their original biotopes.

The hybrids were established by the morphological or chromatical characters, using the main characters or surveys from the scientific literature (BERGER, 1966, 1973, COGALNICEANU et al., 2000, GHIRA & MARA, 2000, STUGREN, 1980, SZYMURA, 1993). An important role in establishing the geographical spread of the herpetofauna, was played by finding and observing a few dead animals, either killed by the local people or run over by cars.

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RESULTS AND DISCUSSIONS

In the region in question we have identified a total of 23 species of the herpetofauna: 14 amphibians (*Salamandra salamandra, Triturus alpestris, Triturus dobrogicus, Triturus cristatus, Triturus vulgaris, Bombina bombina, Bombina variegata, Pelobates fuscus, Bufo bufo, Bufo viridis, Hyla arborea, Rana ridibunda, Rana dalmatina, Rana temporaria*) and 9 reptile species: (*Emys orbicularis, Lacerta agilis, Lacerta viridis, Podarcis muralis, Anguis fragilis, Elaphe longissima, Coronella austriaca, Natrix natrix, Natrix tesselata*). Along with the 22 species, we have also identified in the region 2 hybrid categories between certain amphibian species. In this way, a lot of hybrids between *Bombina bombina* and *Bombina variegata* are to be seen in the area, as well as groups of *Rana kl. esculenta – hybrids* between *Rana ridibunda* and *Rana lessonae*. Both of the hybrid categories, as well as *Lacerta viridis*, have been identified for the first time in the respective area.

We have analyzed the spread of the 23 species and 2 hybrid forms of the herpetofauna in the 42 places of the region in question. We have identified 290 places for the respective species we observed in the above 42 areas (table 1), and among these, 232 places are considered new for Romania's herpetofauna.

Salamandra salamandra (LINNAEUS, 1758) is a rare species in the region we have analyzed. We have noticed few types, originating in a small number of places. This is because there are few high wood areas here, which are specific to these types. The species is present in the wood areas, 200 m altitude and upper.

Triturus alpestris (LAURENTUS, 1786) is a rare species, being identified in only one place, Naidas. It lives mostly in the high area, at 400 m and even upper, although in other western areas in Romania it can be found at lower altitudes, even 150 m (COVACIU-MARCOV et al., 2006 a).

Triturus cristatus (LAURENTI, 1768) lives mostly in the hill and high areas in the south-eastern region. It lives in area higher than 150 m, and also on uneven relief, which is common to western Romania (COVACIU-MARCOV et al., 2003 a, b, 2005 a,b, 2006 a). Although it does not have a very large territory, the populations taken into account are formed of several types.

Triturus dobrogicus (KIRITZESCU, 1903), as opposed to the former species, lives in an area having several spreadings, namely in the field area of the lower hydrographical basin of Crisul Alb. It lives only at altitudes lower than 150m, areas having a plain relief. In certain situations, as Ineu for instance, it can reach the hills' lower limit, but only if the contact between these and the field is a sudden one. The populations are generally not very large, because of the radical anthropi change of the field area. Usually *Triturus dobrogicus* is to be found in the canals or the hitches near the roads. We have not identified hybrids between the two species of comb tritons in the area, although such populations have been seen previously in other places from Arad district (COVACIU-MARCOV et al., 2006 a). This is due perhaps to the steep way of contact between hills and fields – in the region under study, which has the function of a barrier between the areas of the two species. This practically does not allow other intermediary species.

Triturus vulgaris (LINNAEUS, 1785) is the most common Urodele species in the region in question. It lives in the filed but also in the mountains. It can be found in every kind of aquatic biotope, from the canals or the hitches near the roads up to temporary puddles in the forest areas.

Bombina bombina (LINNAEUS, 1761) lives mostly in the field area of the region in question. It can be practically found in every aquatic biotope, and especially in the spring one can notice it in the temporary puddles on the farmers' fields. It does not live in the higher areas of the region we studied, as its altitude limit is 150 m. This is common to the general situation from other places in western Romania (COVACIU-MARCOV et al., 2000, 2002, 2003 b, 2004, 2005 a, b, 2006 a), but its presence is lower than in other places in the country, for instance Transylvania (GHIRA et al., 2003), Moldavia (STRUGARIU et al., 2006 b) or Dobrogea (COVACIU-MARCOV et al., 2006 a).

Bombina variegata (LINNAEUS, 1758) is well represented in the hilly and mountains area of the region under study, living in an area having several spreadings. This is different from other species of the same gene. Generally, the lower altitude limit of the species is 150 m, but it can happen for this to reach 140m as well. In this way, the two species' spread depends on the same altitude factors as in west of the Apuseni Mountains in general.

Bombina bombina X Bombina variegata. The hybrids between the two *Bombina* species are rare in this region. We have met only one hybrid population, near Dud village, between the field and Nadasului Hills, at an altitude of 150 m, the same altitude as other hybrid populations' from western Romania (COVACIU-MARCOV et al, 2000, 2002, 2003 a,b, 2004, 2005 a,b). The hybrids were found in the puddling area. At the level of a permanent brook. Unfortunately, because there is a village in the vicinity, the biotope is very polluted with litter.

Pelobates fuscus (LAURENTI, 1768) is relatively rare in the area under study. The species has been identified only in 10 villages situated solely in the field area, but not very far from the hilly area. This fact, along with the species' rarity in the field area, can be considered a consequence of the field area's anthropic change. Thus, the field from the lower hydrographic basin of Crisul Alb is almost completely cleared and drained, being cut by a series of canals that drain the water quickly. In this way, the species lacks its normal reproduction biotope. However, at the hills' edge, the hydrographical net is more developed, the humidity level is higher, which allows the digging frogs' survival.

Bufo bufo (LINNAEUS, 1758) is almost exclusively spread in the high hilly and mountain area, where is quite common. It is very rare in the field area, and in general one can see it only at the edge between this one and the high relief, as described above, at the former species. In point of reproduction, this takes place in the ditches near the roads. Nevertheless, the massive forest clear has led to a smaller after-laying area.

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Table 1. Distribution of the amphibian and reptile species in the studied region
Tabel 1. Distribuţia speciilor de amfibieni şi de reptile în regiunea cercetată

	Ss	Ta	Td	Tc	Tv	Bb	Bv	BbXBv	Pf	Buf	Buv	Ha	Rr	Re	Rd	Rt	Eo	La	Lv	Pm	Af	Ca	El	Nn	Nt
Agrişu Mare	-	-	-	-	X	-	X	-	-	X	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-
Arăneag	X	-	-	X	X	-	X	-	-	X	X	X	-	-	X	X	-	-	X	-	X	X	-	-	-
Camna	-	-	-	-	X	-	X	-	-	X	X	X	-	-	X	-	-	-	-	-	-	-	-	X	-
Caporal Alexa	-	-	-	-	X	X	-	-	X	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Chier	-	-	-	-	X	X	-	-	X	X	-	-	X	-	X	-	-	X	-	-	-	-	-	X	-
Chişinău Criş	-	-	X	O	S	S	-	-	-	-	S	O	S	-	X	-	-	S	-	-	-	-	-	S	O
Cintei	-	-	X	-	X	X	-	-	-	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Cuied	X	-	-	X	X	-	X	-	-	X	-	X	X	-	X	-	-	X	X	-	-	-	-	X	-
Curtici	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	S	-	-	-	-	-	-	-
Dud	-	-	-	X	X	X	X	X	-	X	X	-	X	X	X	-	-	X	-	-	-	-	-	X	-
Drauţ	-	-	-	-	-	-	-	-	-	X	X	-	-	-	X	-	-	-	X	-	-	-	-	-	-
Galşa	-	-	-	-	X	X	X	-	X	X	X	-	X	-	X	-	-	X	X	-	-	-	-	X	-
Grăniceri	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hodiş	-	-	-	X	X	-	X	-	-	-	-	-	-	-	X	-	-	S	-	-	-	-	-	-	-
Iercoşeni	-	-	-	X	X	-	X	-	-	X	-	X	-	-	X	-	-	X	X	-	-	-	-	X	-
Ineu	-	-	X	O	S	S	-	-	X	O	O	S	S	X	S	-	S	X	-	-	O	-	-	S	-
Luguzău	-	-	-	X	X	-	X	-	-	X	X	X	-	-	X	-	-	X	X	-	-	-	-	X	-
Macea	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Măderat	-	-	-	-	X	X	X	-	-	X	S	O	S	-	S	-	-	S	-	-	-	-	-	S	-
Mâsca	-	-	-	-	X	X	X	-	X	X	X	-	X	-	X	-	-	X	X	-	-	-	-	-	-
Minişu de Sus	X	-	-	X	X	-	X	-	-	X	X	X	-	-	X	-	-	X	X	-	-	-	-	X	X
Minişel	X	-	-	X	X	-	X	-	-	X	-	X	-	-	X	-	-	X	X	-	-	-	-	X	-
Mocrea	-	-	-	-	X	X	-	-	X	X	-	-	X	X	X	-	X	X	-	-	-	-	-	X	-
Nădab	-	-	X	O	S	S	-	-	-	O	X	-	S	-	-	-	-	S	-	-	-	-	-	-	O
Nădaş	S	S	-	X	S	-	S	-	-	S	X	S	X	-	S	S	-	X	X	X	S	S	O	X	X
Olari	-	-	X	-	S	X	-	-	-	-	O	O	X	-	-	-	O	-	-	-	-	-	-	O	-
Pâncota	-	-	-	-	X	X	-	-	X	X	X	-	X	-	X	-	-	X	-	-	-	-	-	-	-
Pilu	-	-	X	-	X	X	-	-	-	-	O	O	X	-	-	-	S	-	-	-	-	-	-	-	-
Satu Mic	-	-	-	-	X	-	-	-	-	X	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Sântana	-	-	-	-	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Seleuş	-	-	X	O	S	X	-	-	X	-	X	-	X	-	-	-	O	S	-	-	-	-	-	-	-
Sintea Mică	-	-	X	-	X	X	-	-	-	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Socodor	-	-	X	-	X	X	-	-	-	-	-	-	X	-	X	-	X	X	-	-	-	-	-	X	-
Şiclău	-	-	X	-	X	X	-	-	-	-	O	-	S	-	-	-	-	-	-	-	-	-	-	S	-
Şicula	-	-	X	-	S	S	-	-	X	-	-	-	X	-	-	-	-	X	-	-	-	-	-	X	-
Şilindia	-	-	-	-	X	X	-	-	-	X	X	-	X	-	-	-	-	X	-	-	-	-	-	X	-
Şimand	-	-	-	-	X	S	-	-	-	-	X	-	-	-	-	-	O	-	-	-	-	-	-	-	-
Şiria	-	-	-	O	S	X	X	-	X	X	X	X	X	-	X	-	-	S	X	O	-	O	X	S	-
Tăuţ	-	-	-	S	S	-	S	-	O	S	S	S	S	-	S	O	-	X	X	-	-	-	-	S	S
Târnova	-	-	-	X	X	X	-	-	-	X	X	-	X	-	X	-	-	X	-	-	-	-	-	X	-
Vărşand	-	-	S	-	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Zărand	-	-	X	-	S	X	-	-	-	X	O	-	-	-	-	-	-	-	-	-	-	-	-	O	-
Σ X	4	-	12	10	28	22	14	1	10	23	20	8	22	3	21	1	2	18	12	1	1	1	1	15	2
Σ S	1	1	1	1	10	5	2	-	-	2	3	3	6	-	4	1	2	7	-	-	1	1	-	6	1
Σ O	-	-	-	5	-	-	-	-	1	2	5	4	-	-	-	1	3	-	-	1	1	1	1	2	2

X – new localities, S – reconfirmed, O – signaled but don't reconfirmed
Ss=*Salamandra salamandra,* **Ta**=*Triturus alpestris,* **Td**=*Triturus dobrogicus,* **Tc**=*Triturus cristatus,* **Tv**=*Triturus vulgaris,* **Bb**=*Bombina bombina,* **Bv**=*Bombina variegata,* **BbXBv**= *Bombina bombina***X***Bombina variegata,* **Pf**=*Pelobates fuscus,* **Buf**=*Bufo bufo,* **Buv**=*Bufo viridis,* **Ha**=*Hyla arborea,* **Rr**=*Rana ridibunda,* **Re**=*Rana esculenta,* **Rd**=*Rana dalmatina,* **Rt**=*Rana temporaria,* **Eo**=*Emys orbicularis,* **La**=*Lacerta agilis,* **Lv**=*Lacerta viridis,* **Pm**=*Podarcis muralis,* **Af**=*Anguis fragilis,* **El**=*Elaphe longissima,* **Ca**=*Coronella austriaca,* **Nn**=*Natrix natrix,* **Nt**=*Natrix tessellata*

Bufo viridis (LAURENTI, 1768) it a well-represented species in this region, living mostly in the high areas. Unlike the former population, it prefers the field areas which are very changed anthropically. Larger groups are to be seen at the western limit of the Zarandului Mountains, where this meets the field.

Hyla arborea (LINNAEUS, 1758) is well represented in the hilly and mountainous forest areas. We have not identified any population in the field area, where this species' biotopes have practically disappeared because of the anthropic activities. In this way, the fields lack forests and permanent swamp areas almost completely. The species can be found only where the field meets the hills, at Ineu and Siria.

Rana ridibunda (PALLAS, 1771) is a common species in the area in question. It loves the hilly and field low areas. It does not like the dark narrow valleys in the mountains areas. The species has large populations, living in almost every aquatic biotope.

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Rana kl. esculenta (LINNAEUS, 1758) is rare in the area, being identified only in 3 places in the contact zone between the field and the hills, at altitudes of 150 m. It lives generally in gutters and ditches, but also in the puddle and swamp areas, generally near brooks. The biotopes and the altitude are similar to those in which the species has been identified previously in Arad district (COVACIU-MARCOV et al., 2005 a, 2006 a).

Rana dalmatina (BONAPARTE, 1839) is a common species the forest areas of the mountain and hilly sides from the lower hydrographic basin of Crisul Alb. However it is very rare in the field – we have only identified it in three places, in the wet areas near some canals, or the few forest islands. The fact that the species is extremely rare is a consequence of the massive forest clear and the field area's draining.

Rana temporaria (LINNAEUS, 1758) is much rarer than the previous one – we have identified it only in two places around the Zarandului Mountains. It lives at altitudes higher than 200 m.

Emys orbicularis (LINNAEUS, 1758) is rare in the region in question, and we have identified it only in four places in the field area. It lives only around Crisul Alb's border zone, in canals, ditches, puddle areas, etc.

Lacerta agilis (LINNAEUS, 1758) is a common species in the region, living not only in the field but also in the high areas.

Lacerta viridis (LAURENTI, 1768) is rarer than the previous one. It only lives in the mountain and hilly areas, 150 m and even higher. It prefers the uneven relief, the bush hilly slopes or the forest skirt.

Podarcis muralis (LAURENTI, 1768) is a very rare species, identified in only one place in the Zarandului Mountains.

Anguis fragilis (LINNAEUS, 1758) is also rare, being exclusively identified in the forest areas in the Zarandului Mountains.

Coronella austriaca (LAURENTI, 1758) lives in a zone similar to the previous one, living in the forest areas of the Zarandului Mountains as well. But, in these places the populations seem to be rather large, as we have met a lot of types killed by the local people or run over by cars.

Elaphe longissima (LAURENTI, 1768) has been identified in a sole place, at Siria. It lives around the western slope of the Zarandului mountains, in direct contact with the field.

Natrix natrix (LINNAEUS, 1758) is the most common snake species in the region under study. It lives not only in the field but also in the high areas, generally in wet areas, near canals or ditches. However, in some cases they are the cars' victims.

Natrix tessellata (LAURENTI, 1768) is spread exclusively in the Zarandului Mountains, along the valleys covering these mountains. Despite the fact this territory is a small one, the number of the types was a large one. A larger population is to be found in the vicinity of the Taut artificial lake. In the proximity of the lake we have noticed a lot of dead bodies run over by cars.

CONCLUSIONS

In the lower hydrographical basin of the Crisul Alb from the district of Arad, we have identified 23 species belonging to the herpetofauna, along with two categories of hybrids between certain amphibian species. We have identified 290 places for the respective species in the 42 places in the region. Among these, 232 places are considered new places for Romania's herpetofauna. The structure of the lower hydrographical basin of Crisul Alb – the district of Arad -, is similar to other structures in this district (GHIRA et al., 2002, COVACIU-MARCOV et al., 2005 a, 2006 a). The hybrid zones between the two *Bombina* species is situated at about 150 m – *Bombina bombina* lives lower and *Bombina variegata* is to be found higher. The same is to be found in the Apuseni Mountains.

The field area in the lower hydrographical basin of Crisul Alb has quite a poor herpetofauna, because of the massive anthropic change, such as forest clearing and draining. Practically, the simplified herpetofauna of the field area is now living in the close vicinity of the rivers, in the narrow space between the breakwaters of the different draining canals, or in the very few forest islands that still exist. A different herpetofauna area is to be noticed in the vicinity of Siria. Here, the direct contact between the field area and the Zarandului Mountains is determining the existence of a great variety of biotopes and therefore a great variety of species. Thus, we may consider that the region in question should be paid a great attention and be given the possibility of becoming a protected area.

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STUDY OVER THE FOOD SPECTRUM OF TWO *Bombina variegata* POPULATIONS IN TURT BAI AREA

SARA FERENTI, VIOREL LAZAR, KATALIN OVLACHI, ANAMARIA DAVID, RAMONA COVACI

Abstract. During May – June 2005 we have studied the feeding process of 99 *Bombina variegata* types. As we analyzed the stomach contents, we have observed some differences according to sex and biotope. The Hymenopterous species – the Formicids and the Coleopteras are the most frequent taxons. Also, there is a noticeable difference in the feeding way between males and females, the latter using the sit-and-wait hunting technique, which allows them to catch the quicker prays. We have also noticed that the yellow belly toads are 'selfish' feeding animals.

Key words: feeding, prey taxa, *B. variegata*

Rezumat. Studiul spectrului trofic a două populaţii de Bombina variegata din regiunea Turţ Băi. În perioada mai – iunie 2005 am studiat hrănirea la 99 de exemplare de *Bombina variegata.* Pe parcursul analizei conţinuturilor stomacale am urmărit diferenţele în funcţie de sexe şi de habitate. Taxonii cu ponderea şi frecvenţa maximă sunt Hymenopterele – Formicide şi Coleopterele. Se observă diferenţă în hrănire între masculi şi femele, cele din urmă folosind tehnica de vânare sit-and-wait, care le permite capturarea prăzilor mai mobile. Am constatat că buhaii de baltă cu burtă galbenă sunt animale cu hrănire oportunistă.

Cuvinte cheie: hrănire, taxoni pradă, *B. variegata*

INTRODUCTION

The studies in different parts of the world have showed that the food structure is an important factor in understanding not only the relations but also certain behaviour aspects as far as the amphibian populations are concerned (DUELLMAN, 1967, INGER & COLWEL 1977). This is important as the amphibians play a great role in the aquatic biotopes (HIRAI & MATSUI 1999).

Bombina variegata (LINNAEUS 1761) is one of the most common amphibian species in Romania, living at an altitude of 1870 m (STUGREN & GHIRA 1978) till 140 m (COVACIU-MARCOV et al, 2000). This species has a nocturnal activity (STUGREN & RUSU 1978), and is more connected to the terrestrial area as opposed to a similar species, Bombina bombina (MADEJ 1973).

There are some data concerning the yellow belly toads' feeding way in Romania (SARBU 1876, SAS et al 2004, NEMES & PETRASS 2003, GHIURCA & ZAHARIA 2005, PETER et al 2005, etc). The present work has the role of bringing extra information, referring to the feeding process differences according to sex and biotope.

MATERIALS AND METHODS

During May-June 205 we have analyzed the various feeding spectrum of two *Bombina variegata* populations from Turt Bai area (the district of Satu-Mare, Romania). Two trips took place during our research, in which we caught 99 *Bombina variegate* types (33 males, 64 females and 2 youngs).

The types we analyzed were caught in two ponds, named here Pond 1 and Pond 2. Between the 2 ponds there is a distance of 500 m, but still a lot of differences can be observed. Pond 2 is an artificial one, near the road, 1-1,5 m deep, and has a small surface, about 6 m^2. The pond ground is covered by mud, and has a semi thick vegetation. This pond water is fairly polluted, and there is a pipe line passing right in the middle. Pond 3 is about 500 m away from the previous one, near a forest. This one is 1 m deep and has about 6 m^2. It has a thick vegetation, and its ground is always covered by leaves and rotten branches. There is a muddy area close to this pond, having a little surface – this is where most of the types were caught.

We collected the stomach contents by using the method called stomach lavage (LEGLER & SULLIVAN 1979, OPATRNY 1980), which allowed us to analyze the content without harming the animal (COGALNICEANU et al 2000). This has been done by using a syringe, 20-30 cm perfusion tube at one end, and its thickness is suitable to the frogs' size. We tried to reduce the time between the *Bombina variegata* types' catching and the effective lavage process, as it is a well known fact that the Amphibians' digestion is very quick, which can interfere with the results (CALDWELL 1996). The respective samples were immediately preserved in test glasses – 4% formol -, and after that labeled with the respective type's sex. The stomach samples were analyzed in laboratory, with the help of a stereomicroscope and also reference material. (IONESCU et al 1971, RADU & RADU 1972, MOCZAR et al 1950).

We have followed such parameters of the trophic spectrum as: taxonomic belonging, weight, frequency and the pray taxons' origin according to the types' sex and the origin biotope.

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RESULTS

Our study has taken place during the hot period of the year 2005, in May and June. We went on two trips and we caught 99 *Bombina variegata* types, of which 33 types were males, 64 females and 3 youngs.

Except for one type, all of them had stomach contents. Here we found vegetal stuff, skin remainders, minerals, but also animal prays.

In point of the vegetal content frequency, this had quite a great value – 63,63%. However, differences appear according to the biotope. For example, Pond 2 individuals are higher in vegetal stomach contents. Another example is the Pond 3 individuals, especially females, which have a higher degree of remainders in their stomachs. The minerals are more frequent in males and Pond 2 individuals.

The animal prays are represented by the invertebrates, and the 722 prays are grouped into 23 categories. There are some prays that appear accidentally, such as the Ephemeropteras, the Gordiaceas, the Hymenopteras – undetermined, the Hymenopteras – Ihneumonidaes, the Myriapodas – Diplopodas and Ortopteras.

The maximum number of prays per stomach (20 prays) was found in a male, in May, in Pond 2. The medium number is 7,18. In point of the taxons in females, the first place is taken by the Hymenopteras – Formicids, then the Coleopteras and the Arachnids. In males we found again Hymenopteras – Formicids (on the first place), followed by Coleopteras and Dypterus – Nematoceras. Besides these one can notice a high number of Tyzanuras and Heteropteras in males, and a high number of Plecopteras in females (table 1).

The differences appear also in point of the biotope. As far as the frequency is concerned, in Pond 2, following the Hymenopteras – Formicids and the Coleopteras, we can observe some Dipteras – Nematoceras, and in Pond 3 on the third place we have the Plecopteras, mostly larvae but also adults.

The Lepidopteras, Plecopteras and Trychopteras larvae are to be found in great number in the toads' feeding spectrum, most of all in Pond 3, in the females' case. The most frequent pray taxons in the individuals' stomachs are the Coleopteras, followed by the Hymenopteras – Formicids, Arachnids, Lepidopteras – larvae and Dipteras (table 2)

As far as the males' favourites are concerned, we can enumerate the Formicids, then the Coleopteras and the Dipteras, while in females, the Coleopteras come first, then the Formicids and the Arachnids. The Coleopteras, the Gastropodas and the Lepidopteras and Plecopteras larvae are higher in Pond 3. In Pond 2 the most frequent are the Formicids and the Dipteras – Nematoceras, and the Dipteras – Brachyceras, respectively.

Table 1. The % abundance of animal preys
Tabel 1. Ponderea procentuală a prăzilor animale

	Males	Females	Pond 2	Pond 3	Total
Annelids	1.079	1.142	1.724	0.549	1.123
Arachnids	8.271	10.899	10.919	8.24	9.689
Colembolas	0.719	0.710	0.862	0.549	0.702
Tizanuras	3.956	0	3.160	0	1.544
Coleopteras	12.946	17.529	14.94	17.306	16.147
Crustaceas	3.236	4.264	2.011	5.494	3.488
Dipteras– Nematoceras	12.949	6.160	11.781	6.043	8.707
Dipteras – Brahiceras	6.474	4.027	6.321	4.120	5.196
Gastropodas	1.797	1.894	0.287	3.571	1.965
Heteropteras	3.237	0	2.586	0	1.264
Hymenopteras – Formicids	29.856	23.696	33.333	18.956	25.983
Homopteras	3.597	2.131	4.597	0.823	2.668
Lepidopteras – larvae	4.316	5.924	2.298	8.241	5.337
Lepidopteras – adults	0	0.473	0.287	0.274	0.280
Plecopteras – larvae	0.719	8.056	0	10.164	5.196
Plecopteras – adults	1.438	7.109	0.574	8.791	4.775
Trichopteras – larvae	3.237	2.369	2.586	2.747	2.668
Trichopteras – adults	0.359	1.184	0.287	1.373	0.842
Others	1.797	2.365	1.435	2.744	2.103

DISCUSSIONS

Our results reveal that the yellow belly toads have different feeding ways, according to the sex and biotope.

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The small number of the individuals that had empty stomachs is probably due to the favourable feeding conditions. There is a big number of individuals whose stomachs was empty, for instance the Urodela: *Triturus cristatus* (COVACIU-MARCOV et al 2001), but also the Anuras: *Rana arvalis* (SAS et al 2003), or *Bombina variegata* populations (PETER et al 2005), where all the individuals presented stomach content.

In the stomachs of the individuals we caught we have identified vegetal remainders. It is a well known fact that the Amphibians are pray animals (COGALNICEANU 2000), and they mostly eat mobile prays (ZIMKA 1966). We have only one species whose not only the larvae but also the adults eat vegetal food, namely *Rana hexadactylia*, because the vegetal food is low in nutrients (DAS 1996).

Throughout our study we have found only 3 individuals whose stomach content was made of vegetals, skin remainders or minerals. This can be explained by the fact that the vegetals are swallowed accidentally together with the animal prays, as the reference literature also suggests. (WHITAKER et al 1977) Such cases were also observed in other *Bombina variegata* populations (PETER et al 2006), and in Amphibians: *Bombina bombina* (SAS et al 2004), *Rana lessonae* and *Rana kl. esculenta* (SAS et al 2007), Rana ridibunda (COVACIU-MARCOV et al 2005), etc.

Table 2. The % occurence of animal preys
Tabel 2. Frecvenţa procentuală a animalelor pradă

	Males	Females	Pond 2	Pond 3	Total
Vegetals	60.60	64.06	71.11	57.40	63.63
Skin remainders	24.24	31.25	24.44	33.33	29.29
Minerals	15.15	3.12	11.11	3.70	7.07
Anelidas	9.09	7.81	13.33	3.70	8.08
Arachnids	36.36	43.75	42.22	38.88	40.40
Colembolas	6.06	3.125	6.66	1.85	4.04
Tizanuras	12.12	0	8.88	0	4.04
Coleopteras	54.54	65.62	57.77	66.66	62.62
Crustaceas	15.15	20.31	13.33	22.22	18.18
Dipteras – Nematoceras	42.42	17.18	31.11	20.37	25.25
Dipteras – Brahiceras	36.36	20.31	31.11	22.22	26.26
Gastropodas	9.09	10.93	2.22	18.51	11.11
Heteropteras	3.03	0	2.22	0	1.01
Hymenopteras – Formicids	63.63	57.81	71.11	50	59.59
Homopteras	12.12	18.18	15.55	5.55	10.10
Lepidopteras – larvae	24.24	28.12	11.11	40.74	27.27
Lepidopteras – adults	0	3.12	2.22	1.85	2.02
Plecopteras – larvae	3.03	25	0	33.33	18.18
Plecopteras– adults	6.06	20.31	2.22	25.92	15.15
Trichopteras – larvae	3.03	4.68	2.22	5.55	4.04
Trichopteras – adults	3.03	6.25	2.22	7.40	5.05
Others	15.15	12.5	11.11	14.81	13.13

In the stomach contents one can also notice skin remainders. Even more, some stomach contents have skin remainders from fellow individuals, which is explained by some researchers as an aspect of the trophic spectrum, caused by the epidermis proteins' recycling. (WELDON et al 1993). In the research literature we can also find other cases of dermatophagia, for example in the *Bombina variegata* (Sas et al 2005) or the *Bombina bombina* (SAS et al 2003)' cases. However, we believe the skin remainders' presence in the yellow belly toads' stomachs is an accidental one, as they swallowed it together with other animal prays.

An interesting fact is the high frequency of the female stomachs having skin remainders. These ones tend to eat more proteins in the reproduction period. Generally, as far as other *Bombina variegata* populations are concerned, the males are the ones eating skin remainders more often. Females having more vegetal and skin remainders stomachs than males is a result of the fact that the former ones feed themselves more than males.

Pond 2 is lower in point of the stomachs having skin remainders. This is due perhaps to the fact that the population has a smaller number of members, and therefore, they eat less. Similar cases have been observed in other *Bombina variegata* populations (PETER et al 2006).

Besides vegetals and skin remainders, a lot of mineral fragments can appear, but only accidentally. On the other hand, this may be explained as the individuals hunt not only on the water surface, but also on its ground. Such examples can be found at some *Rana ridibunda* species (VANCEA et al 1961), but also other *Bombina variegata* populations (SAS et al 2004)

The most important part of the yellow belly toads' feeding spectrum is made of animal prays, which is a normal fact for the Amphibians as pray animals (COGALNICEANU et al 2000).

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The terrestrial invertebrates are also present, such as the Hymenopteras _Formicids, the Coleopteras and the Arachnidas. They appear in large numbers, which cannot be explained by their accidentally falling in the water, but also the fact that *Bombina variegata* individuals hunt on ground too, although *Bombina variegata* is considered a water species (COGALNICEANU et al 2000b).

On the other hand terrestrial animals are easy to find on the plants too (flying insects), on the water surface (different spiders), or the pond ground. We have observed other Amphibians related to water, whose food is made of terrestrial invertebrates (LOW et al 1990, SAS et al 2004, PETER et al 2006, CICEK et al 2006).

The females' feeding process is a way of saving the reproduction energy as well as possible. A higher frequency in eating Coleopteras and Arachnidas is observed, as well as larger invertebrates. The fewer prays, the higher the energy, but at the same time the pray is bigger. On the contrary, males catch more prays, but smaller in size (LOW & TOROK, 1998).

Also, the individuals seem to prefer larvae more. Some researchers think that the holometabola insects' larvae are richer in lipids, having a higher nutrient value than the adults (BROOKS et al 1996).

The fact that the individuals seem to prefer quicker prays (the Coleopteras, the Plecopteras), suggests their sit-and-wait hunting technique, which allows them catching quicker prays, on one hand, and on the other hand, they save more energy (PERRY & PIANKA 1997).

In point of males, they prefer smaller size prays (Hymenopteras – Formicids, Dipteras, Colembolas, Tyzanuras, etc), and slower ones, which suggests their active-foraging hunting technique (Perry & Pianka 1997). This because males do not need the same amount of energy as the females. Also, we can admit that the males are the ones feeding more often with water prays, as we found even Heteropteras in their trophic spectrum. This fact was observed also in other populations of *Bombina variegata* (SAS et al 2004).

Pond 2 and Pond 3 are quite different, and that is why their individuals' stomach contents are different. The Plecopteras' presence in Pond 3 is really interesting. In Pond 2 their frequency is lower. This is because the latter has witnessed a lot of anthropic changes, unfavourable for the Plecopteras that prefer clean and oxygenated water (RADU & RADU 1967). These conditions are proper to Pond 3, whose one side is always apart from UV rays.

Also most of the Lepidopteras and Trichopteras larvae live in Pond 3, as this one is near the forest. In this way, there is a side that is always apart from UV sunrays, offering the best conditions for insects to lay eggs.

To sum up, we can state that yellow belly toads are 'selfish' pray animals, eating almost all types of Invertebrates they can find (COGALNICEANU et al 2000) However, there are some differences between males and females, according to their biotope.

Generally males use the active-foraging hunting method, eating slow prays. As opposed to females they tend to hunt more in the water area.

Females use the sit-and wait technique, and in this way they have access to bigger and quicker prays, thus being reproduction energy-saving. The prays vary according to each biotope conditions. Thus, the most sensitive ones are to be found solely in Pond 3 where the water is more oxygenated and UV protected.

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THE CATALOGUE OF THE SEA AND OCEANIC FISH COLLECTION FROM THE PATRIMONY OF THE OLTENIA MUSEUM CRAIOVA

IONELIA CLAUDIA GOGA

Abstract. Fish, a group of vertebrates with great scientific and economic importance, represented a permanent preoccupation of the zoologists. Thus, we followed the wish of knowledge, collection, and acquisition of autochthonous and exotic fauna and this paper presents the catalogue of the sea and oceanic fish acquired from NISRD Grigore Antipa Constanţa. The Catalogue of the Sea and Oceanic Fish from the patrimony of the Oltenia Museum comprises a number of 129 curios, namely 74 species. The species belong to the four F.A.O statistical fishing areas: F.A.O. 37. The Black Sea, F.A.O. 34 The Eastern Central Atlantic Ocean – MAURITANIA, the statistical area F.A.O. 51 The Western Indian Ocean – SOMALIA, the statistical area F.A.O. 47 The South-east Atlantic Ocean – NAMIBIA.

Key words: ichthyologic patrimony, Oltenia Museum

Rezumat. Catalogul Colecţiei de peşti marini şi oceanici din patrimoniul Muzeului Olteniei Craiova. Peştii, o grupă de vertebrate cu deosebită importanţă ştiinţifică şi economică, a constituit o preocupare permanentă a zoologilor. Mergând pe linia cunoaşterii, colectării şi achiziţionării faunei autohtone şi exotice, lucrarea de faţă prezintă catalogul speciilor de peşti marini şi oceanici achiziţionaţi de la INCDM Grigore Antipa Constanţa. Catalogul Colecţiei de Peşti Marini şi Oceanici din patrimoniul Muzeului Olteniei cuprinde un număr de 129 piese, respectiv 74 specii. Speciile aparţin la patru zone statistice de pescuit F.A.O: F.A.O. 37. Marea Neagră, F.A.O. 34 Oceanul Atlantic est central – MAURITANIA, Zona statistică F.A.O. 51 Oceanul Indian de vest – SOMALIA, Zona statistică F.A.O. 47 Oceanul Atlantic de sud-est – NAMIBIA.

Cuvinte cheie: patrimoniu ihtiologic, Muzeul Olteniei

INTRODUCTION

The publishing of the catalogues of certain collections brings an important contribution to the scientific research work, as they support the approach of certain vast themes regarding the zoogeographical distribution of the fauna complexes. The necessity of achieving this catalogue was determined by the fact that the collection is closed.

Such collections are useful as scientific comparison material for the determination and verification of the future curios that might be included in the patrimony of a museum; at the same time, they are important for knowing the experts that contributed to the gathering and determination of these curios and for temporary exhibitions. The Catalogue of the Sea and Oceanic Fish Collection includes a number of 129 curios, namely 74 species determined and grouped in 4 F.A.O. statistical fishing areas: F.A.O. statistical area 37 The Black Sea, F.A.O. statistical area 34 The Eastern Central Atlantic Ocean – Mauritania, F.A.O. statistical area 51 The Western Indian Ocean – Somalia, F.A.O. statistical area 47. The South-east Atlantic Ocean – Namibia; from these areas, the experts of NISRD Grigore Antipa Constanţa collected the material rendered in the present paper after the expeditions made in 1984, 1985, 1986, 1987,1988, 2004, 2005.

MATERIAL AND WORK METHOD

In order to achieve this paper, it was used the sea and oceanic ichthyologic material preserved in the patrimony of the Nature Sciences Section of the Oltenia Museum from Craiova, material acquired from NISRD Grigore Antipa – Constanţa on the 20th of July 2006; this material was determined and collected by the experts of above-mentioned institution: dr. eng. Ionel Staicu, dr. eng. Valodia Maximov, dr. eng. C-tin Maxim, dr. Nicolae C. Papadopol, geogr. Emil Leonte, eng. Dumitru Zaharia, dr. eng Viorel Dumitrescu, dr. eng. Eugen Anton, dr. eng. Gh. Radu. The formolized curios were displayed on glass plates in special receptacles in formaldehyde 4%.

In the text, there were used the following abbreviations: no - number, sm. - samples, inv. - inventory, exped. – expedition, MP – moist preparation, NISRD – The National Institute of Sea Research and Development, IS – Ionel Staicu, VM- Valodia Maximov, C.M-C-tin Maxim, N.P.- Nicolae Papadopol, E.L.- Emil Leonte, DZ-Dumitru Zaharia,GHE. R- Gheorghe Radu, VD – Viorel Dumitrescu, EA- Eugen Anton.

The nomenclature of the names was made after R.P.R. Fauna Pisces – Osteichthyes. vol XIII. P. Bănărescu.1964, as well as after the Catalogue for determining the main fish and cephalopod species from the West Indian Ocean (eng. V. Dumitrescu and dr. eng. Cornelia Maxim) 1987, and the Guide of the main fish and cephalopod species from the East-central Atlantic Ocean Vol. I. 1989.

SYSTEMATIC INDEX F.A.O. statistical area 37 THE BLACK SEA

Due to its inner position, the Black Sea is an intercontinental sea. As the continental platform goes to a depth of 200 m, it covers a large surface, namely 122,998 sq km; in the neighbourhood of the Romanian shore it is quite high and thus, there develops the greatest number of relict endemic species.

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The management and the supervision of the living resources from the area F.A.O. 37 is directly guided by the General Fisheries for the Mediterranean, an international organism settled on the 24th of September 1949. In 1995, 20 countries, most of them riparian, inclusively Romania were affiliated to this organism. Within the Black Sea, there were signaled families belonging both to the groups of pelagic and demersal fish, the most important of them being: Clupeidae, Carangidae, Scombridae, Squalidae, Serranidae, Mullidae, Sparidae, Acipenseridae, Labridae, Gobiidae, Scophthalmidae, Pleuronectidae, and Soleidae.

Among the pelagic species from the Black Sea the most important ones are: *Sprattus sprattus, Alosa caspia nordmanni, Engraulis encrasicolus, Clupeonella cultriventris, Mugil cephalus, Trachurus mediterraneus ponticus, Atherina boyeri, iar dintre speciile demersale se remarcă: Squalus acanthias, Acipenser stellatus, Acipenser güeldenstaedti, Huso huso, Mullus barbatus ponticus, Merlangius merlangus euxinus, Mesogobius batrachocephalus, Neogobius melanostomus, Psetta maeotica, Platichthys flesus luscus.*

These species display an increased scientific value as many of them appear in the Red Book of the vertebrates from Romania.

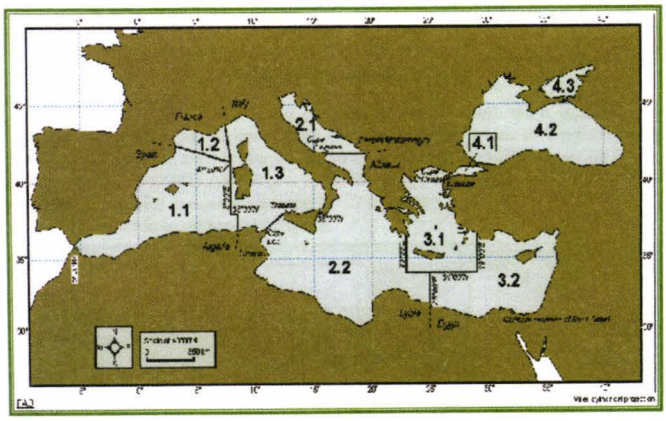

Figure 1. Map F.A.O. statistical area 37 THE BLACK SEA (V. Dumitrescu et all. 1989)
Figura 1. Harta Zona statistică F.A.O. 37 MAREA NEAGRĂ

OSTEICHTHYES Cls. GOODRICH 1909
CLUPEIFORMES Ord. BERG 1940
ENGRAULIDAE Fam. JORDAN et EVERMANN 1896

Engraulis encrasicolus (LINNAEUS, 1758), European anchovy; 5 sm., the Black Sea, inv. no. 53935-53939, V.M., exped. 2004, P.U.

CLUPEIDAE Fam. BERG 1940

Sprattus sprattus (LINNAEUS, 1758); European sprat, 5 sm., the Black Sea, inv. no. 53940-53944, V.M, exped. 2004, P.U.
Alosa caspia nordmanni Antipa, 1906; Danube shad, 2 sm., the Black Sea, inv. no. 53945-53946, V.M, exped. 2005, P.U.
Alosa maeotica maeotica (Grimm, 1901); Black Sea shad, 2 sm., inv. no. 53947-53948, the Black Sea, GHE.R, exped. 2004, P.U.
Clupeonella cultriventris (Nordmann, 1840), Black Sea sprat, 5 sm., inv. no. 53949-53953, the Black Sea, GHE. R, exped. 2004, P.U.

GADIFORMES Ord. BERG 1940
GADIDAE Fam. SVETOVIDOV 1937

Merlangius merlangus euxinus (NORDMANN,1840); whiting, 5 sm., inv. no. 53954 - 53958, the Black Sea, V.M, exped. 2005, P.U.

MUGILIFORMES Ord. BERG 1940
MUGILIDAE Fam. GÜNTHER 1861

Mugil cephalus LINNAEUS, 1758; stripped mullet, 1 sm., inv. no. 53959, the Black Sea, E. A, exped. 2005, P.U
Liza aurata (RISSO,1810); golden grey mullet, 2 sm., inv. no. 53960 – 53961, the Black Sea, GHE.R, exped. 2004, P.U

BELONIFORMES Ord. BERG 1940
BELONIDAE Fam. REGAN 1940

Belone belone euxini (GUNTHER, 1866); garfish, 2 sm., inv. no. 53962 – 53963, the Black Sea, V. M, exped. 2005, P.U.

PERCIFORMES Ord. Bertin et Arambourg 1958
GOBIIDAE Fam. REGAN 1911

Mesogobius batrachocephalus (PALLAS, 1811); flat-head goby, 2 sm., inv. no. 53964 – 53965, the Black Sea, V.M, exped. 2005, P.U

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Neogobius melanostomus (PALLAS, 1811); black spotted goby, 2 sm., inv. no. 53966 – 53967, the Black Sea, GHE.R, exped. 2004, P.U.

MUGILIFORMES Ord. BERG 1940
ATHERINIDAE Fam.GÜNTHER 1859

Atherina boyeri (RISSO, 1810); big-scale sand smelt, 5 sm., inv. no. 53968 - 53972, the Black Sea, GHE.R, exped. 2004, P.U.

PERCIFORMES Ord. BERTIN et ARAMBOURG 1958
MULIDAE Fam. GÜNTHER 1859

Mullus barbatus ponticus (ESSIPOV, 1927); red mullet, 2 sm., inv. no. 53973 – 53974, the Black Sea, V.M, exped. 2005, P.U.

ACIPENSERIFORMES Ord. BERG 1940
ACIPENSERIDAE Fam. BONAPARTE 1832

Acipenser stellatus (Pallas,1771); starry sturgeon, 5 sm., inv. no. 53975 – 53979, the Black Sea, V. M, exped. 2005, P.U.

PERCIFORMES Ord. Bertin et ARAMBOURG 1958
SPARIDAE Fam. Jordan et EVERMANN 1898

Sparus aurata (LINAEUS, 1758); gilt-head bream, 2 sm., inv. no. 53980-53981, the Black Sea, GHE.R, exped. 2004, P.U.
POMATOMIDAE Fam. JORDAN et EVERMANN 1896

Pomatomus saltatrix (LINNAEUS, 1758); bluefish, 2 sm., inv. no. 53982 – 53983, the Black Sea, V. M, exped. 2005, P.U.

CHONDRICHTHYES Cls.
SQUALIFORMES Ord.
SQUALIDAE Fam.

Squalus acanthias (LINNAEUS, 1758); spiny dogfish, 1 sm., inv. no. 53984, the Black Sea, V. M, exped. 2005, P.U.

RAJIFORMES Ord.
DASYATIDAE Fam.

Dasyatis pastinaca (LINNAEUS, 1758); stingray, 1 sm., inv. no. 53985, the Black Sea, V. M, exped. 2005, P.U

PLEURONECTIFORMES Ord. Berg 1940
SOLIDAE Fam. NORMAN 1934

Solea nasuta (Pallas, 1811); snouted sole, 5 sm., inv. no. 53986 – 53990, the Black Sea, GHE.R, exped. 2004, P.U
PLEURONECTIDAE Fam. Norman 1934

Platichthys flesus luscus (PALLAS, 1811); European flounder, 2 sm., inv. no. 53991- 53992, the Black Sea, V. M, exped. 2005, P.U.

BELONIFORMES Ord. BERG 1940
BELONIDAE Fam. REGAN 1940

Parablennius sanguinolentus (PALLAS, 1811); rusty blenny, 2 sm., inv. no. 53993 – 53994, the Black Sea, GHE.R, exped. 2004, P.U

PLEURONECTIFORMES Ord. BERG 1940
BOTHIDAE Fam.NORMAN1934

Psetta maeotica (PALLAS, 1811); Black Sea turbot, 2 sm., inv. no. 53995 – 53996, the Black Sea, V.M, exped. 2005, P.U.

PERCIFORMES Ord. BERTIN et ARAMBOURG 1958
SCORPAENIDAE Fam. JORDAN et EVERMANN 1898

Scorpena porcus (LINNAEUS, 1758); scorpion fish, 2 sm., inv. no. 53997 – 53998, the Black Sea, V. M, exped. 2005, P.U,

SYNGNATHOIDEI Ord. BERG 1940
SYNGNATHIDAE Fam. GÜNTHER 1870

Syngnathus schimidti (POPOV, 1928); pipefish, 2 sm., inv. no. 53999 – 54000, the Black Sea, I.S, exped. 2005, P.U.
Hyppocampus guttulatus microstephanus (Slastenenko, 1937); sea horse, 2 sm., inv. no. 54001 -54002, the Black Sea, I.S, exped. 2005, P.U.

F.A.O. statistical area 34 The Eastern Central Atlantic Ocean – MAURITANIA

This area is the one of the largest oceanic areas and it covers a surface of 3,979,000 sq km. The region is managed by the international organism called Fishery Committee for the Eastern Central Atlantic settled in 1967; this organism supervises all the resources of living organisms of the Atlantic Ocean and 32 countries, among which Romania, joined it. Among the most intense fished species we mention the pelagic ones: *Trachurus trachurus, Tracurus tracae, Decapterus rhonchus, Sardinella aurita, Sardinella maderensis*, while the demersal species hold a small rate: Pagellus, Dentex.

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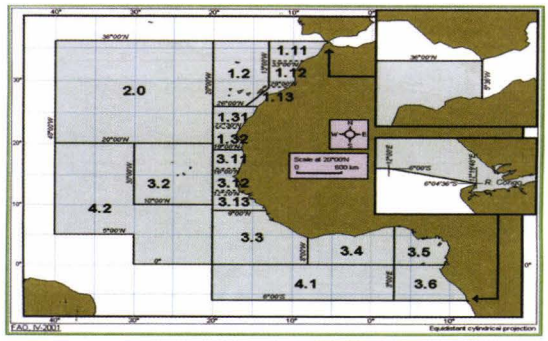

Figure 2. Map F.A.O. statistical area 34 The Eastern Central Atlantic Ocean – MAURITANIA (V. Dumitrescu, et all. 1989)
Figura 2. Harta Zona statistică F.A.O. 34 Oceanul Atlantic est-central – MAURITANIA

ACTINOPTERYGII Cls.
PERCIFORMES Ord.
CARANGIDAE Fam.

Chloroscrombus chrysurus (LINNAEUS,1776); Atlantic bumper, 2 sm., inv. no. 53874 – 53875, the Eastern Central Atlantic Ocean – Mauritania, I.S, exped. 1986, P.U

Decapterus rhonchus (GEOFFROY ST.HILAIRE, 1817); false shad, 2 sm., inv. no. 53876 – 53877, the Eastern Central Atlantic Ocean – Mauritania, V.M, exped. 1988, P.U

Trachurus trecae (CANEDAT, 1949), cunene horse mackerel, 2 sm., inv. no. 53878 – 53879, the Eastern Central Atlantic Ocean – Mauritania, V.M, exped. 1988, P.U

TETRAODONTIFORMES Ord.
MONOCANTHIDAE Fam.

Stephanolepis hispidus (LINNAEUS,1766); planehead filefish, 1 sm., inv. no. 53882, the Eastern Central Atlantic Ocean – Mauritania, I.S, exped. 1986, P.U.

CLUPEIFORMES Ord.
CLUPEIDAE Fam.

Sardinella aurita (VALENCIENNES,1847); round sardinella, 2 sm., inv. no. 53883 – 53884, the Eastern Central Atlantic Ocean – Mauritania, V.M, exped. 1988, P.U.

Sardinella maderensis (LOWE, 1839); Madeiran sardinella, 2 sm., inv. no. 53885 – 53886, the Eastern Central Atlantic Ocean – Mauritania, C.M, exped. 1987, P.U.

CLUPEIFORMES Ord.
PRISTIGASTERIDAE Fam.

Ilisha africana (BLOCH, 1795); West African ilisha, 1 sm., inv. no. 53887, the Eastern Central Atlantic Ocean – Mauritania, V.M, exped. 1988, P.U.

PERCIFORMES Ord.
MULLIDAE Fam.

Mullus barbatus (LINNAEUS,1758); red mullet, 1 sm., inv. no. 53888, the Eastern Central Atlantic Ocean – Mauritania, V.M, exped. 1988, P.U.

POLYNEMIDAE Fam.

Galeoides decadactylus (BLOCH, 1795); lesser African threadfin, 1 sm., inv. no. 53889, the Eastern Central Atlantic Ocean – Mauritania, I.S, exped. 1986, P.U.

Ord. ZEIFORMES
Fam. CAPROIDAE

*Antigonia capros (*LINNAEUS,1758); board fish, 2 sm., inv. no. 53890 – 53891, the Eastern Central Atlantic Ocean – Mauritania, V.M, exped. 1988, P.U.

PERCIFORMES Ord.
HAEMULIDAE Fam.

Brachydeuterus auritus (VALENCIENNES,1833); bigeye grunt, 1 sm., inv. no. 53892, the Eastern Central Atlantic Ocean – Mauritania, V.M, exped. 1988, P.U.

Parapristipoma humile (BOWDICH, 1825); Guinean grunt, 1 sm., inv. no. 53893, the Eastern Central Atlantic Ocean – Mauritania, I.S, exped. 1986, P.U.

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Pomadasys incisus (BOWDICH, 1825); bastard grunt, 2 sm., inv. no. 53894 – 53895 the Eastern Central Atlantic Ocean – Mauritania, V.M, exped. 1989, P.U.
*Dentex macrop*hthalmus (BLOCH, 1791); large eye dentex, 1 sm., inv. no. 53896, the Eastern Central Atlantic Ocean – Mauritania, I.S, exped. 1986, P.U.

SPARIDAE Fam.

Pagellus bellottii (STEINDACHNER, 1882); red pandora, 1 sm., inv. no. 53897, Eastern Central Atlantic Ocean – Mauritania, V.M, exped. 1989, P.U.
Pagellus erythrinus (LINNAEUS, 1758); common pandora, 1 sm., inv. no. 53898, the Eastern Central Atlantic Ocean – Mauritania, V.M, exped. 1989, P.U.

PRIACANTHIDAE Fam.

Priacanthus arenatus (CUVIER, 1829); Atlantic bigeye, 1 sm., inv. no. 53899, the Eastern Central Atlantic Ocean – Mauritania, C.M, exped. 1988, P.U.

TETRAODONTIFORMES Ord.

BALISTIDAE Fam.

Balistes capriscus (GMELIN, 1788); triggerfish, 1 sm., inv. no. 53900, the Eastern Central Atlantic Ocean – Mauritania, C.M, exped. 1988, P.U.

LOPHIIFORMES Ord.

LOPHIIDAE Fam.

Lophius piscatorius (LINNAEUS 1758), anglerfish, 1 sm., inv. no. 53902, the Eastern Central Atlantic Ocean – Mauritania, I.S, exped. 1986, P.U.

SYNGNATHIFORMES Ord.

FISTULARIIDAE Fam.

Fistularia tabacaria (LINNAEUS, 1758); trompetfish, 1 sm., inv. no. 53931, the Eastern Central Atlantic Ocean – Mauritania, V.M, exped. 1989, P.U.

F.A.O. statistical area 51 The Western Indian Ocean – SOMALIA

Covering a surface of 30,198,000 sq km, the region is managed by the organism called the Indian Ocean Fishery Commission, an organization settled in 1967. 42 countries joined the organization; Romania is not a member, but it organized three research expeditions here between 1983 and 1985. The ichthyofauna is quite varied comprising 100 families and 200 species. The most frequent families are: Clupeidae, Scombridae, Carangidae.

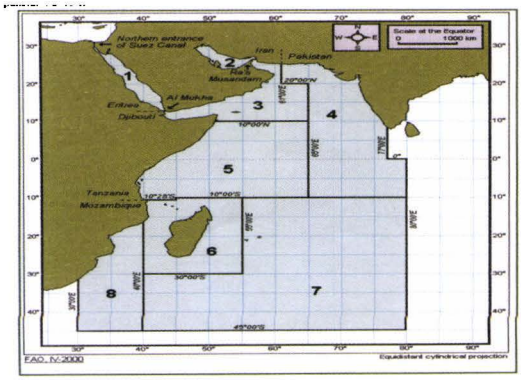

Figure 3. Map F.A.O. statistical area 51 The Western Indian Ocean – SOMALIA (V. DUMITRESCU & CORNELIA MAXIM, 1987)
Figura 3. Harta Zona statistică F.A.O. 51 Oceanul Indian de vest – SOMALIA

ACTINOPTERYGII Class

PERCIFORMES Ord.

SPARIDAE Fam.

Boops boops (LINNAEUS, 1758); bogue, 1 sm., inv. no. 53913, the Western Indian Ocean – Somalia, E.L, exped. 1985, P.U

CLUPEIFORMES Ord.

CLUPEIDAE Fam.

Etrumeus teres (DEKAY, 1842); red-eye round herring, 5 sm., inv. no. 53914 – 53918, the Western Indian Ocean – Somalia, E.L, exped. 1985, P.U

PERCIFORMES Ord.

SCOMBRIDAE Fam.

Rastrellinger kanagurta (CUVIER, 1816); Indian mackerel, 2 sm., inv. no. 53919 – 53920, the Western Indian Ocean – Somalia, V.D, exped. 1984, P.U

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SPHYRANIDAE Fam.

Sphyraena obtusata (CUVIER, 1829); obtuse barracuda, 1 sm., inv. no. 53921, the Western Indian Ocean – Somalia, V.D, exped. 1984, P.U

CARANGIDAE Fam.

Decapterus kiliche (CUVIER & VALENCIENNES, 1833); Indian scad, 1 sm., inv. no. 53922, the Western Indian Ocean – Somalia, E.L, exped. 1985, P.U

Trachurus indicus (NEKRASOV, 1966); horse mackerel, 1 sm., inv. no. 53923, the Western Indian Ocean – Somalia, V.D, exped. 1984, P.U

Decapterul macarellus (CUVIER & VALENCIENNES 1833); mackerel scad, 1 sm., inv. no. 53924, the Western Indian Ocean – Somalia, V.D, exped. 1984, P.U

Alectis indicus (RUPPELL, 1830); Indian threadfish, 1 sm., inv. no. 53880, the Western Indian Ocean – Somalia, V.D, exped. 1984, P.U

CARANGIDAE Fam.

Ulua mentalis (CUVIER, 1833); heavy-jawed kingfish, 1 sm., inv. no. 53881, the Western Indian Ocean – Somalia, V.D, exped. 1984, P.U

MULIDAE Fam.

Parapeneus fraterculus (VALENCIENNES 1833); blacksaddle goatfish, 1 sm., inv. no. 53925, the Western Indian Ocean – Somalia, V.D, exped. 1984, P.U

Upeneus vittatus (LECEPEDE, 1801); yellow-striped goatfish, 1 sm., inv. no. 53926, the Western Indian Ocean – Somalia, V.D, exped. 1984, P.U

Parapeneus rubescens (LACEPEDE, 1801); rosy goatfish, 1 sm., inv. no. 53927, the Western Indian Ocean – Somalia, E.L, exped. 1985, P.U

TETRAODONTIFORMES Ord.

BALISTIDAE Fam.

Abalistes stellaris (BLOCH& SCHNEIDER, 1801); starry triggerfish, 1 sm., inv. no. 53928, the Western Indian Ocean – Somalia, V.D, exped. 1984, P.U

PERCIFORMES Ord.

RACHYCENTRIDAE Fam.

Rachycentron canadum (LINNAEUS, 1758); cobia, 1 sm., inv. no. 53930, the Western Indian Ocean – Somalia, V.D, exped. 1984, P.U

CLUPEIFORMES Ord.

ENGRAULIDAE Fam.

Stolephorus indicus (VAN HASSELT, 1833); Indian anchovy, 1 sm., inv. no. 53923, the Western Indian Ocean – Somalia, V.D, exped. 1984, P.U

PERCIFORMES Ord.

CHAETODONTIDAE Fam.

Chaetodon kleinii (BLOCH); Klein's butterfly fish, 1 sm., inv. no. 53933, the Western Indian Ocean – Somalia, V.D, exped. 1984, P.U

F.A.O. statistical area 47 The South-east Atlantic Ocean – NAMIBIA

Covering a surface of 12,298,000 sq km, this area is managed by the international organism called the International Commission for the South-east Atlantic, organism settled in 1969; 17 countries joined the organization, including Romania in 1977.

The area in question is rich in families and species, the most important families being: Carangidae, Merluccidae, Scombridae, Clupeidae.

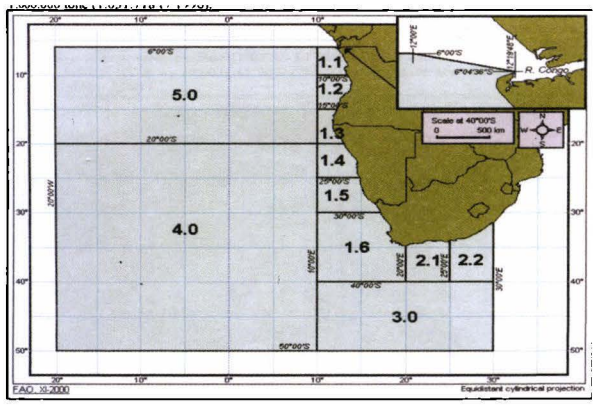

Figure 4. Map F.A.O. statistical area 47 The South-east Atlantic Ocean – NAMIBIA (V. Dumitrescu et al, 1989)
Figura 4. Harta Zona statistică F.A.O. 47 Oceanul Atlantic de sud-est – NAMIBIA

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ACTINOPTERYGII Cls.
PERCIFORMES Ord.
CARANGIDAE Fam.

Trachurus trachurus capensis (CASTELNAU, 1861); cape horse mackerel, 1 sm., inv. no. 53901, the South-east Atlantic Ocean – Namibia, N.P, exped. 1988, P.U

SPARIDAE Fam.

Dentex macrophthalmus (Bloch, 1791); large-eye dentex, 1 sm., inv. no. 53896, the South-east Atlantic Ocean – Namibia, E.L, exped. 1987, P.U

Ord. GADIFORMES
Fam. MERLUCCIDAE

Merluccius merluccius capensis (CASTELNAU, 1861); cape hake, 1 ex, nr.inv. 53904, the South-east Atlantic Ocean – Namibia, N.P, exped. 1988, P.U

ALBULIFORMES Ord.
ALBULIDAE Fam.

Albula vulpes (LINNAEUS, 1758); bonefish, 1 sm., inv. no. 53905, the South-east Atlantic Ocean – Namibia, N.P, exped. 1988, P.U

TETRODONTIFORMES Ord.
BALISTIDAE Fam.

Balistes vetula (Linnaeus 1758); queen triggerfish, 1 sm., inv. no. 53929, the South-east Atlantic Ocean – Namibia, E.L, exped. 1987, P.U

CHONDRICHTHYES Cls.
CHIMAERIFORMES Ord.
RHINOCHIMAERIDAE Fam.

Harriotta raleighana (GOODE et BEAN, 1895); narrownose chimaera, 1 sm., inv. no. 53906, the South-east Atlantic Ocean – Namibia, N.P, exped. 1988, P.U

ACTINOPTERYGII Cls.
SCORPAENIFORMES Ord.
TRIGLIDAE Fam.

Trigla lyra (LINNAEUS, 1758); piper gurnard, 1 sm., inv. no. 53907, the South-east Atlantic Ocean – Namibia, N.P, exped. 1988, P.U

CHONDRICHTHYES Cls.
SQUALIFORMES Ord. Compagno,1973
SQUALIDAE Fam.Blainville, 1816

Squalus acanthias (LINNAEUS, 1758); spiny dogfish, 1 sm., inv. no. 53908, the South-east Atlantic Ocean – Namibia, D.Z, exped. 1986, P.U

PLEURONECTIFORMES Ord.
SOLIDAE Fam.

Austroglossus microlepsis (BLEEKER,1833); sole, 1 sm., inv. no. 53909, the South-east Atlantic Ocean – Namibia, N.P, exped. 1988, P.U

ACTINOPTERYGII Cls.
ANGUILLIFORMES Ord.
OPHICHTHINAE Fam.

Ophisurus serpens (LINNAEUS, 1758); serpent eel; 1 sm., inv. no. 53910, the South-east Atlantic Ocean – Namibia, N.P, exped. 1988, P.U

CHONDRICHTHYES Cls.
RAJIFORMES Ord.
RAIDAE Fam. BLAINVILLE, 1816

Raja doutrei (CADENAT, 1960); violet skate, 1 sm., inv. no. 53911, the South-east Atlantic Ocean – Namibia, N.P, exped. 1988, P.U

SCORPAENIFORMES Ord.
BEMBRIDAE Fam.

Bembros greri (POLL, 1959); bembros, 1 sm., inv. no. 53912, the South-east Atlantic Ocean – Namibia, E.L, exped. 1987, P.U

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ACTINOPTERYGII Cls. KLEIN, 1885
PERCIFORMES Ord.
ECHENEIDAE Fam.

Remora remora (LINNAEUS, 1758); remora, 1 sm., inv. no. 53934, the South-east Atlantic Ocean – Namibia, E.L, exped. 1987, P.U

RESULTS AND DISCUSSIONS

The necessity of achieving such a catalogue is obvious if we take into account that this collection is closed; at the same time, it is quite necessary to present these scientifically important collections from the patrimony of the Nature Sciences Section of the Oltenia Museum Craiova. By publishing this catalogue, it is possible to widen our knowledge about certain species' distribution area.

The 129 curios, namely 74 species are grouped on the 4 F.A.O. statistical fishing areas: F.A.O. 37 The Black Sea, F.A.O. 34 The Eastern Central Atlantic Ocean – Mauritania, the statistical area F.A.O. 51 The Western Indian Ocean – Somalia, the statistical area F.A.O. 47 The South-east Atlantic Ocean – Namibia; the species were collected during certain expeditions made by the experts from NISRD Grigore Antipa in 1984,1985, 1986, 1987, 1988, 1989, 2004, 2005.

17 orders appear in the catalogue: Acipenseriformes, Albuliformes, Anguilliformes, Beloniformes, Clupeiformes, Chimaeriformes, Gadiformes, Lophiiformes, Mugiliformes, Perciformes, Pleuronectiformes, Rajiformes, Scorpaeniformes, Syngnathiformes, Squaliformes, Tetraodontiformes, Zeiformes and 41 families.

This catalogue is very important from the scientific point of view, as it presents exotic and rare species from the ichthyology collection of the museum.

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THE AVIFAUNA OF THE ALPINE AND SUBALPINE ZONES FROM IEZER-PĂPUŞA MASSIFBETWEEN THE 20-TH OF JULY AND 8-TH OF SEPTEMBER 2007

ADRIAN MESTECĂNEANU

Abstract. Between the 20-th of July and the 8-th of September 2007, a team from the Argeş County Museum and Piteşti University catalogued the species and habitats of communitarian interest from Iezer-Păpuşa Massif, in concordance to the foresight of the Habitat Directive and Birds Directive in order to propose the alpine and subalpine zone of this massif as a future Nature 2000 site. The researches took place in the alpine and subalpine of the Iezerul Mare, Păpuşa and Bătrâna Peaks. The climate is temperate Central-European, having the features of a climate of the mountain zones. All the studied peaks have all the floors of vegetation, the only exception being represented by Păpuşa Peak, which does not have the subalpine floor. In the alpine and subalpine floor from Iezer-Păpuşa Massif, 33 species of birds were identified that belong to 4 orders. In accordance with the index of similarity, there is a medium similarity of the three studied zones: 28 species were seen on Iezer, 21 species on Bătrâna and 8 species on Păpuşa. Remarkable is the presence of some species like *Aquila chrysaetos* and *Charadrius morinellus. Circus aeruginosus, Falco subbuteo* and *Merops apiaster* were in passage. According to frequency, the most common species are: *Anthus spinoletta, Corvus corax* and *Loxia curvirostra. Falco* tinnunculus, *Prunella collaris* and *Carduelis cannabina* are certainly breeding and *Charadrius morinellus*, *Turdus torquatus* and *Oenanthe oenanthe* are probably breeding.

Key words: Birds Directive, Iezer-Păpuşa Massif

Rezumat. Avifauna alpinului şi subalpinului din Masivul Iezer-Păpuşa, în perioada 20 iulie – 8 septembrie 2007. În perioada 20 iulie – 8 septembrie 2007, o echipă de specialişti de la Muzeul Judeţean Argeş şi de la Universitatea din Piteşti, a realizat inventarierea speciilor şi habitatelor de interes comunitar din Masivul Iezer-Păpuşa, în concordanţă cu prevederile Directivei Habitate şi Directivei Păsări, în vederea propunerii alpinului şi subalpinului din acest masiv ca viitor sit Natura 2000. Au fost cercetate vârfurile Iezerul Mare, Păpuşa şi Bătrâna. Clima acestora este temperat central-europeană, cu trăsăturile unui climat de munte iar flora prezintă toate etajele de vegetaţie, cu excepţia vârfului Păpuşa, lipsit de etajul subalpin. În urma observaţiilor efectuate în alpin şi subalpin, s-au identificat 33 de specii de păsări care aparţin la 4 ordine. Conform indicelui de similaritate specifică, asemănarea dintre cele trei vârfuri este medie, 28 de specii fiind văzute pe Vf. Iezer, 21 pe Vf. Bătrâna şi 8 pe Vf. Păpuşa. De remarcat este prezenţa acvilei de munte (*Aquila chrysaetos*) şi a prundăraşului de munte (*Charadrius morinellus*) iar, în migraţie, a eretelui de trestie (*Circus aeruginosus*), şoimului rândunelelor (*Falco subbuteo*) şi prigoriei (*Merops apiaster*). Cele mai frecvente specii în observaţii sunt: *Anthus spinoletta, Corvus corax* şi *Loxia curvirostra. Falco tinnunculus, Prunella collaris* şi *Carduelis cannabina* sunt sigur cuibăritoare iar *Charadrius morinellus*, *Turdus torquatus* şi *Oenanthe oenanthe* sunt probabil cuibăritoare.

Cuvinte cheie:Directiva Păsări, Masivul Iezer-Păpuşa

INTRODUCTION

Between the 20-th of July and the 8-th of September 2007, within the Project Life05Nat/Ro/000176 "Alpine, Subalpine and Forestry Habitat from Romania", in collaboration with WWF Danube Carpathians Program, a team whose members are Valeriu Alexiu (coordinator), Nicolae Lotrean, Cristina Constantinescu and Adrian Mestecăneanu from the Argeş County Museum and Monica Neblea from Piteşti University catalogued the species and habitats of communitarian interest from Iezer-Păpuşa Massif, in concordance to the foresight of the Habitat Directive and Birds Directive in order to propose the alpine and subalpine zone of this massif as a future Nature 2000 site.

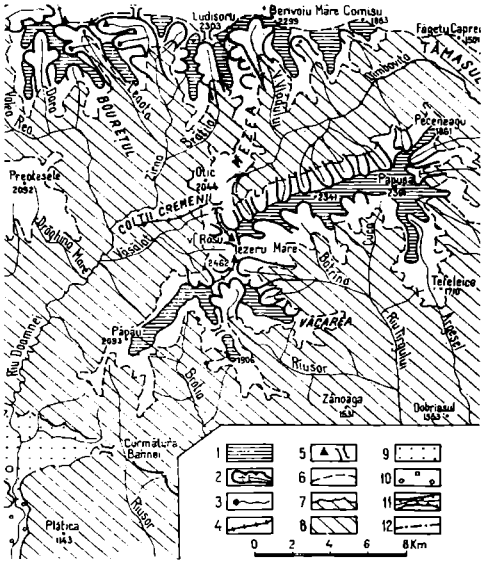

Figure 1. The map of the Iezer-Păpuşa Massif Harta Masivului Iezer-Păpuşa: 1 – surfaces of smoothing of over 2000 m; 2 – glacial circus, valleys and threshold; 3 – lakes situated in punchbowls having glacial origin; 4 – sharpened ridges and indenteds; 5 – pyramidal peaks, saddle; 6 – rounded peaks; 7 – the alpine and subalpine zones; 8 – forestry zones; 9 – intramontane depression; 10 – sub – Carpathians depressions; 11 – gorges; 12 – the border of Argeş County.

MATERIAL AND METHODS

The researches took place in the alpine and subalpine of the Iezerul Mare, Păpuşa and Bătrâna Peaks.

Placed between Făgăraş Mountains (West and North-West) and Piatra Craiului and Leaota Mountains (East and South-East), the Iezer-Păpuşa Massif (400 km^2) belongs to the medium surface massifs from Romanian Carpathians. Its highest peak is Vârful Roşu (2469 m); then as it follows: Iezerul Mare (2461 m), Păpuşa (2391 m) and Bătrâna (2345 m). Geologically, the Iezer-Păpuşa Massif is made of crystalline rocks, the most of the ridge belonging to Cumpăna series and the most of the secondary ridges being carved in the crystalline of the Leaota series. There is a clear contrast between the Northern and Western slopes and the Southern and Eastern ones. The first have steep walls with big sediments of detritus and the second ones have wide and leisurely slopes. In the high zones there is a typical glacial relief. The glacial Lake Iezer is situated in the glacial hollow situated at the foot of Iezerul Mare Peak. The Iezer Lake is the only glacial lake from Iezer-Păpuşa Massif. Most of the Rivers Doamnei and Dâmboviţa tributaries originated in the massif. They represent a rich hydrographic web (Fig. 1).

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The climate is temperate Central-European, having the features of a climate of the mountain zones and thermodynamics perturbation provoked by relief. The annual average temperatures vary from 6°C at the feet of the mountain to negative values on the peaks. The isotherm is 0 °C at 1950 m, suitable to the maximum limit of the arborescet vegetation. The average value of the rainfall is 800 mm at low altitude and 1400 mm at high altitude (BARCO & NEDELCU, 1974).

Regarding the vegetation, I must say that the mountain floor is best represented. It is situated between 600 (500) m and 1600 (1700) m, and it is formed of pure beech brush or mix deciduous in the lower zone and pure spruce fir brush in the higher zone. The next floor is the subalpine floor which consists of rare individuals of Spruce Fir and Arolla Pine and especially of the grove of Juniper tree. Over 2200 m shrubbery, alpine pastures and association of rocks formed the alpine floor. All the studied peaks have all these floors of vegetation, the only exception being represented by Păpuşa Peak, which does not have the subalpine floor (ALEXIU V., 1998).

RESULTS AND DISCUTIONS

The researches effected between 20-th of July and the 8-th of September in the accentor floor, which correspond to alpine and subalpine floor from Iezer-Păpuşa Massif, 33 species of birds were identified. They belong to 4 orders: **Falconiformes**, with 2 families: Accipitridae (5 species) and Falconidae (2 species), **Charadriiformes**, with a families: Charadriidae (1 species), **Coraciiformes**, with a families: Meropidae (1 species) and **Passeriformes** with 9 families: Hirundinidae (2 species), Motacillidae (3 species), Corvidae (2 species), Troglodytidae (1 species), Prunellidae (2 species), Sylviidae (3 species), Turdidae (5 species), Paridae (1 species) and Fringillidae (5 species). Remarkable is the presence of 3 individuals of Golden Eagle (*Aquila chrysaetos*) (LINNAEUS), 1758, seen above Păpuşa Peak, and one Dotterel (*Charadrius morinellus*) LINNAEUS, 1758, observed in the zone of Iezer Lake. 5 species were seen in migration: one male of Marsh Harrier (*Circus aeruginosus*) (LINNAEUS), 1758, flying toward South-South-West, along Tambura-Frăcea ridge and avoiding Bătrâna Peak, one individual of Hobby (*Falco subbuteo*) LINNAEUS, 1758, seen in Grădişteanu-Păpuşa zone, 40 individuals of European Bee-eater (*Merops apiaster*) LINNAEUS, 1758, seen a low high while they went toward South-West above the grassland Plaiul lui Pătru, a few individuals of Barn Swallow (*Hirundo rustica*) LINNAEUS, 1758, and some dozens of House Martin (*Delichon urbica*) (LINNAEUS), 1758.

Among the observed species, 28 species were seen on Iezer, 21 species on Bătrâna and 8 species on Păpuşa (Table 1). In order to determine the degree of similitude of the three zones, I used the index of specific similarity: Ss = (2***c****100)/(**a**+**b**) in which c is the number of the species belonging to both zones and a and b the total number of species identified on the compared surfaces. The value of the index represents: 0% - total difference, under 25% - low similarity, between 25,1% and 75% medium similarity, over 75,1% - high similarity and 100% total similarity. The conclusion is that the similarity between Bătrâna Mountain and Iezer Mountain (which are one next to another and the floors of vegetation are similar) and an index close to a low similarity is noticed between Păpuşa Mountain and Iezer Mountain (distant in space and having different floors of vegetation) (Table 2). Considering their habitats, 22 species on Iezer, 17 species on Bătrâna and no species on Păpuşa (because here the Juniper tree floor does not exist) were identified in the grove of Juniper trees and 17 species on Iezer, 12 species on Bătrâna and 8 species on Păpuşa were identified in the alpine pasture. Globally, 24 species were identified in the grove of Juniper trees and 25 species in the alpine pasture, specifying that 7 species (*Buteo buteo* (LINNAEUS), 1758, *Accipiter gentiles* (LINNAEUS), 1758, *Accipiter nisus* (LINNAEUS), 1758, *Falco tinnunculus* LINNAEUS, 1758, *Hirundo rustica, Delichon urbica* and *Corvus corax* LINNAEUS, 1758) have been observed upon the wing in the Juniper tree floor. 13 such species have been observed in the alpine pastures floor (*Aquila chrysaetos, Buteo buteo, Circus aeruginosus, Falco tinnunculus, Falco subbuteo, Merops apiaster, Hirundo rustica, Delichon urbica, Nucifraga caryocatactes* (LINNAEUS), 1758, *Phylloscopus collybita* (VIEILLOT), 1817, *Loxia curvirostra* LINNAEUS, 1758, *Carduelis spinus* (LINNAEUS), 1758 and *Pyrrhula pyrrhula* (LINNAEUS), 1758).

Aquila chrysaetos, *Charadrius morinellus*, *Anthus spinoletta* (LINNAEUS), 1758 and *Prunella collaris* (SCOPOLI), 1769 are the characteristic species for the alpine pastures floor (the floor of the Juniper tree has not got its own forms). Here forestry species get into: *Buteo buteo, Accipiter gentilis, Accipiter nisus, Nucifraga caryocatactes, Prunella modularis* (LINNAEUS), 1758, *Phylloscopus collybita, Turdus torquatus* LINNAEUS, 1758, *Fringilla coelebs* LINNAEUS, 1758, *Loxia curvirostra, Carduelis spinus, Pyrrhula pyrrhula, Troglodytees troglodytes* (LINNAEUS), 1758, *Sylvia curruca* (LINNAEUS), 1758, *Regulus regulus* (LINNAEUS), 1758, *Erithacus rubecula* (LINNAEUS), 1758 and *Parus ater* LINNAEUS, 1758 . In the Juniper tree floor a vertical rancing in tiers of the species of birds exists. Such species as: *Erithacus rubecula, Parus ater* or *Regulus regulus* are met at the skirt of the forest; other species such as *Prunella modularis* and *Phylloscopus collybita* are widely spread; and species like *Anthus spinoletta* and *Phoenicurus ochruros* (GMELIN, S.G.), 1774 are met in the area of interfering with the alpine pasture or the rocks. Species like *Charadrius morinellus*, *Motacilla cinerea* TUNSTALL, 1771 and *Motacilla alba* LINNAEUS, 1758 prefer the water vicinity and species like *Aquila chrysaetos* and *Falco tinnunculus* prefer the rocky walls and the pastures and species like *Anthus spinoletta* and *Carduelis cannabina* (LINNAEUS), 1758 prefer the pastures. *Prunella collaris, Phoenicurus ochruros* and *Oenanthe oenanthe* (LINNAEUS), 1758 prefer the debris and the rocks. A series of birds travels every day from the inferior to the superior floors for feeding themselves: *Buteo buteo, Accipiter gentilis, Accipiter nisus, Corvus corax, Turdus viscivorus* LINNAEUS, 1758, *Loxia curvirostra* etc.

In accordance with the frequency: 10 species (30,30%) are very rare, 12 species (36,36%) are rare, 6 species (9,09%) are relatively rare, 2 species (6,06%) are relatively common and 3 species (9,09%) are common (Table 1), (Fig.

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2). The very rare species appear in less than 10% of the effected observations, the rare species in 10,1 – 30% of the effected observations, relatively rare species in 30,1 – 50% of the effected observations, relatively common species in 50,1 – 70% of the effected observations and common species in 70,1 – 100% of the observations.

In accordance with their breeding, 13 species (39,39%) are not breeding, 10 species (30,30%) are probably breeding and 10 species (30,30% are certainly breeding (Table 1), (Fig. 3).

According to the ornithological floor occupied during breeding, were they are mostly spread, 5 species (15,15%) belonging to Accentor Floor, 17 species (51,52%) belonging to Tetraonid Floor, 4 species (12,12%) belonging to Columbid Floor, 2 species (6,06%) are ubiquitarian species, 4 species (12,12%) are interzonal species and one species (3,03%) belongs to Great Bustard Floor (Table 1), (Fig. 4).

According to the Birds Directive, I identified 3 species belonging to Annex I (*Aquila chrysaetos, Circus aeruginosus,* şi *Charadrius morinellus*). Special safety measures of protection regarding the habitat in order to ensure the surviving and the reproduction of those species in their area of distribution had been provided. One species (*Turdus viscivorus*) belongs to the Annex II/2 and it could be hunted only in the States of the E. U. for which it is mentioned (Table 1).

According to the biogeographically origins, 13 species (39,39%) are European – E, 11 species (33,33%) are Transpalearctic – Tp, 3 species (9,09%) are Siberian – S, 2 species (6,06%) are Mongolian – Mo, 2 species (6,06%) are Tibetan –Ti, 1 species (3,03%) is Arctic – A and 1 species (3,03%) is Mediterranean – M (Table 1), (Fig. 5).

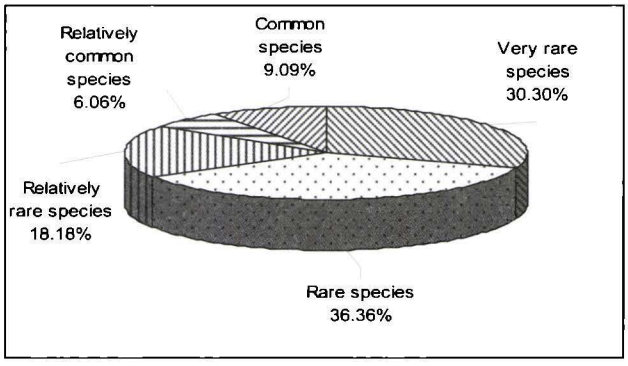

Figure 2. The frequency of the species of birds
Figura 2. Frecvenţa speciilor de păsări

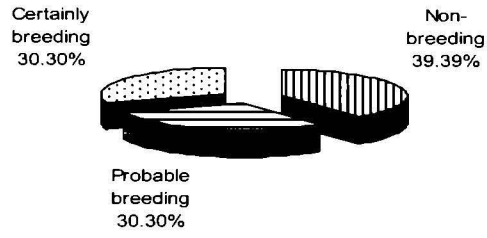

Figure 3. The distribution of the species by breeding
Figura 3. Distribuţia speciilor după cuibărire

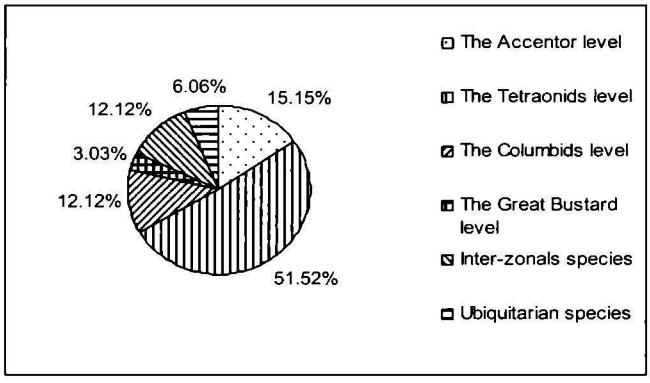

Figure 4. The distribution of the species in accordance with the ornithological floors during breeding
Figura 4. Distribuţia speciilor după etajele ornitologice din timpul cuibăririi

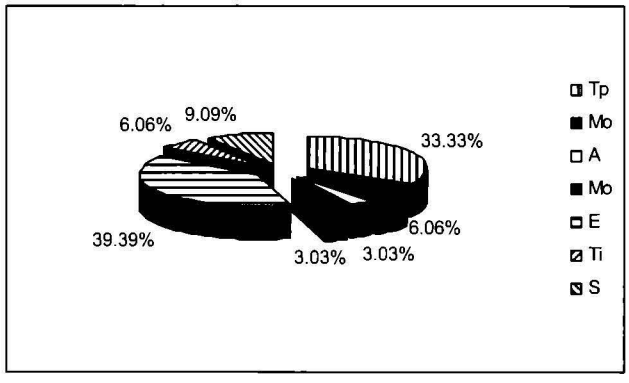

Figure 5. The distribution of the species according to the biogeographically origin
Figura 5. Distribuţia speciilor după originea biogeografică

CONCLUSIONS

33 species of birds have been identified in the alpine and subalpine zones of the Iezer-Păpuşa Massif between the 20-th of July and the 8-th of September 2007.

It was ascertained the presence of some species like *Aquila chrysaetos* which probably came from the Făgăraş Mountain and *Charadrius morinellus* probably hatching in the vicinity of Iezer Lake and *Circus aeruginosus*, *Falco subbuteo* and *Merops apiaster* which were in passage.

In accordance with the index of similarity, there is a medium similarity of the three studied zones, the most similar being Bătrâna Mountain and Iezer Mountain (neighboring and having similar vegetation floors).

According to frequency, the most common species are: *Anthus spinoletta, Corvus corax* and *Loxia curvirostra* and the rarest are: *Aquila chrysaetos, Charadrius morinellus* şi *Prunella collaris.*

Among the breeding species in the alpine and subalpine zone of the Iezer-Păpuşa Massif, *Falco tinnunculus, Prunella collaris* and *Carduelis cannabina* are certainly breeding and *Charadrius morinellus, Turdus torquatus* and *Oenanthe oenanthe* are probably breeding.

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As a result of the studies done in the zone, I hope that the alpine and subalpine zones of the Iezer-Păpuşa Massif to be declared Nature 2000 sites.

Table 1. The bird species observed during 20-th July – 8-th September in the Iezer- Păpuşa Massif
Tabel 1. Speciile de păsări observate în perioada 20 iulie – 8 septembrie în Masivul Iezer-Păpuşa

No.	Species	Presence			Frequency	Breeding	Ornithological floor during breeding	Bird Diorective	Biogeographically origin	Observations
		Iezer	Bătrâna	Păpuşa						
1	*Aquila chrysaetos*			p	Fr	Nc	B	AI	Tp	3ex., 2 August, Păpuşa Peak
2	*Buteo buteo*	j	j, p		R	Nc	T	-	Tp	
3	*Accipiter gentilis*	j	j		R	Nc	C	-	Tp	
4	*Accipiter nisus*	j			Fr	Nc	T	-	Tp	
5	*Circus aeruginosus*		p		Fr	Nc	D	AI	Mo	1 ex., 8 September, Bătrâna Peak
6	*Falco tinnunculus*	j, p	j	p	Rr	Sc	I	-	Tp	
7	*Falco subbuteo*			p	Fr	Nc	C	-	Tp	1 ex., 2 August, Păpuşa Peak
8	*Charadrius morinellus*	p			Fr	Pc	B	AI	A	1 ex., 20 July, Iezer Lake
9	*Merops apiaster*		p		Fr	Nc	C	-	M	40 ex., 8 September, Bătrâna Peak
10	*Hirundo rustica*		j,p	p	R	Nc	I	-	Tp	
11	*Delichon urbica*	j, p	j, p	p	Rr	Nc	I	-	Tp	
12	*Motacilla cinerea*	j, p			R	Sc	T	-	E	2 juv., 28 July, Iezer Lake
13	*Motacilla alba*	p			Fr	Pc	U	-	E	
14	*Anthus spinoletta*	j, p	j, p	p	C	Sc	B	-	Ti	
15	*Corvus corax*	j, p	j, p	p	C	Nc	T	-	Tp	
16	*Nucifraga caryocatactes*	j	p		R	Nc	T	-	S	
17	*Troglodytees troglodytes*	j	j		R	Pc	T	-	E	
18	*Prunella modularis*	j, p	j		Rc	Sc	T	-	E	
19	*Prunella collaris*	p			Fr	Sc	B	-	Ti	3 juv., 28 July, Iezer Lake
20	*Phylloscopus collybita*	j	j, p		Rr	Sc	T	-	Tp	
21	*Sylvia curruca*	j	j		R	Pc	T	-	E	
22	*Regulus regulus*	j			Fr	Pc	T	-	E	
23	*Erithacus rubecula*	j	j		Rr	Sc	T	-	E	
24	*Turdus torquatus*	j, p			R	Pc	T	-	E	
25	*Turdus viscivorus*	p			R	Nc	T	AII/2	E	
26	*Phoenicurus ochruros*	j,p	j		Rc	Sc	B	-	Mo	
27	*Oenanthe oenanthe*	p	p	p	R	Pc	I	-	Tp	
28	*Parus ater*	j	j		Rr	Pc	T	-	E	
29	*Fringilla coelebs*	j	j, p		R	Pc	U	-	E	
30	*Loxia curvirostra*	j, p	j, p		C	Pc	T	-	S	
31	*Carduelis spinus*	j, p			R	Pc	T	-	E	
32	*Carduelis cannabina*	p			Fr	Sc	C	-	E	3 juv., 18 September, Iezer Lake
33	*Pyrrhula pyrrhula*	j, p	j		Rr	Nc	T	-	S	
	Total species	28	21	8						
	The Juniper tree floor species	22	17	-						
	The alpine pasture species	17	12	8						

Legend:
j - Juniper tree floor, p – alpine pasture; Fr – very rare species, R – rare species, Rr – relatively rare species, Rc – relatively common species, C – common species; Nc – non breeding species, Pc – probable breeding species, Sc – certainly breeding species; B – Accentor Floor, T – Tetraonid Floor, Columbid Floor, D – Great Bustard Floor, I – inter-zonal species, U – ubiquitarian species; Tp – Transpalearctic species, Mo – Mongolian species, A – Arctic species, M – Mediterranean species, E – European species, Ti – Tibetan species, S – Siberian species.

Table 2. The values of the index of similarity specific for the three studied surfaces.
Valorile indicelui de similaritate specifică pentru cele trei suprafeţe studiate

Location	Iezer Mountain	Bătrâna Mountain	Păpuşa Mountain
Iezer Mountain	-	73,46	27,77
Bătrâna Mountain	(18 sp.)	-	41,37
Păpuşa Mountain	(5 sp.)	(6 sp.)	-

Legend: () – species which are common for the two compared habitats.

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RESULTS REGARDING THE WINTER MONITORING OF THE BIRDS SPECIES WITHIN THE WETLAND BISTRET – CARNA (DOLJ)

MIRELA SABINA RIDICHE

Abstract. The paper briefly renders the results of the quantitative evaluation of the species of birds that stationed within the wetland Bistreţ – Cârna in the month of January between 2003 and 2007. The results of the research are reported to the meteorological conditions, which influenced the state of the biotopes, respectively the presence or the absence of the birds. The data of these local censuses correlated with the national and international ones allow us to draw certain conclusions regarding the tendencies of the studied populations (increase, decrease or stability tendencies) at a global level, as well as the determination of certain areas with high avifaunal importance, the purpose of which is the preservation of the species of great community interest.

Key words: winter monitoring, birds, wetland Bistret

Rezumat. Rezultate privind monitoringul de iarnă al speciilor de păsări din zona umedă Bistreţ – Cârna (Dolj). Lucrarea prezintă sintetic rezultatele evaluării cantitative a speciilor de păsări care au staţionat în zona umedă Bistreţ – Cârna, în luna ianuarie a anilor 2003 – 2007. Rezultatele cercetărilor sunt raportate la condiţiile meteo, care au influenţat starea biotopurilor, respectiv prezenţa sau absenteismul păsărilor. Datele acestor recensamânturi locale, coroborate cu cele din plan naţional şi respectiv internaţional, permit unele concluzii privind tendinţele populaţiilor studiate (de creştere, de scădere sau stabilitate) la nivel global, precum şi desemnarea unor arii de importanţă avifaunistică cu scopul conservării speciilor de interes comunitar.

Cuvinte cheie: monitoring de iarna, păsări, zona umedă Bistreţ

INTRODUCTION

The annual census of the aquatic birds is an important action; there are involved numerous European countries, as well as countries from other continents and the census takes place in January according to an international program coordinated by Wetlands International, the headquarters of which is in Wageningen (Netherlands). It centralizes and interprets the data supplied by all the participant countries.

The practical utility of this regular action of birds' effectives evaluation within the wintering places is to establish the tendencies of the investigated populations (the diminution, increase or stability tendency), on the basis of which there are taken decisions with regard to the hunting quotas or, on the contrary, there are imposed protective legislative measures (MUNTEANU, 2005).

At the same time, on the basis of the quantitative and qualitative values determined in different wetlands, it is established the avifaunal importance of the studied areas and promoting certain measures able to preserve the habitats becomes compulsory.

Beginning with 1997, our attention focused on the avifauna of the ecosystems from Bistreţ – Cârna (Dolj County). Located within the Danube alluvial plain, at about 5 km north of the river, the lake Bistreţ – Cârna is an objective easy to spot, which displays a great scientific and economic interest. It is fitted out for intensive piscicultural exploitation and it is supplied by the Desnăţui River in the North; thus, the lake represented a permanent attraction point for the aquatic birds, especially for the migratory and/or partially migratory birds.

MATERIAL AND WORKING METHOD

The paper presents a synthesis of the direct ornithological research made by mid January in the area of the piscicultural basins from Bistreţ – Cârna and in their neighbourhood.

We used the binoculars 10 x. for observations, while for the identification process we consulted the guide for determining bird species (BERTEL BRUUN et al., 1999).

Although our research started in 1997 (RIDICHE, 2000, 2004, RIDICHE et al., 2006), in the present study, there were interpreted only the observations made between 2003 and 2007, as starting with this date we constantly participated in the Winter census of the aquatic birds coordinated by the Romanian Ornithological Society at a national level.

For choosing the observation spots, there were taken into account the conditions of each basin of the lake; consequently, we appreciate that the identified species, as well as the estimated number of birds are somehow numerically under-evaluated as the analysed territory was not entirely covered.

During the research, there were also taken into account the meteorological conditions and the state of the biotopes, which influenced the presence or the absence of the birds.

RESULTS AND DISCUSSIONS

According to Table 1, the ornithological research that took place in the month of January of the last five years led us to the identification of a total umber of 37 species, 19 of them aquatic species (Pelecaniformes Order - 2 species,

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Ciconiiformes Order – 3 species, Anseriformes Order – 6 species, Gruiformes Order – 2 species, Charadriiformes Order – 7 species) and 18 non-aquatic (Falconiformes Order – 4 species, Galliformes Order – 1 species, Piciformes Order – 1 species, Passeriformes Order – 12 species).

Table 1. Quantitative and Qualitative List of the Birds under Observation at Census of the Winter 2003 - 2004
Tabel 1. Lista calitativă şi cantitativă a păsărilor observate la recensamantul de iarnă 2003-2007

	Species	Jan. 15th 2003	Jan. 15th 2004	Jan. 17th 2005	Jan. 17th 2006	Jan. 18th 2007
1	*Phalacrocorax carbo sinensis* (BLUMENBACH)				10-15	+ 30
2	*Phalacrocorax pygmeus* (PALL.)			3	7-9	5-8
3	*Egretta g. garzetta* (L.)					1
4	*Egretta a. alba* (L.)			3	2	1
5	*Ardea c. cinerea* (L.)	1 yung	2 (1 ad.+1 yung)	2		27
6	*Anser a. albifrons* (SCOP.)			11		
7	*Anser erythropus* (L.)					
-	*Anser sp.*			12 – 14		5
8	*Tadorna tadorna* (L.)			1	10	
-	*Anas sp.*		7			
9	*Anas c. crecca* (L.)			about 200		+ 800
10	*Anas p. plathyrhynchos* (L.)			120-150		+ 250
11	*Mergus m. merganser* (L.)			70 -80		
12	*Accipiter n. nisus* (L.)		1			
13	*Buteo b. buteo* (L.)			1		
14	*Buteo l. lagopus* (PONT.)		1			
15	*Falco t. tinnunculus* (L.)	1				
16	*Perdix p. perdix* (L.)	10				
17	*Rallus aquaticus* (L.)	2				
18	*Fulica a. atra* (L.)				5	+12
19	*Calidris sp.*			7-8		
20	*Limosa l. limosa* (L.)					80
21	*Numenius a. arquata* (L.)			100	12	
22	*Larus r. ridibundus* (L.)			+ 50	8	60-70
23	*Larus canus* (L.)			9-12		
24	*Larus argentatus cachinnans* (PALL.)			7		
25	*Dendrocopos major pinetorum* (CH. L. BREHM)		1			
26	*Galerida c. cristata* (L.)	+ 20 in	8	20-30	1	
27	*Phoenicurus o.*				1	
28	*Pica p. pica* (L.)	12	6		12-15	
29	*Corvus monedula soemmeringii* (FISCH.)		30			
30	*Corvus f. frugilegus* (L.)	4	12			
31	*Corvus corone cornix* (L.)	8	2			
32	*Passer d. domesticus* (L.)		20			
33	*Passer m. montanus* (L.)		20-30		+18	
34	*Fringilla c. coelebs* (L.)				1	
35	*Emberiza c. citrinella* (L.)	50-70 in	12-15			
36	*Emberiza hortulana* (L.)					
37	*Emberiza schoeniclus* (L.)		7-9 in	2		
	TOTAL	**+132 in.**	**+ 144 in.**	**+ 630 in.**	**+ 100**	**+ 1300**

Legend: in. – individ

Taking into account the climatic conditions that were different from one year to another (table no. 2), we admit that they influenced the state of the biotopes and, consequently, the dynamics of the birds' populations.

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Table 2. The meteorological Conditions during the Observations
Tabel 2. Condiţii meteo în timpul observaţiilor

Jan. 15th 2003	Jan. 15th 2004	Jan. 17th 2005	Jan. 17th 2006	Jan. 18th 2007
Frozen soil and pools (15-20 cm.); Snow cover: 10-25 cm thick. Cloudy sky 2/8, T-5°C. Intense wind W>E	Severe weather: T 2°C, overcast sky 8/8, rain and sleet. Ice and snow cover of 5mm – 1cm thick; 70% of the pool covered. Slow wind.	Relatively warm weather. The pool and the fields around it were not frozen. T about 3°C, overcast sky 6/8.	T: -2° – 0°C. The terrain and the pool were frozen and covered by a thin snow cover. Dense fog, 30-40 m visibility.	Clear sky, average intensity wind, W-E. T. 8-12°C. Snow or other precipitation forms missed during the entire winter.

From the quantitative point of view, the greatest number of individuals was registered in 2007 (about 1,300 individuals); this winter, the climate was warm (above the normal values for this period) and without precipitations during the entire cold season.

A similar situation was registered in January 2005, when the relatively warm weather did not allowed the freezing of the pools and of their neighbouring fields and thus, the number of identified birds was estimated at 630 individuals.

The meteorological conditions registered by the middle of January in 2003, 2004, and 2006, characterized as normal for winter in the South of the country, limited the access of the birds in the habitats that became hostile in the wetland Bistreţ-Cârna; thus, there were registered between 100 and 144 individuals.

Table 3. The annual numerical values of the birds' populations stributed according to their order
Tabel 3. Valori numerice anuale ale populaţiilor de păsări repartizate pe ordine

Crt. no.	Order	2003	2004	2005	2006	2007
1	Pelecaniformes	-	-	3 in.	17 – 24 in.	35 – 38 in.
2	Ciconiiformes	1 in.	2	5 in.	2 in.	29 in.
3	Anseriformes	-	7	456 in.	10 in.	+ 1,055 in.
4	Gruiformes	2 in.	-	-	5 in.	+ 12 in
5	Charadriiformes	-	-	178 in.	+ 12 in.	+ 150 in.
6	Other order	125 in.	135 in.	33 in.	+ 18 in.	?

From the qualitative point of view, Ciconiiformes Order registered a constant presence; it was well represented by the species *Ardea cinerea* and *Egreta alba.* Anseriformes Order was represented by the following duck species: *Anas crecca* and *A. plathyrhynchos*, while Charadriiformes Order by the species *Limosa limosa* and *Numenius arquata.*

Phalacrocorax carbo was the representative species for Pelecaniformes Order, while Gruiformes Order was sporadically represented by *Fulica atra* and *Rallus aquaticus.*

Most of the identified species appears on the list of the species of community interest and their preservation requires the designation of the special preservation areas and of the special avifaunal protection areas (Official Gazette No. 442 from the 29th of June 2007).

CONCLUSIONS

During the ornithological research made in the last five years within the framework of the international program for the monitoring of the aquatic birds, we identified a total number of 37 species, 19 of them aquatic and 18 non-aquatic species.

From the quantitative point of view, the greatest number of individuals was registered in 2007 and 2005, when the weather was warm and atypical for this period of the year. On the other hand, the number registered in 2003, 2004, and 2006 was quite low because of the severe weather that is typical for winter.

From the qualitative point of view, Ciconiiformes and Anseriformes Orders registered a constant appearance followed by Charadriiformes and Pelecaniformes Orders.

The presence of the species of community interest justifies the designation of the wetland Bistreţ-Carna as an area with increased avifaunal importance and there were already taken legislative preservation measures.

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ANALYSES REGARDING SOME *Bombina* GENUS'S POPULATIONS IN THE ARAD COUNTY, ROMANIA

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Abstract. Our study took place in may 2006, and was made on a *Bombina* sp. population nearby Cermei locality, a field region, and on 4 populations from Mădrigeşti, a mountain region, from Arad county. We analyzed 20 characters belonging to both species on porpose to establish the affiliation of the studied populations. The Cermei's population belongs to B. bombina species, however were signed the presence of some characters expressed like *B. variegata* . The same think about the Mădrigeşti's population which belong to B. variegata species, there was identified, noticed some characters expressed like *B. bombina.*

Key words: affiliation, character, *Bombina bombina, Bombina variegata*

Rezumat. Analiza unor populaţii ale genului Bombina din judeţul Arad, România. În perioada lunii mai 2006 în judeţul Arad, am studiat o populaţie de *Bombina* sp. din regiunea de câmpie Cermei, şi 4 populaţii din regiunea montană Mădrigeşti. Am urmărit 20 de caractare pentru a stabili afilierea populaţiilor studiate. Populaţia de la Cermei aparţine speciei B. bombina, prezentând caractere de *B.variegata.* Populaţiile din regiunea Mădrigeşti aparţin speciei B. variegata, prezentând caractere ale speciei B. *bombina.*

Cuvinte cheie: afiliere, caractere, *Bombina bombina, Bombina variegata*

INTRODUCTION

Bombina bombina is a typical species for the field fauna living in the low regions from the east and center Europe (ARNTZEN, 1980), generally going up to 400 m height. *Bombina variegata* species is spread in the high regions, the inferior area being at 100 m height, here is present just in a exceptional way (MADEJ, 1964). In general, appears up to 150 m height, and it can arrive at 1870 m (STUGREN & GHIRA, 1987).

Bombina bombina and *Bombina variegata* species are not isolated from the reproduction point of view, and there were noticed hybrid populations in all regions where the 2 species have contact (SZYMURA, 1993). In the speciality literature were identified cases when the characters of a species appears at the other species, despite their far localization from the hybrid zone(STUGREN, 1980, GHIRA & MARA, 2000, COVACIU-MARCOV et al., 2002, 2003), and the presence of these characters can't be caused by the cross-breeding phenomenon.

We attended to establish the affiliation of the populations to the 2 species, based on the known characters, and also the existence of a species characters in the other.

MATERIALS AND METHODS

Our study was realized in may 2006 on 33 samples from Cermei and 143 samples from the 4 habitats in Mădrigeşti.

To establish the affiliation of the studied populations we used the method of analyzing some morphologic and chromatics characters of the two species. We analyzed 20 characters using 2 grids, each grouping 10 characters. The used characters are the most important diagnose characters of the two species and different authors used them (STUGREN, 1980, GOLLMANN et al., 1993, SZYMURA & BARTON, 1991, GHIRA et al., 2003).

The first grid analyses the morphology, the dimensions and the ratios of light ventral spots. These are red at *Bombina bombina* species and yellow at *Bombina variegata* species. (FUHN, 1960). The grid analyses the confluence or separate degree between the light ventral spots, from different parts of the body identifying 10 chromatics groups (Table no. 1). The grid was made by Szymura, Gollman and then by many others authors (SZYMURA & BARTON, 1991, GOLLMANN, 1984, GOLLMANN et al., 1993) . If the light spots are separated between by dark pigment then the character belongs to *Bombima bombina* species, and if the light spots are united, the light pigment appears uniformly the characters belongs to *Bombina variegata* species.

The second grid analysis 10 characters and was made by Stugren (1980) and modified by Ghira & Mara (2000) (Table no. 2).

Each character receives a mark: 1 if is *Bombina variegata*, 0 if is *Bombina bombina.* Summing the obtained mark's for each character, a certain individual can receive on each grid a score ranging from 0 to 10, these score equal to 0 means that the individual is a pure *Bombina bombina*, the score equal to 10 indicating a pure *Bombina variegata* individual, and the values closed to these indicates *Bombina bombina* and *Bombina variegata – like* individuals. The intermediate scores of 4, 5, 6 indicates hybrids.

After this, we calculated the average score of all individuals of each population, for each grid, and then the average of the two grids, obtaining a number (%) which express the affiliation of the population. The values closed to 0 indicates a *Bombina bombina* population and values closed to 100 indicates a *Bombina variegata* population. The final

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mark indicates the amount of *Bombina variegata* species features in every studied population. The method allows to change some features in percentage and the statistic interpretation of these.

The studied habitats are represented by 3 pools and a brook from Mădrigesti at 450 meters height and a pool nearby Cermei locality, at 105 m height.

The first habitat from Mădrigesti is represented by a permanent big pool of 10 m^2 with approximate 1 m deepness, situated next to the road and a beech forest with rich vegetation (reed and scouring rush). In this habitat we found besides Bombina species newts species as well, and for this the habitat was named the pool with newst. The second habitat located beyond the road, on the field being a temporary pool, of about 3 m^2, with reduce deepness and oozy substratum. The third habitat from Mădrigesti is represented by a brook located in a wooded zone, next to the pool with newts. The deepness of the weather reach maximum 30 cm, the pollution degree is reduced, the following of the weather being relatively fast. The forth habitat is a temporary pool, with reduced size, nearby the pool with newts; it shrinks in the forest, named the pool under the forest, with a small deepness and oozy substratum.

The Cermei's habitat is represented by a pool located in a field region; it has a size of about 70 m^2, but strongly polluted. The vegetation of the pool is thick (reed and scouring rush), being present invertebrates and vertebrates as well.

Table 1. Grid 1 of differentiation of the European species of the *Bombina* gender (the characteristics of the ventral pattern) (SZYMURA & BARTON, 1991, GOLLMANN, 1984)
Tabel 1. Grila 1 pentru diferențierea speciilor europene ale genului *Bombina* (caracteristicile modelului ventral) (SZYMURA & BARTON, 1991, GOLLMANN, 1984)

Characteristic (light spots on):		*Bombina bombina*	*Bombina variegata*
1	Chin-chin	Separated	United
2	Chin-chest	Separated	United
3	Chest-chest	Separated	United
4	Chest-shoulder	Separated	United
5	Shoulder-arm	Separated	United
6	Chest-abdomen	Separated	United
7	Abdomen–abdomen	Separated	United
8	Abdomen – basin	Separated	United
9	Basin–basin	Separated	United
10	Basin–thigh	Separated	United

Table 2. Grid 2 of differentiation of the European species of the *Bombina* gender (after STUGREN, 1980, modified by GHIRA & MARA, 2000)
Tabel 2. Grila 2 pentru diferențierea speciilor europene ale genului *Bombina* (după STUGREN, 1980, modificat de GHIRA & MARA, 2000)

Character		*Bombina bombina*	*Bombina variegata*
1	. Colour of open ventral spots	*Red, orange, yellowish*	*Yellow*
2	Colour of upper part of the first finger and the top of fingers	*Black*	*Yellow*
3	Dorsal colouring	*Black*	*Pale grey*
4	The relation tarsian and plantar open spots	*Separated*	*United*
5	Ventral colour	*Orange spots on black background*	*Black spots on yellow background*
6	The relation between the length and width of the head	*Length > width*	*Length < width*
7	. The drawing of lateral and ventral parts	*White spots around the verrucae*	*Without white spots around the verrucae*
8	The drawing of the dorsal part	*Regulated black tubercles*	*Black scattered verrucae*
9	Dorsal verrucae	*Lens – shaped squatted*	*Sharp, rough*
10	The ratio of tibia – tarsian joints when the stylopode and the zeugopode are parallel	*Not touching*	*Touching*

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RESULTS

The studied population from Cermei is a *Bombina bombina* population, presenting the major amount of the studied features by us, expressed just like at the fire-bellied toad. For these, the studied population presents a percentage of 12,27 % features which expresses like at *Bombina variegata* (Fig.1).

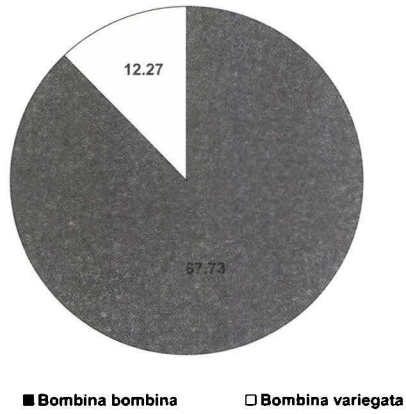

Figure 1. The amount of characters of *B. variegata* in the Cermei's *Bombina bombina* population
Figura 1. Ponderea caracterelor de *B. variegata* la populaţia de *Bombina bombina* de la Cermei

After analyzing the characters from the first grid (Table no.3) we have noticed the expression of some features just like at *Bombina variegata* represented by C1 (3 %), C3 (3 %), C6 (3 %), C7 (1,5 %), C10 (3 %), dominating the C5 feature. The C2, C4, C8 and C9 characters were typical of *Bombina bombina*. In the second grid the C3 and C9 features are presented in the same way like at the population they belong (0%), the rest of the characters in some cases express like *Bombina variegata*, with the C6 feature dominating, this one being mostly responsible of the major amount of the *Bombina variegata* species features at the *Bombina bombina* population.

Table 3. The amount of Bombina variegata characters in the Cermei's Bombina bombina population
Tabel 3. Ponderea caracterelor de *B. variegata* la populaţia de *Bombina bombina* de la Cermei

	Habitat	Cermei's Pool
	Total no. of samples	33
G1%	Character1	3.00
	Character 2	0.00
	Character 3	3.00
	Character 4	0.00
	Character 5	46.90
	Character 6	3.00
	Character 7	1.50
	Character 8	0.00
	Character 9	0.00
	Character 10	3.00
G2%	Character 1	6.00
	Character 2	21.20
	Character 3	0.00
	Character 4	1.50
	Character 5	10.60
	Character 6	90.90
	Character 7	3.00
	Character 8	15.10
	Character 9	0.00
	Character 10	39.30

Regarding the Mădrigesti habitats, the *Bombina variegata* populations also presented characters which express just like at the other species, represented in the pool with newts by 22,07 %, in the pool from the field with 22,26 %, in the brook 20,69 % and in the pool under the forest 23,7 %.

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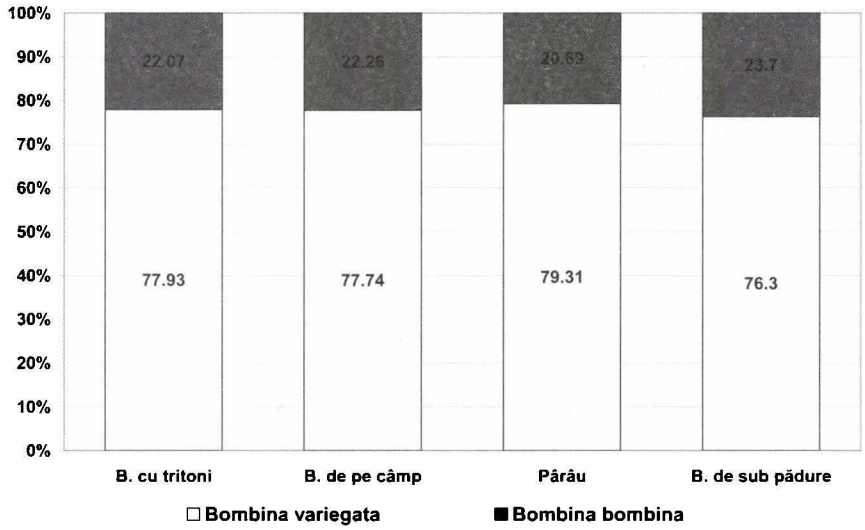

Figure 2. The amount of the *B. variegata* characters in the Mădrigeşti's *Bombina variegata* population
Figura 2. Ponderea caracterelor de *B. variegata* la populaţiile de *Bombina variegata* de la Mădrigeşti

Table 4. The amount of *B. variegata* characters in the Mădrigeşti's *Bombina variegata* population
Tabel 4. Ponderea caracterelor de *B. variegata* la populaţiile de *Bombina variegata* de la Mădrigeşti

	Habitat	The pool with newts Mădrigeşti	The pool from the field Mădrigeşti	The brook Mădrigeşti	The pool under the forest Mădrigeşti
	Total no. of samples	40	40	40	23
G1%	C1	100.00	100.00	100.00	95.60
	C2	3.70	12.50	6.20	8.60
	C3	17.50	7.50	12.50	13.00
	C4	83.70	78.70	82.50	82.60
	C5	100.00	100.00	100.00	100.00
	C6	46.20	53.70	46.20	41.30
	C7	98.70	100.00	98.70	100.00
	C8	95.00	100.00	95.00	100.00
	C9	100.00	100.00	97.50	100.00
	C10	100.00	98.70	100.00	100.00
G2%	C1	100.00	100.00	100.00	100.00
	C2	100.00	100.00	100.00	100.00
	C3	100.00	97.50	100.00	73.90
	C4	76.20	76.20	78.70	71.70
	C5	100.00	100.00	100.00	100.00
	C6	80.00	82.50	100.00	91.30
	C7	30.00	5.00	0.00	4.30
	C8	72.50	75.00	85.00	56.50
	C9	100.00	100.00	97.50	100.00
	C10	57.50	67.50	90.00	82.60

In the first grid the 2 and 3 characters are responsible for the appearance of the *Bombina bombina* characters in the *Bombina variegata* populations, and the most stable characters, constantly expressed just like at *Bombina variegata* species are C1, C5, C7, C8, C9 and C10 (>95 %) (Table no.4).

In the second grid the smallest values are noticed in the case of the character number 7, which don't overtake 30% (The pool with newts), the brook has all it's individuals, presenting the feature just like at *Bombina bombina* (0%).

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The characters 1, 2, 5 and 9 express just like at *Bombina variegata*, with values higher than 97 %. The characters 4, 6 and 8 at some individuals have expressed either just like at *Bombina bombina* or just like at *Bombina variegata*.

DISCUSSION

The height and the characteristics of the Cermei's habitat are favorable to the fire- bellied toad, being present a population of *Bombina bombina*, even though there are meet some characters expressed just like at *Bombina variegata*.

Our results are similar to those obtained by Stugren (STUGREN, 1980) , which identified features of *Bombina variegata* species at the Russian Field's *Bombina bombina* populations, placed at large distance from the yellow-bellied toad area or hybridization zone. Also, there were studied 6 populations from more localities placed in the Ier Field identifying at all studied populations the existence of a reduce percent (generally under 10 %) of characters which express just like at *Bombina variegata* (COVACIU-MARCOV et al., 2002). In opposition whit our results, some studied *Bombina bombina* populations from the Ier Valley, although detain features of the *Bombina variegata* species, these are given by the preponderance of other characters than from this study. For instance, the 4 and 5 characters in the Cermei's population is very closed to *Bombina bombina*, at the Ier Valley's populations the *Bombina variegata* characters are responsible in the *Bombina bombina* populations. Meanwhile in this study the *Bombina variegata* features are thanks to the characters 6 and 10, at the Ier Valley's population the characters 6 and 10 exclusively present *Bombina bombina* features.

In the Cermei's population the amount of the *Bombina variegata* characters at the *Bombina bombina* population is 12,27% a higher value that in the case of Ier Valley study, where this value don't overtake, except one population where the value is 10 % (Chesereu 10,21 %) (COVACIU-MARCOV et al., 2002) . It can be noticed the affiliation of the individuals to *Bombina bombina*, without hybrid individuals or similar to *Bombina variegata*. A single individual present characters expressed in about similar amounts.

The 4 habitat's characters from Mădrigeşti, as well as the height of the localization are favorable to the yellow-bellied toad, even though these populations of *Bombina variegata* we have identified some characters expressed just like at *Bombina bombina*. All the studied *Bombina variegata* populations presents in a percentage characters of *Bombina bombina* species. The amount of expression of the features at the *Bombina variegata* populations presents similar values, the difference between the amount of the characters of the 4 populations being reduced (2 %). The fire-bellied toad characters detain the highest values, over 20 % for each population.

The brook population presents the highest amount of the *Bombina variegata* characters, witch can be explained by the fact that the brooks are typical habitats for this species. In some populations concerning the hybridization region between the two species and their preference of habitats it can be said that the most pure *Bombina variegata* populations are present in brooks and temporary pools, no matter the height they are situated, with the condition that this has to overtake 150 m. (COVACIU-MARCOV, 2003). The pool with newts present the next highest amount value of *Bombina variegata* characters, thanks to the favorable conditions, this one is the biggest pool, a permanent one, with a rich vegetation. In the pool from the field and the one under the forest are helpful some *Bombina bombina* characters, that's why the amount of this specie's characters increases with 1-2 %.

In the speciality literature are described *Bombina variegata* populations which presents *Bombina bombina* specie's characters. Thus, even though some of the studied populations are placed far away from the hybridization zone placement, nevertheless the amount of the other specie's characters is unexpectedly high, for example the population from Sisteu, placed at over 600m height, in the high zone of the Ses Mountain. At this population, which it should have been pure *Bombina variegata*, the amount of *Bombina bombina* characters expressed are important. This population is placed out and at distance from the cross-breeding zone. (COVACIU-MARCOV, 2003).

For the 4 population from Mădrigeşti and as well as for the studied population from the Beius Depression (COVACIU-MARCOV, 2003) with little differences the same characters are responsible for the *Bombina bombina's* characters in the *Bombina variegata* populations. In can be ascertained the fact that the high amount of the fire-bellied toad characters, this one being more important than the amount of the *Bombina variegata's* characters expressed in Cermei's *Bombina bombina* population. At the Cermei's population the *Bombina variegata's* characters reach just 12,27%. In the study concerning some populations from the Beius Depression, it has been proved the high amount of the fire-bellied toad characters in the *Bombina variegata* populations, this one being more important than the amount of the *Bombina variegata's* characters expressed at the Ier Field's *Bombina bombina* populations (COVACIU-MARCOV, 2003). The studied zones are placed far away from the cross-breeding areas between the two species, thus hybridization can't be a cause for the appearance of one specie's characters in a other specie's populations. The only possible explanation for this could be the presence in their genom of the two species of some allele-genes, of *b* and *v* type, responsible of the codification for both express manners of each characters (STUGREN, 1980), depending on the existent conditions. *Bombina bombina* and *Bombina variegate* divert from the classical concept about species, defined on reproductive isolation (MAYR, 1942, BĂNĂRESCU & BOŞCAIU, 1973). The two species, genetic very closely, (SZYMURA & FARANA, 1978), differentiated in Pliocen (SZYMURA, 1993), moleculars datas place the divergent moment at about 3-5 million years (SZYMURA et. al., 1985, SZYMURA, 1993).

It's hard to explain why it wasn't touched the reproductive isolation, counting the long period of time. An explication could be given by the hypothesis of successive contact of the two species across the Cuaternar period. It is possible that the 2 species have hybrided in the past too (MAXON & SZYMURA, 1979), being able to contact in the warmer interglacials and further to lose contact again. Thus it is explained the appearance of a specie's characters in the

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other specie's populations the successive contacts allowing recurrent give and take of genes. In the North- West part of Romania don't exist pure populations, inclusively at those placed at heights and typical habitats appearing characters from the other species (COVACIU-MARCOV, 2003).

In the Mădrigeşti's *Bombina variegata* populations the characters from the other species of *Bombina bombina* appears in a higher amount than in the reverse situation in the case of Cermei's *Bombina bombina* population.

Thus, it is anomaly the fact that a species presents more characters from the other species one, in comparation with the reverse situation. The explanation of this anomaly can't be satisfactory given than the past pf the two species in the actual intergalcial, mostly by the postglacial migration ways of them, and the eventual contact between them. The last glacial periods strongly affected the Europe fauna, the number of the hybridization zones known as far on the continent, being a consequence of these (HEWITT, 1996, 2000). During the last ice age *Bombina variegata* used as a shelter the west zones of Balkanic Peninsula, and *Bombina bombina* had the shelter in the inferior course of the Danubian river (SZYMURA, 1993). Probably the 2 species had a different evolution during the last ice age fact that explains the differences between their characters amounts (COVACIU-MARCOV, 2003).

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A CATALOGUE OF FOSSIL VERTEBRATES FROM AIUD NATURAL SCIENCES MUSEUM

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Abstract. The Aiud Museum Natural Sciences collections are the oldest ones of this kind in Romania. Their beginning runs far back in time, since the beginning of the 18th century. The vertebrate collection is not very large, but involves some interesting exhibits collected in 19th and 20th centuries. Among the most interesting items there are Uppermost Cretaceous dinosaur bones originating from Alba district, an Eocene sirenian rib and a series of teeth and bones belonging to Pleistocene mammals originating from various localities. This catalogue is trying to point out the outstanding value of this collection for the knowledge of the Transylvania vertebrate faunas.

Key words: Vertebrate paleontology, reptiles, mammals, Aiud, Transylvania.

Rezumat. Catalog al vertebratelor fosile de la Muzeul de Ştiinţele Naturii Aiud. Colecţiile Muzeului de Ştiinţele Naturii de la Aiud sunt cele mai vechi de acest fel din România. Începuturile lor sunt consemnate încă din secolul al XVIII-lea. Colecţia de vertebrate fosile nu reuneşte piese foarte numeroase, însă păstrează unele eşantioane extrem de interesante colectate în secolele XIX şi XX. Dintre cele mai remarcabile sunt de semnalat oase de dinozaur descoperite în jud. Alba, o coastă de sirenid eocen, precum şi o serie de oase şi dinţi de mamifere Pleistocene provenind din diferite localităţi. Acest catalog încearcă să scoată în evidenţă valoarea acestei colecţii şi semnificaţiile ei pentru cunoaşterea faunelor de vertebrate fosile din Transilvania.

Cuvinte cheie: paleontologia vertebratelor, reptile, mamifere, Aiud, Transilvania.

INTRODUCTION

The Natural Science Museum in Aiud (Alba district) nowadays locate in the Bethlen College, has its roots in a very old collection of minerals and fossils, first mentioned since 1720 - according to the manuscript "*Catalogus Raritatum et Benefacorum*". Later, a museum was born in 1796 in Aiud, under the name "*Raritatum Et Rerum Naturalium Museum*". It is the oldest natural sciences museum in Romania, much older either than the ones from Transylvania (*e.g.* Sibiu, Cluj), or from the outer Carpathians, in Iaşi or Bucharest.

Along its long history, the museum had known fortunate as well as unfortunate epochs, all close related to the Transylvania history. For example, after 1848 its collections suffered large losses due to the revolution events. However, each time a number of biologists and geologists tried to fill the goals, trough generous donations. Among the contributors involved in the collections establishment and grown one can mention Franscisсus Benko, Károly Herepei, M. Zeyk or Z. Szilady.

The geological collections host a wide diversity of exhibits. As outstanding ones, it worth to be stressed out several fragments of the meteorite fall at Mociu in 1882 (MAXIM, 1958), a fair preserved *Sabal major* leaf imprint originating from Upper Cretaceous deposits near Vinţu de Jos (HEREPEI & GÁSPÁR, 1896) or a large sample of Middle Miocene sea urchins and molluscs collected mainly at Gârbova de Sus, a village located not very far from Aiud. This kind of fossils represents the prevailing part of the 1660 items forming the paleontology museum collection.

The vertebrate fossils forming this collection are not very numerous, but at least a part of them are illustrative for the Transylvanian geology science evolution. This contribution is focused on this collection, trying to outline a catalogue of the exhibits still existing in Aiud (abbreviated, AiM). We mentioned for each exhibit: the locality of provenance, catallogue number, systematic assignation, the bone or tooth position and - when available - details on each lithostratigraphic unit where the fossils originated from, the discoverer, documented either on references or on the labels and collection registers. For the most representative exhibits, photographs and short paleontological descriptions and measurements are provided too.

A lot of localities mentioned in the museum registers and labels were in Hungarian. For finding the actual toponyms, we used the SUCIU's (1967) dictionary and MITTELSTRASS' (1992) digest, both very helpful tools in solving this task.

The vertebrate fossils are exposed in the museum case # 16 and their data mentioned into the Inventory register # III, pages 1571-1576.

SYSTEMATIC PALAEONTOLOGY

Class *Reptilia*
Dinosauria indet.

Alba Iulia (= Borbánd; former village Bărăbanţ, nowadays a town suburb).

AiM 1026 – Dinosaur limb bone, probably a tibia still covered by its rock matrix, embedded in plaster into a wood box (Pl. I, fig 1).

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It is verisimilar that this bone belongs to the sauropod *Magyarosaurus*. A more convenient assignation would need the cleaning of the rock matrix still covering the bone, as well as the removing of the plaster embedding the fossil.

According to the label still accompanying the fossil (Pl. I, Fig. 2), it was discovered at Bărăbanț, "between the village up side and the flour mill", probably in 1860. In spite on these scarce data, it is obviously clear that the bone had been found in the Șard Formation (Late Cretaceous-? Paleogene; CODREA & DICA, 2005). This formation bears a large amount of dinosaur bones, the Metaliferi area being the second one in richness in our country after the famous Hațeg Basin. These fossils had been mentioned firstly by NOPCSA (1905), later by CODREA et al. (2000, 2002) or CODREA & DICA (2005).

Initially, this fossil had been related to Paleogene large mammals: *Anoplotherium* (TÉGLÁS, 1886), or later to *Anthracotherium* sp. (KOCH, 1894, 1900), the last name being still mentioned on the label. However, the bone morphology, as well the fossilization is indicating that this assignment is inappropriate.

At the end of the 19th and the beginning of 20th centuries a dispute occurred between two prominent Transylvanian geologists, ANTON KOCH and BARON VON NOPCSA, concerning the age of the red deposits from Alba Iulia-Sebeș area. The main subject of debate was focused mostly on the age of the deposits from Râpa Roșie near Sebeș, in Sebeș Formation (CODREA & DICA, 2005). The first of them was thinking that some large bones discovered there belonged to *Anthracotherium*, while the second one refuted this theory and was the partisan of their dinosaur origin. Unfortunately, since this scientific debate, the fossils from Râpa Roșie once curate at Sebeș Gymnasium had been lost. However, a fact is very well proved: all the fossil bones found at Râpa Roșie after, in the last century, belong to Maastrichtian reptiles (*e.g.* GRIGORESCU, 1987; JIANU et al., 1996; CODREA & VREMIR, 1997), but all of them are reworked into these red beds from older deposits. In this manner, the rocks from Râpa Roșie are probably ?Paleogene and Lower Miocene, anyhow younger than the Eocene as long as into Râpa Roșie conglomerate are present also limestone boulders bearing nummulites, and older than the Badenian, which covers in discordance the red beds.

The Șard Formation, which yielded AiM 1026 is older than the Sebeș one. The dinosaur bones from this formation have an *in situ* status. This formation was the source area for the reworked dinosaur bones in Sebeș Formation, at Râpa Roșie or Râpa Lancrămului.

AiM 1026 is probably the most, or anyhow, among the most valuable items of Aiud fossil vertebrates collection because until now, it is the oldest finding of a dinosaur bone in our country.

Measurement (mm): the bone length is 390 mm. The other dimensions cannot be measured in a convenient manner due to the plaster, which covers the bone.

Ciugud (= Csugud; village located eastward from Alba Iulia, on the left bank of Mureș River).

AiM 1025 – concerns a small fragment of a dinosaur long bone (Pl. I, Fig. 3). It was assigned to "a mammoth ankle bone" <*sic*!> according to the museum register. The bone is covered by fine green-grey sandstone resembling the rocks of this kind from the Late Cretaceous at Vurpăr, near Vințu de Jos, belonging to the Șard Formation. However, at Ciugud it is very plausible that this bone fragment could be reworked into the Sebeș Formation deposits.

Class Mammalia
Order Carnivora
Genus *Ursus* LINNAEUS 1758
Ursus spelaeus ROSENMÜLLER 1794

Onceasa Cave (Bihor district)

AiM 1007, AiM 1019 (femurs), AiM 1008, AiM 1010 (vertebrae), AiM 1011 (sacrum), AiM 1020 (bone indet.). The Onceasa Cave is a famous Pleistocene site visited by "hunters of fossils" from Transylvania or abroad along nearly two centuries ago. The donator of the cave bear bones remains unknown, but probably an Aiud gymnasium teacher had collected these fossils during a visit on the site.

Huda lui Papară Cave (= Szolcsvai, Alba district)

AiM 1021, AiM 1017 - three metacarpals and one molar.

Order Rodentia
Genus *Marmota* BLUMENBACH 1779
Marmota bobak (MÜLLER 1776)

Cluj-Napoca, Someșeni (= Szamosfalva; former distinct village, now a town suburb)

AiM 1016 – fragmentary skull, preserving also a part of the right half mandible embedded in plaster (Pl. II, Figs. 1-3). It originates from the old open pits, once mining Pleistocene and Holocene gravel at Someșeni, where several other large Pleistocene herbivores had been found (Koch 1891 a; VÖRÖS, 1983). This fossil will be described in a further distinct contribution. Although there are not additional indications, the old fashion style of its label seem to attest that it represents an old discovery, probably from the second half of the 19th or the first half of the 20th century. Anyhow, KOCH in his fossil vertebrates repertory issued in 1900 didn't specify such a fossil at Aiud musem.

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Order *Sirenia*
Sirenia indet.

Cetea (= Csáklya; Alba district)
AiM 1027 – a rib embedded in plaster, into a wood box (Pl. II, Fig. 4).

Found on Pârâul Lupului in "Miocene" deposits, according to its label ("mediterran"; Pl. II, Fig. 5). However, in his repertory of fossils, TÉGLÁS (1886) mentioned that the rocks from Pârâul Lupului should be Eocene and not Miocene. Later, KOCH (1900) refers this rib to an Eocene representative too ("*Halitherium* sp."). This is pointing out nothing else but the rather unclear stratigraphy of this fossil. In our opinion, it belongs rather to an Eocene representative, as both TÉGLÁS and later KOCH mentioned.

The confusion is even accrued because the same label assigns the rib to "*Brachydiastematherium transilvanicum*". Or, *Brachydiastematherium* BÖCKH & MATYASOVSKI 1876 is an Upper Eocene poor known titanothere, without any connection with the Miocene faunas. A comparison we have made with some Eocene ribs fragments from Rădaia and Morlaca belonging to animals of *Brachydiastematherium*-size, stresses out different morphologies that in Cetea bone. The compactness of the bone marked by pachyostosis, really indicates a sirenian rib at Cetea.

In these circumstances, a more advanced systematic assignation would be imprudent, as long as ribs are not diagnostic bones for generic or specific assignations in sirenians. The rib length is 503 mm.

Order Perissodactyla
Genus *Equus* LINNAEUS 1758
Equus sp.

Araci (= Árapatak, Covasna district)
AiM 1046 – it concerns a right mandible horizontal branch, with p4-m3 (Pl. III, Fig. 1). The label mentions that this "*Equus primigenius*" originates from lignite, with *Congeria*. Measurement: L m1-m3 – 87.0

Gălăţeni (= Szent Gerlicze, Mureş district)
AiM 1002 – right half mandible. Pleistocene. *Measurements* (mm): Tooth row – L p2-m3 -165.4; L p2-p4- 81; L m1-m3 – 85.
References: Koch (1891, 1900) probably referred to this fossil as "*E. fossilis*".

Ormeniş (Mirăslău commune, Alba district)
AiM 1040 – tooth

Păsăreni (= Baczka-Madaras, Mureş district)
AiM 1004 – neural skull fragment. Pleistocene.

Tur (= Balaj Falva, Tűr village near Blaj, on Târnava Valley, Alba district)
AiM 999 + 1000 – mandible preserving both tooth rows (Pl. III, Fig. 2). Pleistocene. *Measurements* (mm): L – 420; Right tooth row: L – 158; L p2-p4 – 77.5; L m1-m3 – 79; Left tooth row: L – 159.5; L p2-p4 – 81; L m1-m3 – 79; Length of symphisys - 81; Symphysis transverse diameter-36; Horizontal mandible branch transverse diameter before p2 – 59.5; Idem, backward m3 – 106.5
References: Koch (1891, 1900) probably referred to these fossils as "*E. fossilis*".

Genus *Coelodonta* BRONN 1831
Coelodonta antiquitatis (BLUMENBACH 1799)
(= *Rhinoceros lenensis* PALLAS 1773; = *Rhinoceros thichorhinus* FISCHER 1811; wooly rhino)

Ormeniş (Mirăslău commune, Alba district)
AiM 1041 – mandible right horizontal branch fragment preserving p2-m1 (Pl. III, Fig.3). It originates from Pleistocene löess. *Measurements* (mm): L – 354 +; L p2-m1 – 137; L p3-p4 (at alveoli) – 67; Height under: m1 – 60; p2 – 64; p2/p3 – 68; p3/p4 – 71.5; p4/m1 – 87.5 Teeth: p3 – L: 31.5 W anterior: 21.7 W posterior: 21.7; p4 – L : 36 W anterior: 25.7 W posterior: 27.4; m1 – L : 36.5 W anterior: 28 W posterior: 29.7.

It concerns a rather young specimen. The cement is present inside the transverse valleys, as well covering the external teeth walls. Well preserved cheek teeth - excepting p2 heavy damaged and p4 damaged on its lingual side -, devoid of external and internal cingula. The p3 has small level difference between the transverse valleys, both "V" shaped. The last premolar, shows great level differences between the transverse valleys and a hypsodont pattern. The first molar with medium difference between the levels of the "V" shaped transverse valleys.

AiM 1042 – left M1 from the same site. *Measurements* (mm): L – 53.8; W anterior – 59.2 ; Width posterior – 55.3.

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Waved ectoloph, typical for the species. Devoid of lingual and vestibular cingula. Ante-crochet missing, medio-fosette closed by fusion between crochet and crista.

References: TÉGLÁS (1887), KOCH (1891, 1900), BARBU (1930), NICOLAESCU-PLOPŞOR (1938), EUFROSIN (1942).

Rhinocerotinae indet.

Comolău (former village, now part of Reci village, Covasna district)

AiM 987 – right proximal femur fragment. *Measurements* (mm): L – 375 +; Transverse diameter of diaphysis – 77; Antero-posterior diameter of diaphysis – 57.

This locality is well known for its Holstein large herbivores (KOVACS, 1981; RĂDULESCU & SAMSON, 1985). It would be intersting to know how this fossil reached the Aiud collection, but for instance we have no detail about this.

Order *Proboscidea*

Genus *Mammuthus* BROOKES 1828

Mammuthus primigenius BLUMENBACH 1799

Araci (= Árapatak, Covasna district)

AiM 1047 - upper molar fragment. The label mentions that it originate "from stratified lignite deposit", but this provenience seem to be implausible if judging after the tooth fossilization. Perhaps it was not donated by the discoverer, but by another person who maybe confused the occurrence.

References: TÉGLÁS (1887), KOCH (1891, 1900), BARBU (1930), VÖRÖS (1983)

Corneşti (= Sövényfalva, Mureş district)

AiM 410 (however, it seems that this number is from an older registration; it could not be retrieved in the new register); left m1 preserving 12 plates, with waved occlusion surface, belonging to a specimen still keeping trogontheroid characters (enamel thickness; Pl. IV, Fig. 1). Measurements (mm): enamel thickness – 2.2-3; lamellae frequency – 8

References: TÉGLÁS (1887), KOCH (1891, 1900), VÖRÖS (1983)

Filipişu Mic (= Kisfülpös, Mureş district)

AiM 1023 – right lower molar fragment, still keeping eight lamellae; enamel thickness – 2.4 mm.

References: It is possibly that this fossil had been the one mentioned at Filipişu Mare (= Magyar Fülpös) by TÉGLÁS (1887), KOCH (1891, 1900), VÖRÖS (1983).

Icland (Mureş district)

AiM 1045 – tusk fragment. Donated by the schoolmaster Deneş Lörincz.

Gălăţeni (Szent Gerlicze, Mureş district)

AiM 1022 – *caput femoris*.

References: Koch (1891, 1900), VÖRÖS (1983)

Măgheruş (= Küküllőmagyaros, on Târnava Mică River, Mureş district)

AiM 1012- right lower molar distal fragment, from löess.

AiM 1013 – left m1 without roots, from loess. *Measurements* (mm): L -119; W – 76; enamel thickness – 2; number of plates – 11; lamellae frequency- 10

AiM 1014 – molar, same site (*non vidi*).

References: TÉGLÁS (1887), KOCH (1891, 1900), BARBU (1930), VÖRÖS (1983)

Ormeniş (= Örményes, Alba district)

AiM 1036- right femur diaphysis, from löess („Zekhely Urmennios arok losz keplete mammut labszar csont"). *Measurements* (mm): L – 765 +; Transverse diameter of diaphysis – 126; Antero-posterior diameter of diaphysis – 75.

AiM 1039; probably right m2. *Measurements* (mm): L - 186; W - 84; enamel thickness - 2 – 3; number of plates –13x; lamellar frequency – 8

References: TÉGLÁS (1886, 1887), KOCH (1891, 1900), BARBU (1930), VÖRÖS (1983).

Păsăreni (= Baczkamadaras, Mureş district)

AiM 1030 - right M3. *Measurements* (mm): L – 218; maximum width – 87; height – 160; occlusion surface length – 189; enamel thickness – 2.1; number of plates – 16x; lamellae frequency - 8.

AiM 1031 – upper molar distal fragment (probably M3); enamel thickness – 2 mm; lamellae frequency – 8

References: Koch (1891, 1900), VÖRÖS (1983)

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Râmeţi-Olteni (= Remete; Alba district)
AiM 1043 – tusk fragment preserved embedded into plaster, in a wood box. It was found in 1877, "at Coşinilor spring", as part of „mammouth skeleton" according to TÉGLÁS (1886) and VÖRÖS (1983) (Pl. IV, Figs. 2-3).

Sânvăsii (= Nyárádszentlászló; Mureş district)
AiM 1028 – probably a left m1; 11x plates; enamel thickness – 3 mm. The attrition surface was aberrant, conferring a peculiar aspect to the occlusion surface (Pl. IV, Fig. 4).

Suplac (Mureş district)
AIM 1032 - molar

Order Artiodactyla
Genus *Cervus* LINNAEUS 1758
Cervus elaphus LINNAEUS 1758

Gălăţeni (= Szent Gerlicze, Mureş district)
AiM 991, 992. Antler fragments. Possibly Pleistocene.
References: Koch (1891, 1900)

Genus *Bison* HAMILTON SMITH 1827
? Bison priscus (BOJANUS 1827)

Comolău (former village, now part of Reci village, Covasna district)
AiM 995 – bone fragment (*non vidi*).

Genus *Bos* LINNAEUS 1758
? Bos primigenius BOJANUS 1827

Gălăţeni (= Szent Gerlicze, Mureş district)
AiM 1009. Skull fragment, from löess. Pleistocene.

Bos sp.

Aiud (Alba district)
AiM 1003 – horn.

FOSSILS WITHOUT LOCALITIES OF ORIGIN.

Equus sp.: AiM 1015 – cheek tooth
Mammuthus : AiM 1034, AiM 1037, AiM 1044 and AiM 410 – molars; without label number – tusk fragment
Cervus: without label number - antler fragment

CONCLUSION

The fossil vertebrates collection in Aiud refers to various exhibits, discovered mainly between the last 19th half and first decades of the 20th. All of them had been found as fortuitous finding and not as results of systematic diggings. The majority refers to Pleistocene herbivores, but older mammals and dinosaurs are present too. A large part of them retrieves in the structure of list of fossils drew up by geologists as TÉGLÁS or KOCH. Their data can be retrieved subsequently in other fossil vertebrates lists, as the ones belonging to BARBU or VÖRÖS. By far, TÉGLÁS had the main merit in putting on the map these fossils, but KOCH's contributions were more notorious.

One can easily observe that this collection in Aiud Museum practically ceased to grow after the First World War, when at Aiud the interest for paleontology decreased. After this, none outstanding paleontologist can be mentioned there.

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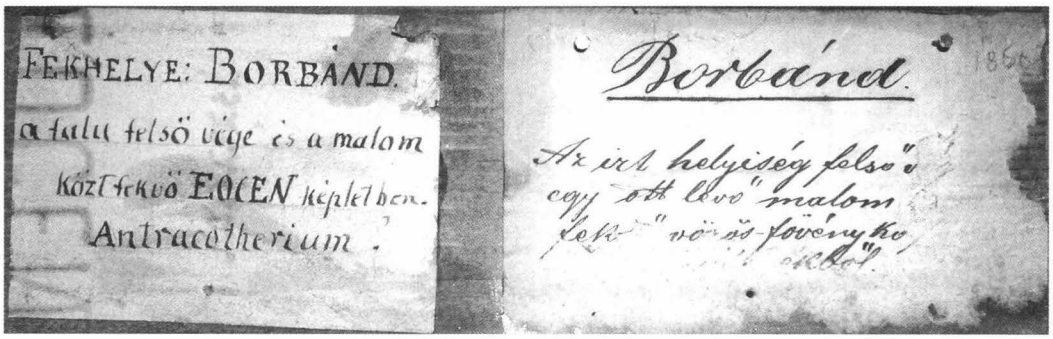

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Plate I: Fig. 1 - ? *Magyarosaurus*, Alba Iulia (Bărăbanţ; AiM 1026); Fig. 2 – original labels on the wood box containing the dinosaur hind limb bone from Bărăbanţ (AiM 1026); Fig. 3 – dinosaur bone fragment (Ciugud, AiM 1025). Scale bars: 50 mm.

Planşa I: Fig. 1 - ? *Magyarosaurus* Alba Iulia (Bărăbanţ; AiM 1026); Fig. 2 – etichetele originale ale cutiei în care se păstrează osul de dinozaur provenit de la Bărăbanţ (AiM 1026); Fig. 3 – fragment de os de dinozaur (Ciugud, AiM 1025). Scara: 50 mm.

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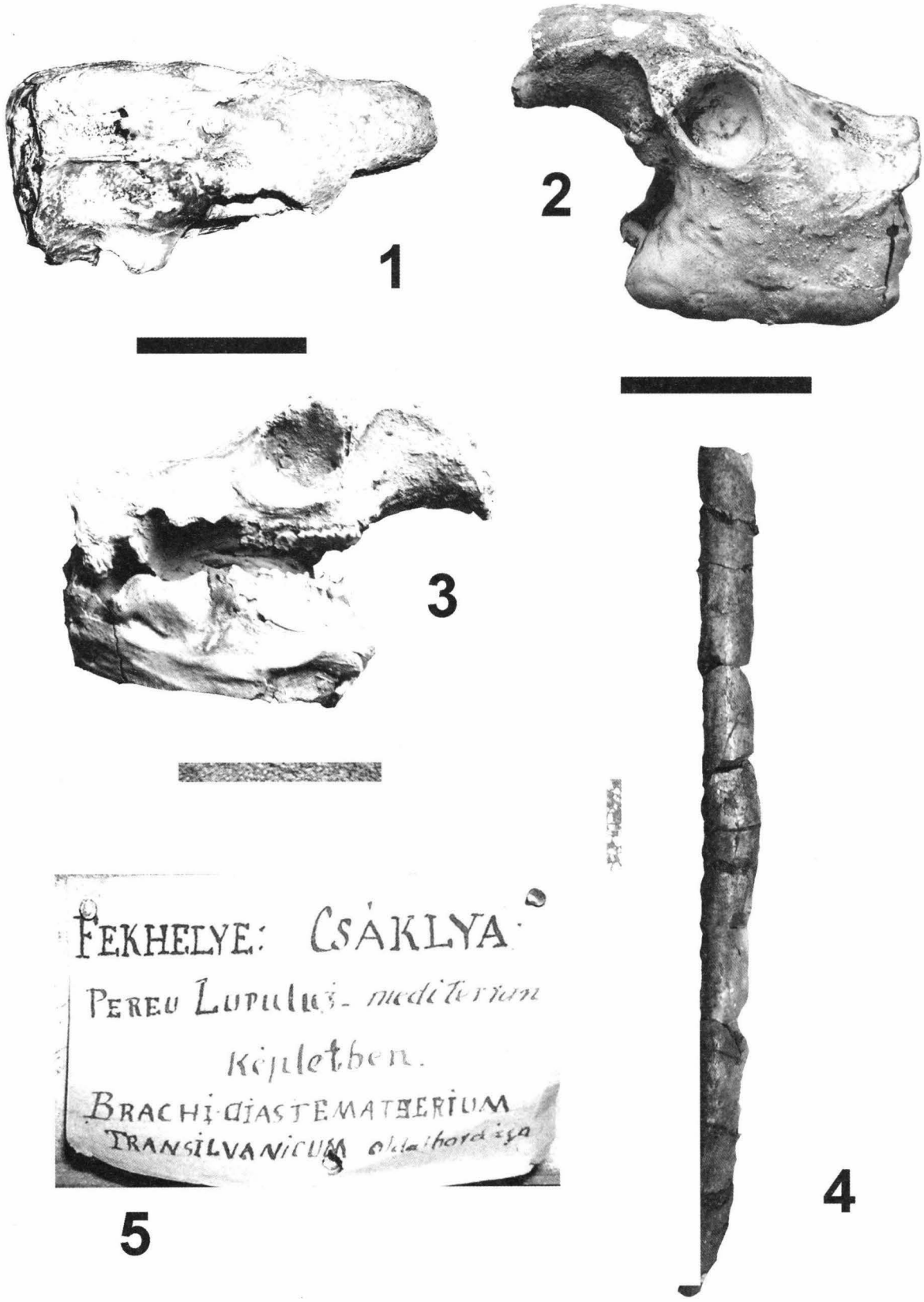

Plate II: Figs. 1-3 - *Marmota bobak* (MÜLLER 1776), Cluj-Napoca (Someşeni; AiM 1016); Fig. 4-5 – Sirenia indet. (Cetea, AiM 1027). Scale bars: 50 mm

Planşa II: Fig. 1-3 - *Marmota bobak* (MÜLLER 1776), Cluj-Napoca (Someşeni; AiM 1016); Fig. 4-5 – Sirenia indet. (Cetea, AiM 1027). Scara: 50 mm

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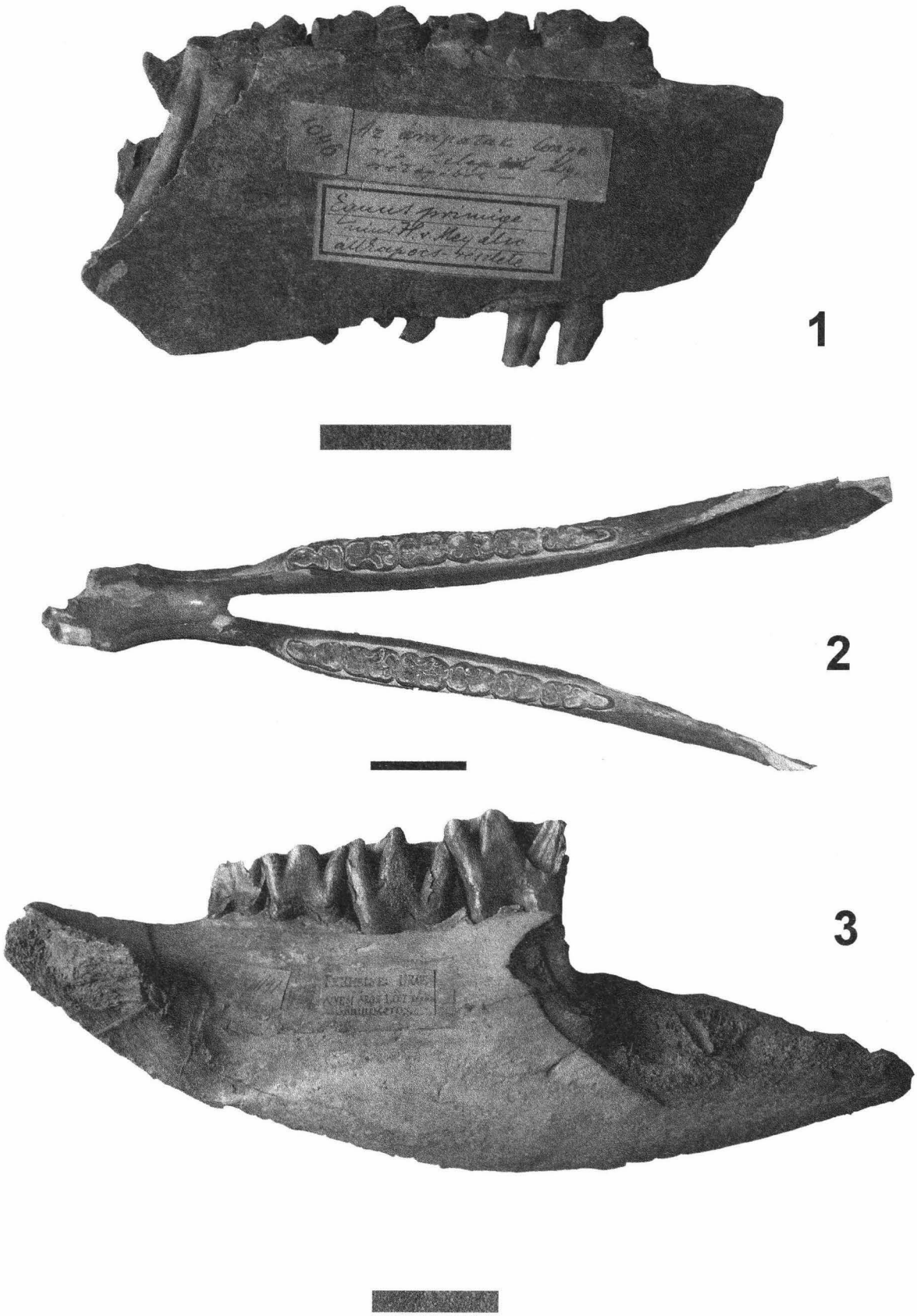

Plate III: Fig. 1 - *Equus* sp., Araci (AiM 1046); Fig. 2, *Equus* sp., Tur (AiM 999 + 1000); Fig. 3 - *Coelodonta antiquitatis* (BLUMENBACH 1799); Ormeniş (AiM 1041)

Planşa III: Fig. 1 - Equus sp., Araci (AiM 1046); Fig. 2, Equus sp., Tur (AiM 999 + 1000); Fig. 3 - Coelodonta antiquitatis (BLUMENBACH 1799); Ormeniş (AiM 1041)

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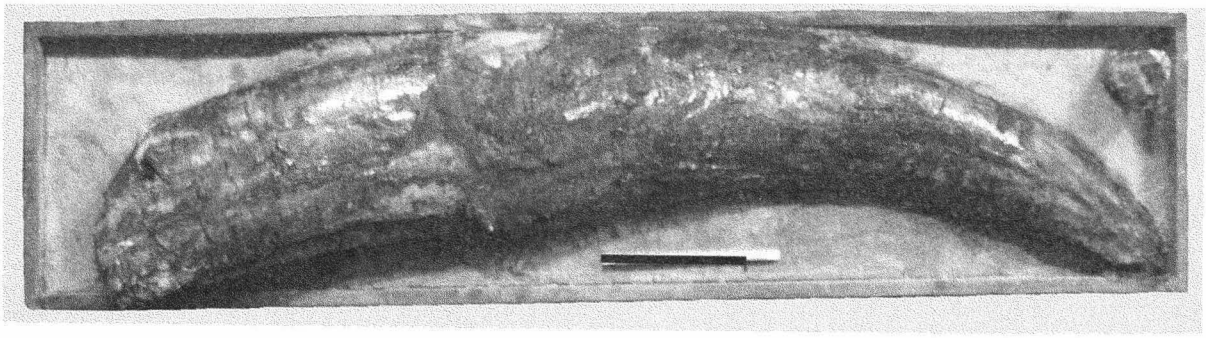

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Plate IV: *Mammuthus primigenius* BLUMENBACH 1799; Fig. 1, Cornești (AiM 410); Fig. 2-3, Râmeți-Olteni (AiM 1043); Fig. 4, Sânvăsii (AiM 1028)

Planșa IV: Mammuthus primigenius BLUMENBACH 1799; Fig. 1, Cornești (AiM 410); Fig. 2-3, Râmeți-Olteni (AiM 1043); Fig. 4, Sânvăsii (AiM 1028)

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A NEW MAMMOTH FINDING IN DOBROGEA

CURLIŞCĂ ANGELICA, CODREA VLAD

Abstract. A half mandible found in south Dobrogea at Ostrov, on the Danube right bank terrace gravel, document the presence of Mammuthus primigenius (BLUMENBACH 1799) in these Pleistocene deposits. Ostrov is a new locality for this species in this region.

Key words: Pleistocene, Dobrogea, wooly mammoth.

Rezumat. O nouă descoperire de mamut în Dobrogea. O hemimandibulă descoperită în Dobrogea de sud, în depozite de terasă de pe malul drept al Dunării la Ostrov, dovedeşte prezenţa speciei Mammuthus primigenius în aceste depozite Pleistocene. Localitatea menţionată este nou semnalată pentru această specie de proboscidian.

Cuvinte cheie: Pleistocen, Dobrogea, mamut.

INTRODUCTION

As in all Europe, the Pleistocene large herbivores findings are rather common in our country. Among them, the mammoths (*i.e.*, the *Mammuthus* genus representatives) are the most frequent. As a rule, the commonest fossils originating from these mammals are the cheek teeth. Their frequency can be explained by the peculiar teeth functionality in these proboscideans (it is well known the fact that along its lifetime, a mammoth was able to replace a worn cheek tooth by the following one trough ejection, pending the last molar) as well as by their high susceptibility to be fossilized. On the opposite, complete mammoth skeletons are practically missing in our country. Only skeletons parts had been discovered until now (*e.g.* APOSTOL, 1971; JURCSÁK & MOISI, 1983), none of them allowing the reconstruction of an entire individual.

A retrospective on the mammoth findings in Romania (PATTE, 1936; APOSTOL, 1968; PĂUNESCU, 2000, 2001) stress out the wooly mammoth (*Mammthus primigenius*) numerous findings. This fact is not unusual, as long as the deposits accumulated in the Pleistocene last glacial (Weichsel) are widespread in Romania, originating from a wide range of environments (cave fillings, river terraces, löess et.c.). The most numerous such fossils are issuing from Transylvania (JURCSÁK, 1983; VÖRÖS, 1983; PĂUNESCU, 2001) and Moldova, but their scarcity elsewhere could be falsified by the findings reports absence: it is trustworthy to believe that a large number of findings from Muntenia, Dobrogea or south Moldova remained unknown, as long as these fossils could be retrievable in school, local museums or even private collections.

In these circumstances, in southwest Romania the wooly mammoth remains extremely poor documented (APOSTOL, 1962; 1968). However, a recent mammoth finding on the right Danube bank at Ostrov (Constanta district), adds a new locality for this species in Dobrogea (Fig. 1).

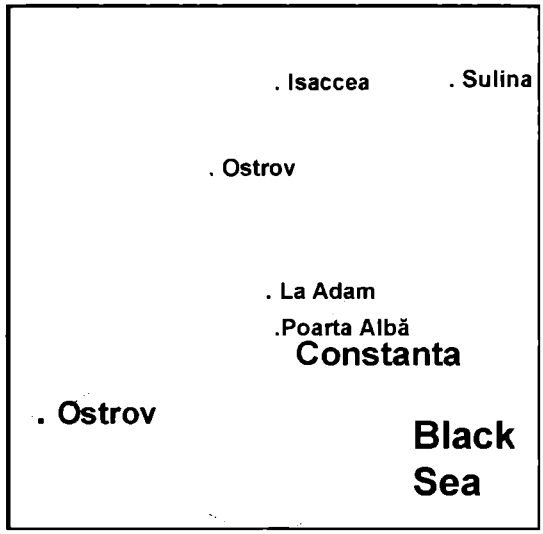

Figure 1. *Mammuthus primigenius* localities in Dobrogea
Figura 1. Localităţi cu *Mammuthus primigenius* în Dobrogea

This discovery concerns a half mandible, still preserving its m2. The fossil was found in gravel and sand, deposits probably representing a Danube terrace, located at Chiciu-Ostrov passing (390 km on Danube). It had been donated to one of us (A.C.) for study by MENAEV EVDOCHIA in March 2006. The fossil is curate in Museum of Natural Sciences Constanţa, inventory number 902/Paleontology Collection/346/2006.

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From structural viewpoint, this region belongs to the South Dobrogea block, part of the Moesian Platform. It involves a heteroclite metamorphic basement, covered by Paleozoic, Mesozoic and Cenozoic sedimentary covers accumulated during sedimentary cycles (IONESI, 1994). The Pleistocene is there mainly represented by löess draping the oldest rocks, in this manner hiding their contact relationships. However, besides löess, the fluvial terraces gravel and sand occur too, mainly on the banks of Danube and its tributaries.

SYSTEMATIC PALEONTOLOGY

Class Mammalia
Order Proboscidea ILLINGER 1811
Family Elephantidae GRAY 1821
Subfamily Mammuthinae SIMPSON 1845
Genus *Mammuthus* BURNETT 1830

Mammuthus primigenius (BLUMENBACH 1799)
(Plate I, figs. 1-2)

The wooly mammoth material available from Ostrov concerns a left mandible fragment. It preserves only the horizontal branch with m2, as well as its damaged symphysis area.

Only the m2 is preserved into its alveoli. It has a distal arched outline ("distal bogenförmig", in MUSIL, 1968, Abb. 12, 7). The tooth was nearly entirely worn (N = 17 and N_F = 17; wear stage B4 or even C, in BEDEN, 1979). The m1 had not been still ejected during the animal life. It was broken probably when the mandible fragment had been unearthed, because its roots are still remaining in their alveoli.

Dimensions (mm): length – 170+; width – 59 (at l_6); enamel thickness – 1.5; lamellar frequency (DLI) – 8.

The horizontal branch exposes a rather round mental foramen (14 mm in diameter). Its high before m1 is 130 mm, and its width in the same area, 135 mm.

CONCLUSION

The Ostrov fossil originated form a mature mammoth, probably belonging to an evolved form (according to its lamellar frequency and enamel thickness). Unfortunately, the poor stratigraphy of this finding does not allow an advanced discussion on the deposit yielding the fossil. Obviously, it is a Pleistocene Danube terrace, but for more details we would need additional data on this finding, for instance unfortunately, unavailable.

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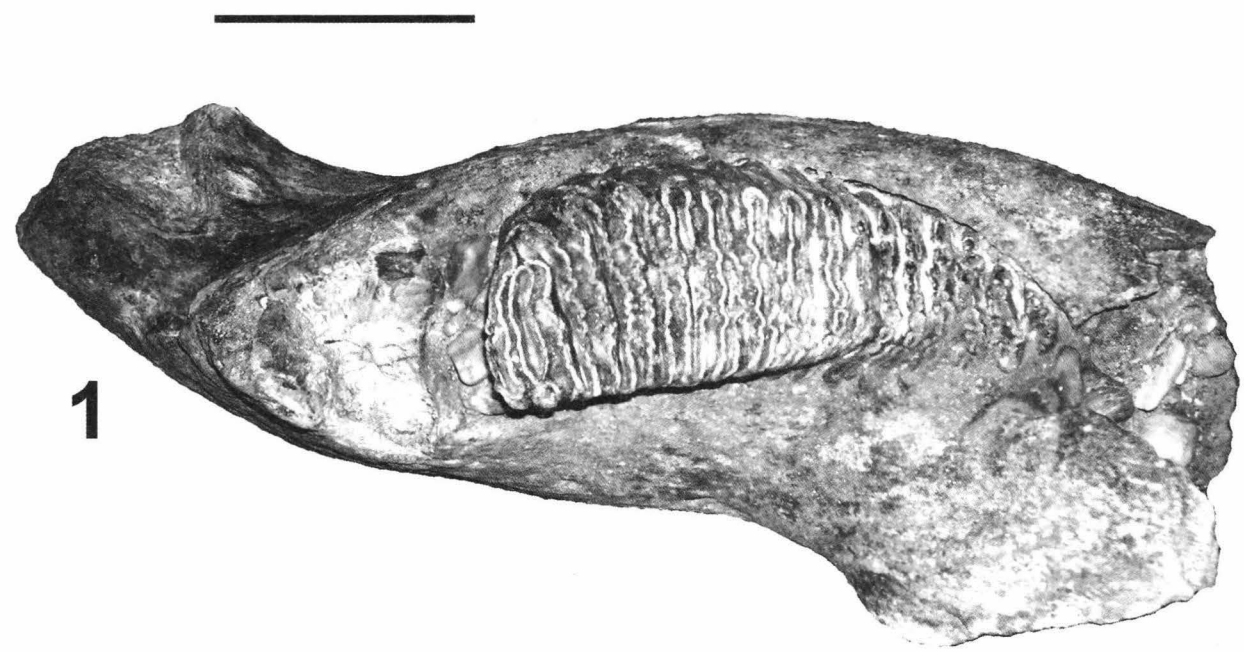

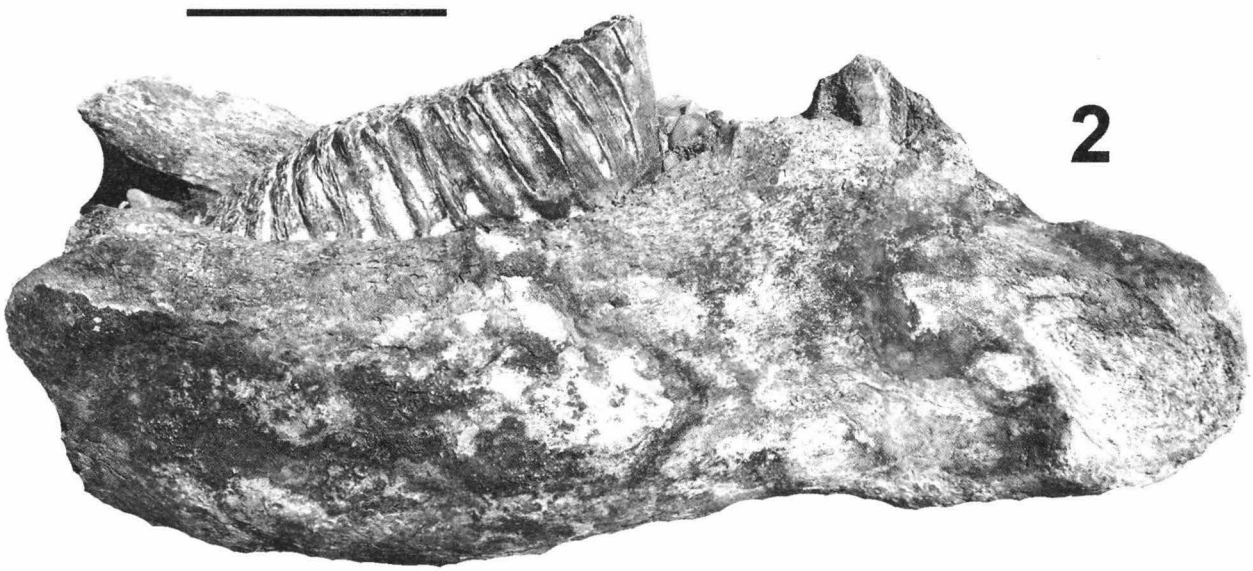

Plate I, figs. 1-2

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THE FLORISTIC REPERTORY OF THE MIO-PLIOCENE MACROFLORAS FROM DANUBE – MOTRU SECTOR (MEHEDINŢI DISTRICT)

FLORINA DIACONU

Abstract. The paper presents the results of the macrofloras researches achieved for reconstitution the conditions of the milieu existents during accumulation the mio-pliocene deposits from Danube – Motru sector. The floristic repertory of Mio-Pliocene floras from Danube-Motru sector had been based on the personal researches carried on in the period 2000-2007 just same sites: Batoţi, Crăguieşti, Cariera Husnicioara, Dedoviţa si Bâcleş. The floristic repertory of the mio-pliocene macrofloras from Danube – Motru sector contains 67 species, belonging to 33 genera, 22 families, 3 classes and 2 phylum. The paleoecological study of the floristic repertory of the mio-pliocene macrofloras from Danube – Motru sector indicated the presence of distinctive paleobiotopes: coniferous forest, deciduous forests, deciduous forests hygrophyte, river meadows and marsh.

Key words: macroflora, Mio-Pliocene, Danube-Motru sector, Mehedinţi

Rezumat. Repertoriul floristic al macroflorelor mio-pliocene din sectorul Dunăre – Motru (judeţul Mehedinţi). Lucrarea prezintă rezultatul cercetărilor macrofloristice întreprinse în vederea reconstituirii condiţiilor de mediu existente în timpul acumulării depozitelor miocen superior-pliocene din sectorul Dunăre – Motru. Repertoriul floristic al macroflorelor mio-pliocene din sectorul Dunăre – Motru a fost elaborat pe baza cercetărilor proprii efectuate în perioada 2000-2007, precum şi a cercetărilor anterioare în punctele foslifere: Batoţi, Crăguieşti, Cariera Husnicioara, Dedoviţa si Bâcleş. Repertoriul floristic cuprinde 67 de specii, repartizate în 33 genuri, 22 familii, 3 clase şi 2 încregături. Analiza paleoecologică a macroflorei identificate in sectorul Dunăre – Motru arată prezenţa unor paleobiotopuri distincte: pădure de conifere, pădure de foioase, pădure de foioase higrofite, pădure de luncă şi mlaştină.

Cuvinte cheie: macroflora, Mio-Pliocen, sector Dunăre-Motru, Mehedinţi

INTRODUCTION

Due to the large development of the lacustrine and palustre deposits, the Pliocene formations of Oltenia have rich fossil plants contents. This drew the attention of the paleobotanists even since the down of the geologic researches in this side of the country.

The first studies of the Pliocene flora of Oltenia belong to LAURENT & MARION (1898) who assigned some of the plants of the collection send by Ştefănescu to the famous paleobotanist G. Saporta. In his doctorate thesis, named "*Flora fosilă din Terţiarul Olteniei*" BARBU (1954) resumed all the previous researches carried out until his work in Oltenia, this synthesis being a keystone for each paleofloristic study in this area.

Ticleanu brought an important contribution to the paleobotanic researches of Oltenia (between 1982- 1992) and has had the first attempts to reconstruct the coal forming vegetation of Oltenia's Pliocene, which were mainly based on macroflora data. In 1992, in his doctorate thesis named „*Studiul genetic al principalelor zăcăminte de cărbuni neogeni din România pe baza paleofitocenozelor caracteristice, cu privire specială la Oltenia*", ŢICLEANU did a complete revision of all the former paleobotanic researches regarding the macroflora and Dacian vegetation from the Dacian Basin and settles the main coal forming paleophytocoenosys.

Pontian deposits

PETRESCU et al. (2002) were the first to study the fossil plant-bearing deposits from Batoţi (Mehedinti District) focusing on the exceptional palynologic content of the Early Pontian content. In this study, five species of macroflora have been identified: *Glyptostrobus europaeus* (BRONGNART) Unger, *Alnus kefersteini* (GOEPPERT) UNGER, *Salix varians* GOEPPERT, *Fagus pliocaenica* SAPORTA and *Quercus pseudocastanea* GOEPPERT.

The first macrofloral researches at Batoţi (ŢICLEANU et al., 2002) stressed out the following taxa: *Taxodium dubium* (SERNBERG) HEER, *Glyptostrobus europaeus* (BRONGNART) UNGER, *Platanus platanifolia* (ETTINGSHAUSEN) KNOBLOCH, *Alnus ducalis* (GAUDIN) KNOBLOCH, *Alnus cecropiaefolia* (ETTINGSHAUSEN) BERGER, *Betula insignis* GAUDIN, *Fagus silesiaca* WALTH. & ZAST., *F. pliocaenica* SAPORTA, *Quercus kovatsi* E. KOVACS, *Q. pontica* C. KOCH *miocaenica* KUBAT, *Quercus* cf. *macrantheroides* ANDREANSZKI, *Ulmus pyramidalis* GOEPPERT, *Pterocarya paradissiaca* (UNGER) Iljniskaya, *Populus populina* (BRONGNART) KNOBLOCH and *Byttneriophyllum tiliaefolium* (AL. BRAUN) KNOBLOCH & KVACEK.

Later, DIACONU (2002b) added seven new taxa to the floral list of this site: ?*Sequoia gigantea* L., *Liquidambar europaea* AL. BRAUN, *Castanea* cf. *crenata* SIEBOLD & ZUCCARINI, *Carya serraefolia* (GOEPPERT) KRAUSEL, *Acer integerrimum* (VIVIANI) MASSAL, *Vitis teutonica* AL. BRAUN, *Cornus* sp. and reconfirmed the presence of *Alnus cecropiaefolia* (ETTINGSHAUSEN) BERGER.

Corroborating the results of the previous researches DIACONU et al. (2004), pointed out the importance of micro-and macroflora from Batoţi in the frame of the paleofloristic heritage of Romania. The recent researches

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(DIACONU, 2004a, 2004b) reaching the conclusion, in the actual stage of the knowledge that Pontian flora from Batoți involves 50 taxa.

Recently, in 2005 was discovered a new fossil site at Crăguiești, were in Pontian deposits represent by clay marl, I identified 4 taxa: *Liquidambar europaea* AL. BRAUN, *Alnus* sp., *Betula insignis* GAUDIN and *Fagus silesiaca* WALTH.& ZAST. These researches are only at the beginning.

Dacian deposits

Although in the Danube - Motru sector the majority of the Pliocene deposits are sandy, because of the large development of the Berbesti Formation, even if in these were found fossil plants too, just like in the case of the fossil site from Dedovita, from were ȚICLEANU et al. (1982) described and illustrated a Dacian age flora with: *Pinus* sp., *Sequoia abietina* (BRONGNART) KNOBLOCH, *Glyptostrobus europaeus* (BRONGNART) Unger, *Alnus* sp., *Betula* cfr. *macrophylla* (GOEPPERT) HEER, *Carya serraefolia* (GOEPPERT) KRAUSEL, *Juglans acuminate* AL. BRAUN, *Salix integra* GOEPPERT , *Salix* sp. aff. *S. varianus* AL. BRAUN, *Liquidambar europaeum* AL. BRAUN, *Rhamnus* cfr. *gaudinii* HEER, flora with is considered by the authors belonging to the superior Dacian.

The fossil plants derive from the layer IV roof coal in Husnicioara open pit (Mehedinți District), were identified (DIACONU, 2000) the following taxa: *Byttneriophyllum tilliaefolium* (AL. BRAUN) KNOBLOCH & KVACEK, *Glyptostrobus europaeus* (BRONGNART) HEER, *Glyptostroboxylon tenerum*, *Salix ştefănescui* LAURENT & MARION, *Salix* sp., *Potamogeton* cf. *nodosus* POIR, *Phragmites oeningenussis* AL. BRAUN, *Ceratophyllum* sp. aff. *C. demersum* LINNÉ, *Quercus* sp. and *Acer* sp.

Later, in the same site, but above layer VI (DIACONU, 2002a) identified the following species: *Byttneriophyllum tilliaefolium* (AL. BRAUN) KNOBLOCH & KVACEK, *Glyptostrobus europaeus* (BRONGNART) HEER. Recently researches (DIACONU & TICLEANU, in press) were discovered in the adjacent layer IV deposits of coal, a three species of *Pandanus*, and above layer VI of coal was identified *Carya denticulata* (WEBER) ILJINKAIA, *Platanus platanifolia* (ETTINGSHAUSEN) KNOBLOCH and *Carpinus betulus* LINNÉ.

The deposits of the layer IV coal in Husnicioara open pit, (PETRESCU et al, 1989) were also researched palynology viewpoint. The palyonology researches were interpreted from a paleoclimatic viewpoint reaching the following conclusions: arctotertiary elements (*Sciadopitys*, *Picea*, *Tsuga*, *Pinus* s. *diploxylon*, *Carpinus*, *Fagus*, *Ulmus*, *Compositae* etc.) and intermediate ones (*Cedrus*, *Carya*, *Pterocarya*, *Zelkova* ş.a.) are dominated, but the thermophile elements (*Myrica*, *Reevesia*) are sporadically.

Romanian deposits

On Romanian deposits from Bâcleş (Mehedinți District), which are constituted by clays and silt clays, TICLEANU et al. (2001) determinate the following species: *Taxodium dubium* (STERNBERG) HEER, ?*Platanus platanifolia* (ETT.) KNOBLOCH, *Ulmus laevis* LINNÉ, *Quercus roburoides* GAUDIN, *Quercus* cf. *muehlembergii* ENGELMAN, *Carya serraefolia* (GOEPPERT) KRAUSEL, *Acer* cf. *tricuspidatum* BRONN. and *Salix* sp. At the floral list of this site DIACONU (in ENCIU et al., 2006) added four new taxa: ?*Sequoia abietina* (BRONGNART) Knobloch, *Ulmus pyramidalis* Goeppert, *Acer* cf. *campestre* LINNÉ and *Alnus* sp.

MATERIAL AND METHOD

The fossils had been collected from clay and siltic clay from the Batoți site, on clay marl from Crăguiești, from the gray clay in layer IV and VI coal roof at Husnicioara open pit, from clay marl at Dedovița and the silt clay from Bâcleş (fig. 1).

The floristic repertory of Mio-Pliocene floras from Danube-Motru sector had been based on the personal researches carried on in the period 2000-2007 just same sites.

RESULTS AND DISCUSSIONS

The floristic repertory of the mio-pliocene macrofloras from Danube – Motru sector contains 67 species, belonging to 33 genera, 22 families, 3 classes and 2 phylum (Table 1). The paleoecological study of the floristic repertory of the mio-pliocene macrofloras from Danube – Motru sector indicated the presence of distinctive paleobiotopes: coniferous forest, deciduous forests, deciduous forests hygrophyte, river meadows and marsh.

Table 1. Floristic repertory of Mio-Pliocene macrofloras from Danube-Motru sector
Tabel 1. Repertoriul floristic almacroflorelor mio-pliocene din sectorul Dunăre – Motru

Phyllum	Class	Family / Genus	Species	Actual correspondent	paleobiotop	Sites				
						BT (P)	CR (P)	HS (D)	DD (D)	BC (R)
Pt	Pt	**Pinaceae**	*Pinus* sp. - binae		CF	+			+	

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		Pinus	*Pseudotsuga* cf. *taxifolia* BRITT.	*P. taxifolia* BRITT.	CF	+				
		Taxodiaceae Sequoia	?*Sequoia gigantea* LINNÉ	*S. gigantea* LINNÉ	CF	+				
			Sequoia abietina (BRONGNART) KNOBLOCH	*S. sempervirens* (LAUB.) ENDL.	CF				+	+
		Taxodium	*Taxodium dubium* (STERNBERG) HEER	*T. distichum* RICH.	RM	+				+
		Glyptostrobus	*Glyptostrobus europaeus* (BRONGNART) UNGER	*G. pensilis* (STOUNT) KOCH	M	+		+	+	
MAGNOLIOPHYTA	MAGNOLIATAE	**Magnoliaceae** Magnolia	*Magnolia* sp. aff. *M. acuminata* LINNÉ	*M. acuminate* LINNÉ	DF	+				
		Lauraceae Sassafras	*Sassafras subtriloba* (KONNO) TANAI et ONOE	*S. tzumu* HEMSL *S. sassafras* KRARST	DF	+				
		Ceratophylaceae Ceratophyllum	*Ceratophyllum* sp. aff. *C. demersum* LINNÉ	*C. demersum* LINNÉ	M			+		
		Hamameliadaceae Liquidambar	*Liquidambar europaea* AL. BRAUN	*L. styraciflua* LINNÉ	M	+	+		+	+
		Platanaceae Platanus	*Platanus platanifolia* (ETTINGSHAUSEN) KNOBLOCH	*P. occidentalis* LINNÉ	RM	+		+		+
		Betulaceae Alnus	*Alnus cecropiaefolia* (ETTINGSHAUSEN) BERGER	Uncertain	DFh	+				
			Alnus ducalis (GAUDIN) KNOBLOCH	*A. serrulata* (AIT.) WILD.	DFh	+				
			Alnus sp.		DFh	+	+		+	+
		Betula	*Betula insignis* GAUDIN	*B. luminifera* WINKLER	DF	+	+			
			Betula pseudoluminifera GIVULESCU	*B. luminifera* WINKLER	DF	+				
			Betula cfr. *macropylla* (GOEPPERT) HEER	*B. papryfera* MARSHAL	DF				+	
		Carpinus	*Carpinus grandis* UNGER	*C. betulus* LINNÉ	DF	+			+	
			Carpinus betulus LINNÉ	*C. betulus* LINNÉ	DF			+		
			Carpinus betulus LINNÉ - bractee	-	DF			+		
			Carpinus pyramidalis GAUDIN - bractee	*C. betulus* LINNÉ	DF				+	
		Ostrya	*Ostrya* sp. aff. *O. virginiana* (MILLER) C. KOCH	*O. virginiana*	DF	+				
		Fagaceae Fagus	*Fagus silesiaca* WALTH. ET ZAST.	*F. grandifolia* HER.	DF	+	+		+	
			Fagus sylvatica LINNÉ	*F. sylvatica* LINNÉ	DF	+				
			Fagus pliocaenica SAPORTA	*F. silvatica* LINNÉ	DF	+				
		Castanea	*Castanea* cf. *sativa* MILLER	*C. sativa* MILLER	DF	+				
			Castanea kubinyii KOVATS	*C. vesca* GAERTN.	DF	+				
			Castanea gigas (GOEPPERT) ILJINKAIA		DF	+				
			Castanea atavia UNGER	*C. sativa* MILLER	DF	+				
			Castanea cf. *crenata* SIEBOLD et ZUCCARINI	*C. crenata* SIEBOLD & ZUCCARINI	DF	+				
		Quercus	*Quercus drymeja* UNGER	*Q. serrata* THBG.	DF	+				
			Quercus pontica C. KOCH *miocaenica* KUBAT	*Q. pontica* C. KOCH	DF	+				
			Quercus cf. *kodorica* KOLAKOVSKI	*Q. mirbeckii* şi *Q. hartwissiana*	DF	+				
			Quercus cf. *macrantheroides* ANDREANSZKY	Uncertain	DF	+				
			Quercus kovatsi E. KOVACS	*Q. petraea* (MATT.) LIEBL.	DF	+				
			Quercus cf. *pseudocastanea* GOEPPERT	*Q. muehlenbergii* ENGELMANN	DF	+				
			Quercus cf. *muehlenbergii* ENGELMANN	*Q. muehlenbergii* ENGELMANN	RM	+				+

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			Quercus roburoides GAUDIN	*Q. robur* LINNÉ	DF				+	+
			Quercus sp.		DF	+				
		Ulmaceae Ulmus	*Ulmus pyramidalis* GOEPPERT	*U. americana* Wild.	RM	+				+
			Ulmus leavis LINNÉ	*U. leavis* LINNÉ	RM					+
		Zelkova	*Zelkova zelkovefolia* (UNGER) BUZEK ET KOTLABA	*Z. crenata* Spach – *Z. carpinifolia* PALLAS	DF	+				
		Myricaceae	? *Myrica lignitum* (UNGER) SAPORTA	*M. californica* CHAM. & SCH.	M			+		
		Juglandaceae Juglans	*Juglans acuminata* AL. BRAUN	*J. regia*	DF	+		+		
		Carya	*Carya serraefolia* (GOEPPERT) KRAUSEL	*C. amara* şi *C. tementosa*	RM	+			+	+
			Carya denticulata (WEBER) ILJINSKAIA	*C. tomentosa, C. amara* and *C. ovata*	RM			+		
			Pterocarya paradisiaca (UNGER) ILJINSKAIA	*P. caucasiaca* C. A. MEY.	RM	+				
		Aceraceae Acer	*Acer tricuspidatum* BRONN	*A. ruburum* LINNÉ	DF	+				+
			Acer integerrimum (VIVIANI) MASSAL	*A. pictum* THBG.	RM	+				
			Acer cf. *campestre* LINNÉ	*A. campestre* LINNÉ	DF	+				
		Rhamnaceae Berchemia	*Berchemia multinervis* (AL. BRAUN) HEER	*B. volubilis* D.C.= *B. scadens* (HILL.) C. KOCH	DF	+				
		Rhamnus	*Rhamnus* cf. *gaudini* HEER	*R. grandifolius* FISCH. & MEYER	DF	+			+	
		Vitaceae Vitis	*Vitis teutonica* AL. BRAUN	*V. cordifolia* MICHX. şi *V. vulpina* L. *V. cordifolia*	DF	+				
		Cornaceae/Cornus	*Cornus sp.*	*C. mas*	DF	+				
		Silicaceae Populus	*Populus populina* (BRONGNART) KNOBLOCH	*P. canadensis* MOENCH.	RM	+				
		Salix	*Salix integra* GOEPPERT		RM				+	
			Salix sp. aff. *S. varians* AL. BRAUN	*S. fragilis* LINNÉ	RM				+	
			Salix varians GOEPPERT	*S. fragilis* LINNÉ	RM	+				
			Salix sp.		RM	+		+		+
		Sterculiaceae Byttneriophyllum	*Byttneriophyllum tiliaefolium* (AL. BRAUN) KNOBLOCH ET KVACEK	Not have	M	+		+	+	
		Ebenaceae Diospios	*Diospyros anceps* HEER	*D. virginiana* LINNÉ	DF	+				
		Caprifoliaceae Lonicera	*Lonicera* sp.	Not have	DF	+				
	LILIATAE	**Gramineae** Phragmites	*Phragmites oeningensis* AL. BRAUN	*Ph. communis* TRIN.	M	+		+		
		Typhaceae Typha	*Typha latissima* A. BRAUN	*T. latifolia* LINNÉ	M	+		+		
		Pandanus	*Pandanus austriacus* ETTINGSHAUSEN		M			+		
			Pandanus trinervis ETTINGSHAUSEN		M			+		
			Pandanus barbui PETRESCU & DUSA		M			+		
TOTAL		**22** **33**	**67**			**52**	**4**	**15**	**15**	**12**

Legend:
Paleobiotopes: coniferous forest (CF), deciduous forests (DF), deciduous forests hygrophyte (DFh), river meadows (RM), marsh (M)
Sites: Batoţi (BT) Crăguieşti (CR), Husnicioara (HS), Dedoviţa (DD), Bâcleş (BC)
Geological age: Pontian (P), Dacian (D), Romanian (R)

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CONCLUSIONS

In this study were analyzed the researches issued from the following sites: the Early Pontian deposits from Batoţi and Crăguieşti, the Early Dacian deposits from Husnicioara open pit, the Superior Dacian deposits from Dedovita and the Romanian deposits from Bâcleş. At Batoţi, Dedoviţa and Crăguieşti the decidous forest are dominating, at Bâcleş the river meadows, but at Husnicioara open pit marsh played the main role.

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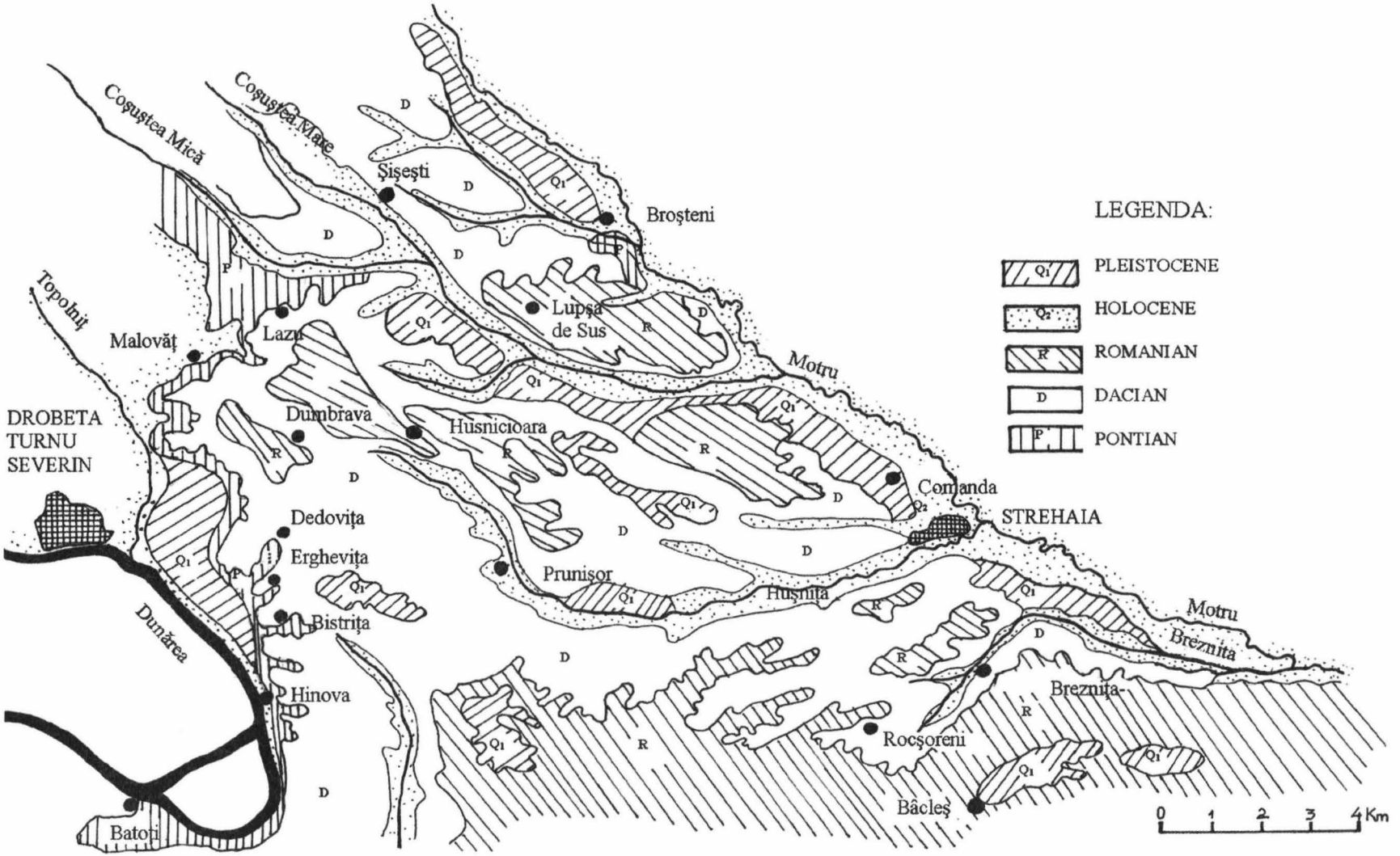

Fig. 1 Map geologic of the Danube—Motru sector

Fig. 1 Harta geologica a sectorului Dunăre—Motru

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LE PONTIEN DE CUJMIR (DEP. MEHEDINŢI)

CONSTANTIN ENACHE, AURELIAN POPESCU

Abstract. From the deposits cropping out in an open-pit located on the left terrace on the river Drincea, around Cujmir (Mehedinti district), several samples of mollusc shells had been collected. They belong to the following species: *Dreissena rostriformis, Dreissena rimestiensis, Plagiodacna carinata, Pontalmyra subcarinata, Tauricardium petersi nasyrica, Tauricardium baraci.* These samples prove the Upper Pontian (Bosphorian) age of the formation they originated from.

Key words: Oltenia, Cujmir, Late Pontian, molluscs.

Rezumat. Ponţianul de la Cujmir (jud. Mehedinţi). Din depozitele care aflorează într-o carieră aflată în terasa de pe malul stâng al Drincei, pe raza localităţii Cujmir (jud. Mehedinţi), au fost recoltate cochilii aparţinând speciilor: *Dreissena rostriformis, Dreissena rimestiensis, Plagiodacna carinata, Pontalmyra subcarinata, Tauricardium petersi nasyrica, Tauricardium baraci*, care atestă vârsta ponţian superioară a formaţiunilor în care au fost descoperite.

Cuvinte cheie: Oltenia, Cujmir, Ponţian superior, moluşte;

HISTORIQUE DES RECHERCHES

Dans la région qui s'étend entre Hinova – Batoţi – Izvoarele – Salcia – Cetate – Basarabi – Cujmir – Corlăţel, les dépôts pontiens ont été interceptés dans des forages, mais ils affleurent aussi à Hinova, Batoţi, Isvoru Frumos, Salcia, Gruia, Vraţa, Cetate, Basarabi, Viaşu, Pătulele et Cujmir. Dans ce secteur, les sous-divisions suivantes ont été établies (GHENEA et al., 1963):

I. le Pontien inférieur, représenté par des marnes compactes, violâtres, qui se brisent dans des plaques et par des argiles grises qui apparaissent couramment à Batoţi, Isvoru Frumos, Viaşu, Cetate, Basarabi et Calafat. De ces dépôts ont été cités: *Paradacna abychi* (HOERNES), *Valenciennius* annulatus ROUSSEAU, *Dreissena rostriformis* DESHAYES, *Congeria* sp.

II. le Pontien supérieur, représenté par des alternances d'argiles sablonneuses et de sables argileux, parfois avec des intercalations de grès friables qui apparaissent couramment chez Hinova, où a été identifié l'association faunique suivante : *Phyllocardium planum planum* (DESHAYES), *Tauricardium subsquamulosum* ANDRUSSOV, *Arpadicardium peregrinum* EBERZIN, *Bosphoricardium emarginatum* DESHAYES, *Tauricardium petersi* HOERNES, *Limnocardium banaticum* (FUCHS), *Pterodacna edentula* DESHAYES, *Caladacna steindachneri* (BRUSINA), *Pontalmira subcarinata* (DESHAYES), *Dreissenomya aperta* (DESHAYES), *Dreissena rostriformis* (DESHAYES), *Dreissena rimestiensis* (FONTANNES), *Viviparus achatinoides achatinoides* DESHAYES, *Valenciennius annulatus* ROUSSEAU, *Melanopsis decollata* STOLICZKA, *Hydrobia pontilitoris* WENZ, *Bulimus speciosus* COBALCESCU.

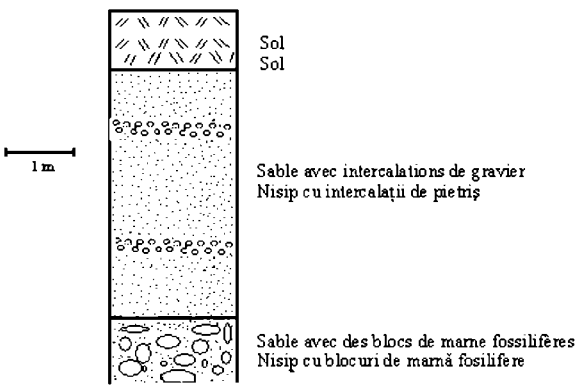

Figure 1. Colonne lithologique de la carrière de Cujmir
Figura 1. Coloana litologică a carierei de la Cujmir

Dans le forage de Scăpău, on a rencontré le Pontien inférieur en facies argileux, avec *Paradacna abichi* (HOERNES), *Dresissena rostriformis* şi *Valenciennius* sp. (PANA IOANA et al., 1981) tandis que dans les forages de Rast - Ghidici, à la profondeur de 140 m, on est entré dans des marnes pontiennes contenant : *Pseudocatillus pseudocatillus* (BAR. DE MARNY), *Caladacna steindachneri*, *Congeria* sp. Dans un autre forage, de Corlaţel, on est entré dans le Pontien entre 145-386 m, représenté par une alternance d'argiles, marnes argileuses et sables à *Paradacna abychi*, *Valenciennius annulatus* et *Phyllocardium planum planum*.

LE PONTIEN DE CUJMIR

Les dépôts pontiens qui affleurent dans la vallée Drincea chez Cujmir ont été connus, comme on a déjà montré, d'avance, mais la faune qu'ils contiennent n'a pas été mentionnée.

À l'occasion des recherches entreprises par l'un d'entre nous (A. POPESCU) à Cujmir, ces dépôts ont été décrits et on a collecté des spécimens de leur faune contenue qui a été ultérieurement déterminée.

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Les dépôts pontiens se trouvent à la base d'une vieille carrière de gravier et de sable située dans la terrasse gauche de Drincea, à 500 m du fil de l'eau, et sont formés des sables jaunâtres avec des blocs sous-arrondis, aux dimensions arrivant jusqu'à 20-30 cm, constitués d'une marne jaunâtre-rougeâtre très dure. Dans ces blocs on a trouvé les mollusques pontiennes. Il ya a ensuite 4 m de sables grossiers, grisâtres, gris-blanchâtres, faiblement consolidés par endroits, avec des intercalations (30 cm) de gravier avec des elements sous-arrondis, ayant un diamètre de 1-2 cm. La colonne s'achève par une couche d'environ 1 m de sol gris-noirâtre (fig. 1).

Du matériel collecté on a décrit et figuré les espèces suivantes :

Classe BIVALVIA

Sous-famille DREISSENACEA
Genre *Dreissena* EBERZIN, 1835

Dreissena rostriformis (DESHAYES), 1838
Pl.1 fig.1
1898 *Dreissena rostriformis* ANDRUSOV, p. 262, pl. 14, fig. 1, 32
1942 *Dreissena rostriformis* WENZ, p. 118, pl. 60, fig. 626-632
1981 *Dreissena rostriformis* IOANA PANA, ENACHE, ANDREESCU, p. 64-65, pl. 43, fig. 8-11

Coquille longue de 15-17mm, aux valves convexes, ovales, à umbo terminal, recourbé avec un rostrum. La largeur maximale de la coquille se trouve dans sa moitié inférieure. La marge dorsale est fortement incurvée, la marge ventrale à un sinus sous l'umbo, puis fortement convexe.

Dreissena rimestiensis (FONTANNES) 1886
Pl.1 fig.2
1886 *Dreissena Rimestiensis* FONTANNES, p. 347, pl. 26, fig. 62-64
1896 *Dreissena rimestiensis* SABBA ŞTEFANESCU, p. 73, pl. 7, fig. 7-12
1942 *Dreissena rimestiensis* WENZ, p. 119, pl. 61, fig. 633-642
1981 *Dreissena rimestiensis* IOANA PANĂ, ENACHE, ANDREESCU, p. 64, pl. 43, fig. 12-16

Coquille longue de 20-22 mm, aux valves ovales allongées, un peu bombées, petit umbo terminal. La zone centrale et dorsale de la coquille un peu arquée.

Superfamille CARDIACEA
Famille LIMNOCARDIIDAE
Genre *Plagiodacna* ANDRUSOV 1903

Plagiodacna carinata (DESHAYES) 1838
Pl.1. fig.3
1874 *Cardium carinatum,* R. HOERNES, p.64, pl.5, fig.1
1957 *Plagiodacna carinata* EBERZIN, p. 76, pl.13, fig. 1-6
1981 *Plagiodacna carinata* IOANA PANĂ, ENACHE, ANDREESCU, p. 66-67, pl. 52, fig. 10

Coquille de taille moyenne, ovale-trapézoïdale, petit umbo, placé à la partie anterieure. La surface couverte par 19-22 côtes planes, séparées par des espaces intercostales plus étroites. Les valves convexes fortement non-équilatérales, à la marge cardinale droite.

Genre *Pontalmyra* SABBA 1896

Pontalmyra subcarinata (DESHYES) 1838
Pl.1 fig.4
1896 *Pontalmyra constantiae* SABBA ŞTEFANESCU, p. 70, pl. 6, fig. 30-31
1910 *Plagiodacna subcarinata* ANDRUSOV, p. 62, pl. 2, fig. 10-19
1918 *Plagiodacna constantiae* IONESCU-ARGETOAIA, p. 418, pl. 13
1942 *Didacna subcarinata subcarinata* WENZ, p. 131, pl. 67, fig. 702-704
1962 *Didacna (Pontalmyra) subcarinata* EBERZIN, DEVELAIA; p. 93, pl. 18, fig. 1-2
1981 *Pontalmyra subcarinata* IOANA PANA, ENACHE, ANDREESCU, p. 68-69, pl. 51, fig. 4-6

Des valves sous-quadrangulaires, aplaties, non-équilatérales, à umbo aigu, triangulaire, déplacé antérieurement. Une carène faiblement distinguée, qui descend de l'umbo à la marge inférieure de la valve, sépare le champ antérieur, développé, du champ postérieur. La surface de la valve couverte par 22-24 côtes aplaties, séparées par des espaces intercostales linéaires. Présente en Bosphorien.

Genre *Tauricardium* ANDREESCU, 1981
Tauricardium petersi nasyrica EBERZIN 1947

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Pl.1 fig. 6

1947 *Limnocardium (Tauricardium) subsquamulosum* var. *nasirica* EBERZIN, p. 47, pl.II, fig. 3, 5

1981 *Tauricardium petersi nasirica* IOANAPANA, ENACHE, ANDREESCU, p. 92-93, pl. 51, fig. 9

Coquille grande, haute, ovale-arrondie, à l'umbo un peu haut, déplacé antérieurement. La partie antérieure arrondie-tronquée, la partie postérieure allongée, plus étroite. La surface des valves couverte par 10-12 côtes arrondies, qui distinguent cette espèce de *Tauricardium olteniae.*

Présente en Bosphorien.

Tauricardium baraci (BRUSINA) 1884

Pl.1 fig.7

1884 *Adacna Baraci* BRUSINA, p. 156, pl. XXVIII, fig. 42

1918 *Cardium baraci* IONESCU-ARGETOAIA, p. 36, pl. XII, fig. 5

1956 *Limnocardium (Tauricardium) baraci,* NIŢĂ PION, fig. 16-17

2000 *Limnocardium (Tauricardium) baraci,* FLORINA DIACONU; ENASCHE, p. 39-40 pl. 2, fig. 2, 5.

Coquille presque circulaire, très convexe, au bord cardinal droit et les marges fortement arquées. La surface de la coquille avec 9 côtes radiaires médianes et trois postérieures souvent effacées. Les côtes s'élargissent vers le bord paléal. L'umbo quasi-central, projeté en avant. Présente en Bosphorien.

CONCLUSIONS

Les espèces déterminées attestent l'existence du Pontien supérieur (Bosphorian) chez Cujmir. Parmi les éspeces rencontrées, *Tauricardium baraci, Tauricardium petersi nasirica, Plagiodacna carinata* et *Pontalmyra subcarinata,* sont caractéristiques pour le Pontien supérieur (Bosphorien).

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Planche 1
Planşa 1

Figure 1. *Dreissena rostriformis* (DESHAYES) 1838

Figure 2. *Dreissena rimestiensis* (FONTANNES) 1886

Figure 3. *Plagiodacna carinata* (DESHAYES) 1838

Figure 4. *Pontalmyra subcarinata* (DESHAYES) 1838

Figure 5. *Tauricardium peterssi nassirica* EBERZIN, 1947

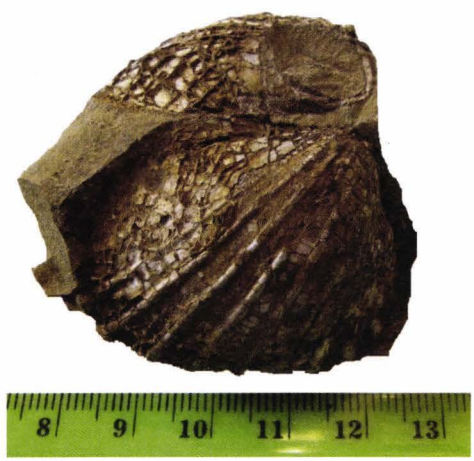

Figure 6. *Tauricardium baraci* (BRUSINA) 1884

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NEW DATA ON THE CAVE HYENA (*Crocuta crocuta spelaea* GOLDFUSS 1832) FROM MUIERII CAVE (BAIA DE FIER, GORJ DISTRICT, ROMANIA)

EMANOIL ŞTIUCĂ, AURELIAN POPESCU, ALEXANDRU PETCULESCU

Abstract. A new approach on the representatives of the Pleistocene *Crocuta* genus is presented in this paper. The main morphological and dimensional data are here discussed and reinterpreted on the basis of new information. We underline the defining characteristics of the subspecies *C. crocuta spelaea*, thus allowing a good differentiation from the other subspecies.
We remark the presence of an archaic feature (the existence of a well represented metaconid at the lower carnassial) at Baia de Fier fossils. We accept and reconfirm the existence of the subspecies *C. c. intermedia* during Medium Pleistocene. We analyze certain features that could be defining from the chronostratigraphic point of view.

Key words: Mammalia, Hyaenidae, Taxonomy, Pleistocene.

Rezumat. Noi date asupra hienei de peşteră (*Crocuta crocuta spelaea* GOLDFUSS 1832) din Peştera Muierii de la Baia de Fier (Gorj, România). O nouă privire asupra reprezentanţilor genului *Crocuta* din Pleistocen este abordată în această lucrare. Principalele date morfologice şi dimensionale sunt luate în discuţie şi reinterpretate pe baza noilor cunoştinţe. Caracterele definitorii ale subspeciei *C. crocuta spelaea* sunt subliniate permiţând astfel o buna diferenţiere faţă de celelalte subspecii.
Este remarcată prezenţa unui caracter arhaic (existenţa unui metaconid bine reprezentat la carnasiera inferioară) la fosilele de la Baia de Fier. Este acceptata şi reconfirmată existenţa subspeciei *C. c. intermedia* în timpul Pleistocenului mediu, şi se analizează unele caractere ce pot fi definitorii din punct de vedere cronostratigrafic.

Cuvinte cheie: Mammalia, Hyaenidae, Taxonomie, Pleistocen.

INTRODUCTION

The sub-family Hyaenidae is currently represented by two genera, *Hyaena* BRISSON 1762 and *Crocuta* KAUP 1828, whose evolution from Miocene to Pleistocene gave many forms, whose phylogeny we are going to discuss. After SOERGEL (1936) and ARAMBURG (1958), the Würmians hyena forms are, from the size point of view, very close to the current spotted hyena. On the contrary, our opinion is that the fossil species is different from the actual one by its heavy skeleton, its massive canines and premolars and its thick dentition. The fossil forms have distinct archaic features (the relatively high frequency of the metaconid on the lower carnassial, the symmetry of the two lobes at the same tooth, the large difference between the size of the premolar 4 and that of the molar 1) that we no longer encounter in actual taxa.

Although hyenas are not exactly rare in the caves of Romania, they have a considerable palaeo-environmental importance.

Location

Pestera Muierii (Muierii Cave) is geographically located in the Getic Depression of Oltenia, on the territory of the commune Baia de Fier, Gorj County, at the entrance of the Galben river quay, on its right side.

Muierii Cave belongs to the karstic zone Polovragi-Cernadia, situated in the south of Parâng and Căpăţânii Mountains. Peştera Muierilor is located at the altitude of 500m and it looks like a multilayered cavity.

Research history

Between 1924-1929, with some breaks, C.S. NICOLĂESCU-PLOPŞOR undertakes a series of research works which, after the discovery of some white objects made of quartzite and of several manufactured silexes (pointes à main), whose shape and technique reminded of the musterian industry from the Ohaba Ponor, led to the conclusion that the cave played the role of a shelter for the Paleolithic man. Also at this stage, skeleton samples from *Ursus spelaeus, Canis lupus* and *Equus caballus fossilis* were discovered. At this stage, the first two floors of the cave were identified: the first floor, with the Main Gallery, and the second floor, with the Musterian Gallery.

Between 1951-1957, the cave was studied by a complex team of researchers (C.S. Nicolăescu-Plopşor, Margareta Dumitrescu, T. Orghidan, J. Tanasachi, Val. Puşcariu and others). Most of that year's diggings ere focused on the Musterian Gallery. The same year the third floor was discovered, the "Bears' Gallery", which is the paleontological treasure of the cave.

The filling deposit

The filling deposit of the galleries in Muierii Cave is made of calcareous degradation materials, in the surface levels, and, in the deeper levels, it is made of materials transported and deposited by infiltrated streams, also of remains from bones and vital activities of animals that lived in the cave, as well as from human contributions.

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The testing made in 1951 at the cave's entrance revealed, under the holocene detritus layer, a stratum of argil and sand, with calcareous detrital elements, which goes on until it reaches the calcareous bed.

In the Musterian Gallery, the filling material is represented by a sandy yellow-brown argil, mixed with elements of calcareous gravel, the whole formation having the thickness of 0,5m. In the Bears' Gallery, the skeleton material is covered by the calcareous crust or by a fine yellow-orange, yellow-grey argil, which, near the bottom of the gallery, lies straight on the calcareous bed.

The guano deposit also covers considerable surfaces, sometimes with thickness of tens cm.

The Quaternary mammal association at Baia de Fier

The large mammal fauna at Baia de Fier was researched by Gh. Bombiţă, who published in 1954 the paper *Mammals in the glacial of the caves at Baia de Fier*, which comprises the elements discovered in 1951. The list of the species contains: *Felis spelaeus* (*Felis leo spelaea* GOLDFUSS), *Felis pardus* (*Felis pardus spelaea* KOCH), *Felis silvestris* SCHREBER, *Hyaena crocuta spelaea* GOLDFUSS, *Canis lupus spelaeus* GOLDFUSS, *Canis vulpes fossilis* GOLDFUSS, *Ursus spelaeus* BLUMENBACH, *Mustela martes* LINNAEUS, *Gulo spelaeus* GOLDFUSS, *Lutra vulgaris* LINNAEUS, *Sus scrofa* LINNAEUS, *Bos taurus* LINNAEUS, *Capra ibex fossilis* NEHRING, *Equus caballus fossilis* LINNAEUS, *Castor fiber* LINNAEUS, *Rhinoceros tichorhinus* CUVIER, *Mammuthus primigenius* BLUMENBACH.

The species of large mammals in Peştera Muierilor were attributed to the last glacial Würm cycle, being located on two stratigraphic levels: the lower, musterian one (*Ursus spelaeus, Hyaena crocuta, Felix leo* LINNAEUS, *Felix (Linx) pardina* TEMMINCK, *Felix pardus* LINNAEUS, ***Canis lupus spelaeus, Canis vulpes fossilis,*** *Bison priscus* BOJAN, *Saiga tatarica* LINNAEUS, *Capra ibex* LINNAEUS, *Rupicapra tragus* GRAY, *Mustela martes* LINNAEUS) and the upper, aurignacian one.

The second, ochre-reddish level pleads, through its fauna content, for the cooling of the climate: *Ursus spelaeus*, *Felix leo*, *Hyaena crocuta, Canis lupus spelaeus, Felix (Linx) pardina, Felix pardus, Canis vulpes fossilis, Bison priscus*, *Saiga tatarica, Mustela martes, Cervus (megaceros) euriceros* ALDROW.

The paleontological material belonging to micromammals that resulted after diggings at Baia de Fier comes from the Musterian Gallery and from the entrance area of the cave.

In the Musterian Gallery, an association of *Cricetus cricetus*, *Arvicola terrestris* and *Microtus arvalis* was identified, with the age attributed to the end of the isotopic stage 5 (RĂDULESCU & al., 1999).

From the sequence that covers the levels with Upper Paleolithic industry (Aurignacian) at the cave's entrance (NICOLĂESCU-PLOPŞOR & al., 1957), TERZEA (1972) determines *Chionomis nivalis*, *Microtus agrestis*, *Cricetus cricetus*, *Ochotona pusilla*. RĂDULESCU et al. (1999) also mentions *Sicista subtilis*, *Microtus arvalis* and *Arvicola terrestris*.

The whole of the data regarding this sequence suggests the equating of this stratigraphic sequence to the upper side of the isotopic stage (RĂDULESCU et al., 1999).

The presence of man in the glacial of Muierii Cave (Baia de Fier)

Also from the upper level comes a human skull, found together with a mandible, a scapula and a tibia.

Due to its features and morphometric characteristics, the skull was first attributed to *Homo sapiens fossilis,* then to *Homo sapiens sapiens*, who still keeps some Neanderthal features.

Dated through the method of radioactive carbon, the age of the skull was established at approximately 29 000 years.

In 2004, AGATA OLARIU and EMILIAN ALEXANDRESCU, making team with a group of Swedish experts, used the AMS method and determined the age of the mandible at 30150 plus or minus 800 years.

SOFICARU et al. (2006) also attributes to the human samples the age of 30 000 years.

TAXONOMY

The species of the *Crocuta* genus that evolved across the Middle and Late Pleistocene in Eurasia and Africa were regrouped by KURTEN (1956) in *Crocuta sivalensis* (FALCONER & CAUTLEY, 1868) from India's Villafranchian (Sivalik zone) and *Crocuta crocuta* (ERXLEBEN, 1777) with 4 subspecies: *crocuta, spelaea* (GLODFUSS, 1823), *ultima, ultra*, plus *intermedia*, confirmed by BONIFAY (1971) and accepted by us.

DESCRIPTION

UPPER DENTITION. **The upper premolar 3 (P3)** is a tooth usually higher than the anterior-posterior diameter. The protocone covers almost the entire surface of the tooth; the anterior and posterior cusps are poorly developed, while the cingulum that borders the interior collar is vaguely expressed. VIRET (1954) considered that characteristic for the *Crocuta* genus was the interior widening of the posterior lobe and the presence of a little short talon at the level of the cingulum, features also observed in the samples at Baia de Fier.

The morphology of the upper carnassial (Fig. 1). This tooth displays several characteristics that allow generic and specific determination.

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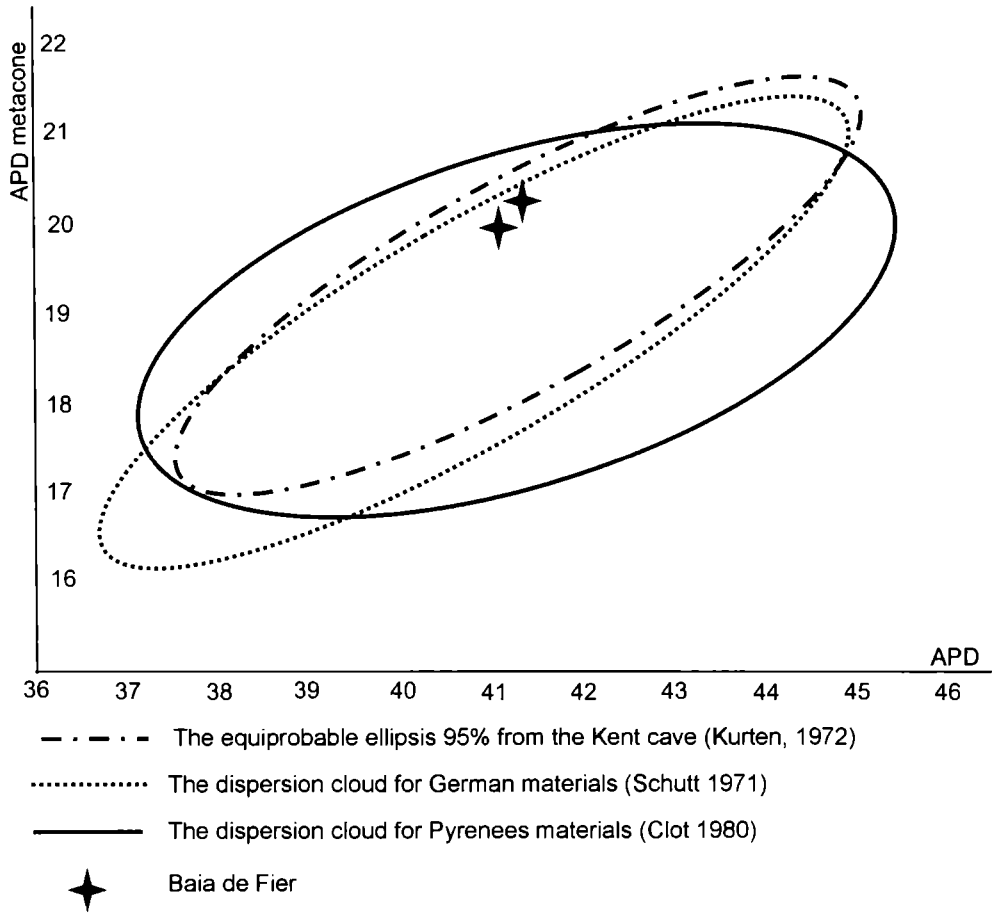

Figure 1. Upper carnassial diagram for ADP metacon/ADP M_1.
Figura 1. Diagrama carnasierei superioare pentru DAP metacon/DAP M_1

1. **Wide development of the posterior lobe** (the metacone), which in the teeth at Baia de Fier is double compared to the anterior lobe.
2. **Position of the interior talon**. After HAGMANN (1899) and EHRENBERG (1938), the interior talon is located upfront at *spelaea* and it makes an obtuse angle with the longitudinal axis of the tooth. Its positional changes had been reported by several authors for *intermedia* forms (from Lunel-Viel BONIFAY, 1971) and *spaelaea* at which it is sometimes pushed backwards (HERLE, 1910). For a more objective evaluation of the talon position, we measured on the two teeth from Baia de Fier, the angle formed by the long axis of the tooth with the line that links the anterior margin of the parastyle to that of the talon and we obtained the values 91^0 and 93^0. These values fall inside the area peculiar to those known in references, *i.e.* $88^0 - 98^0$ with the mean value 93^0, 54' (Gerde), $87^0 - 103^0$ with the mean 93^0 87' (Bouhadere) (CLOT, 1980).
3. **Absolute size**. The anterior-posterior diameter corresponds to the arithmetical means given by various authors; these figures vary, for important samples, between 40.6 and 41.6 (CLOT, 1980). Pieces at Baia de Fier are nevertheless somewhat stronger (41. 3 and 41. 7) while the mean for those in the Kent cave is 40. 06, and for the 28 würmians pieces in Germany is 40.3 (SCHUTT, 1971). The mean for the ant. DT is 22.3 while in other deposits in Europe, it varies between 21.3 in grottoes from Pyrenee Mountains (CLOT 1980) and 22.62 at Kent cave (KURTEN 1972). In picture 1, pieces at Baia de Fier are represented, in the diagram, the anterior-posterior metacone diameter/ anterior-posterior diameter (APD), compared to other pieces in Europe. It is obvious that these values are inside the probability ellipsis of 90% designed for *spelaea* by Kent (KURTEN 1972) and inside the dispersion cloud for materials in Germany (SCHUTT 1971).
4. **The shape of the posterior root** after SOERGEL (1937) seems, in würmians forms, more elongated in the anterior-posterior zone than in the rissian forms. At Baia de Fier, the index of high tooth root/ APD is 75.5, positioned at the inferior side of the variation domain of rissian forms with means between 73.9 and 79.6 (CLOT 1980), compared to rissians at Lidental with the mean 94.9 (SOERGEL, 1936). If this criterion was also proved for other rissian forms, it could become an important chronological index.

LOWER DENTITION (Figs 1 & 2)

The canine (Fig. 2) is relatively small and it has two edges slightly pearled on its tongue surface, the anterior and the posterior ones. The diastema, which separates it from the premolars, is short and we remarked it at all pieces we studied. At the basis of the anterior edge the burelet is not very well marked, being reduced to a little protuberance.

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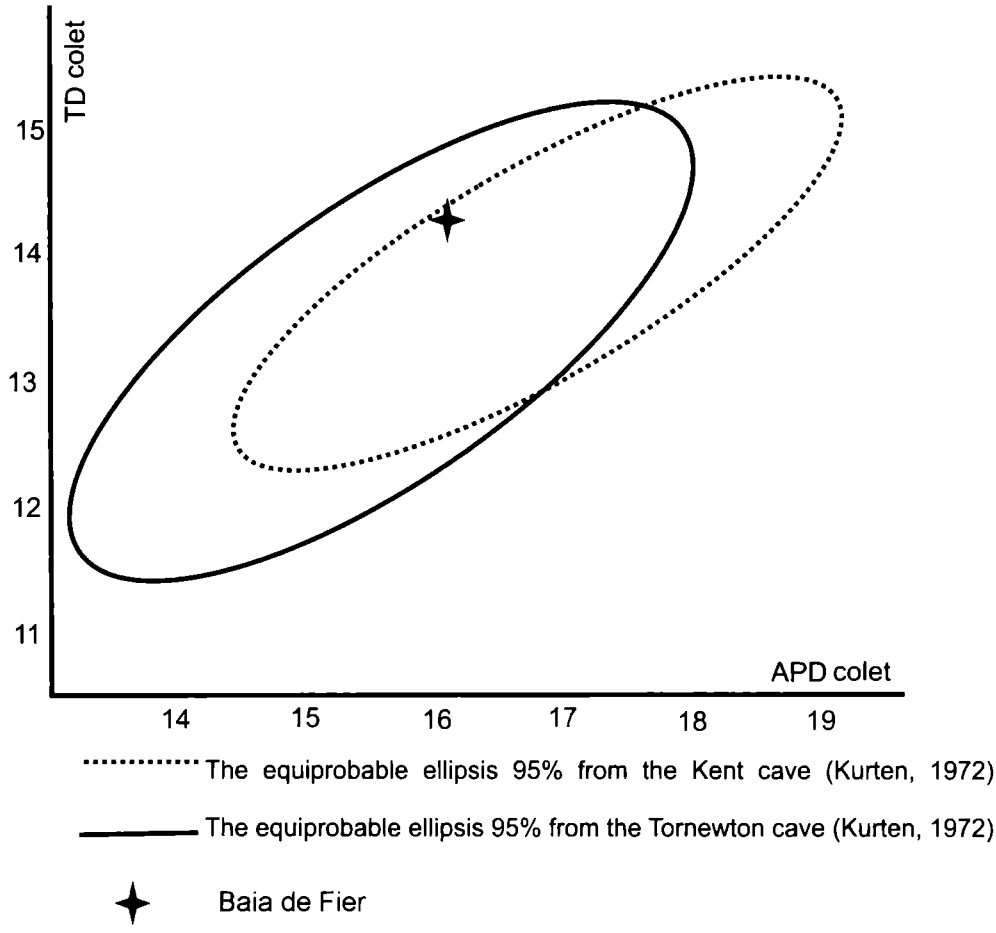

Figure 2. Lower canine diagram of collar dimension.
Figura 2. Diagrama caninului inferior în funţie de dimensiunile coletului

In picture 2 you can see the dimensions of the collar as compared to those in Kent and Tornewton Cave after KURTEN (1972) and Gerde (CLOT 1980). The only canine at Baia de Fier that we had at our disposal is found in the common part of the two equiprobable ellipses of 95%.

Premolar 2 is robust, with a large protoconid followed by a little denticle, and the lingual and labial edges are almost parallel, but their posterior side is thicker than at the *Crocuta c. intermedia*. The anterior denticle is not well developed both with nowadays *C. c. crocuta* and with *C. c. spelaea*, compared to *Hyaena* genus.

Premolar 3 has a very high protoconid which does not present, as with *Hyaena* genus, a very developed parastylid. The metric (dimensional) values are between 22.9 and 25.0, values that are common with würmian *spelaea*, compared to interglacial forms 21.5 - 21.75 (3 English Riss-Würm sites, KURTEN, 1963) or 21.24 (Lunel-Viel, BONIFAY, 1971).

KURTEN (1975) represented in a diagram (Fig. 3) anterior-posterior diameter for P2 depending on APD for P3 from materials in Kent and Tornewton Caves. This graphic, completed with data from France (BONIFAY 1971, CLOT 1980) and those at Baia de Fier, gives us the possibility to observe the positioning of our pieces inside the 95% ellipsis of würmian forms at Kent as well as the largest part of würmian forms in France, while interglacial forms, even if some of them overlap, most of the times they are outside it.

Premolar 4 is especially interesting, due to its dimensions, larger than at the rissian form and also due to its morphology. This tooth has a small paraconid, but always distinct from the protoconid. We mention that this is a *spelaean* feature that evolved towards reduction during Pleistocene. The hypoconid, or posterior denticle, is also well developed, the index Anterior-Posterior Diameter **hip.**/APD varying between 31.2 and 33.7 for the 5 pieces that were measured. The protoconid is high and bent backwards more that at premolar 3, it does not present external cingulum and its anterior side is well marked, these two characteristics are defining for the separation of *Hyaena* and *Crocuta* genera.

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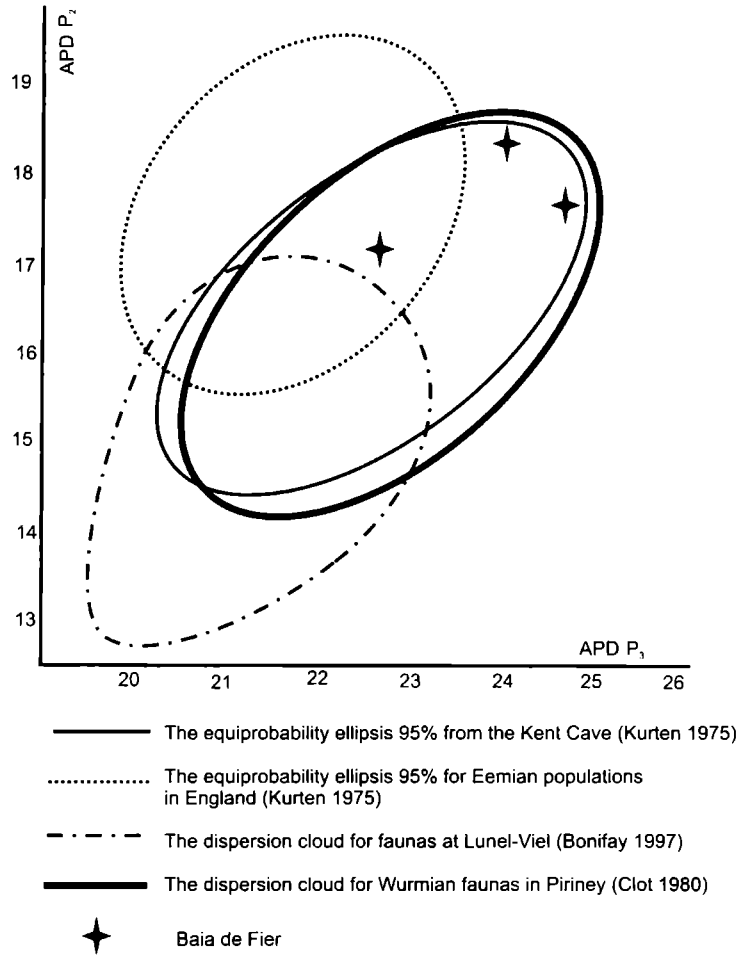

Figure 3. Diagram of APD P_2 in relation with APD P_3.
Figura 3. Diagrama DAP P_2 în funcţie de DAP P_3

Morphology of the lower carnassial (Fig. 4): just like its superior equivalent, it allows a subtle identification at the level of the *genus* and the species. With materials at Baia de Fier, it is characterized through:

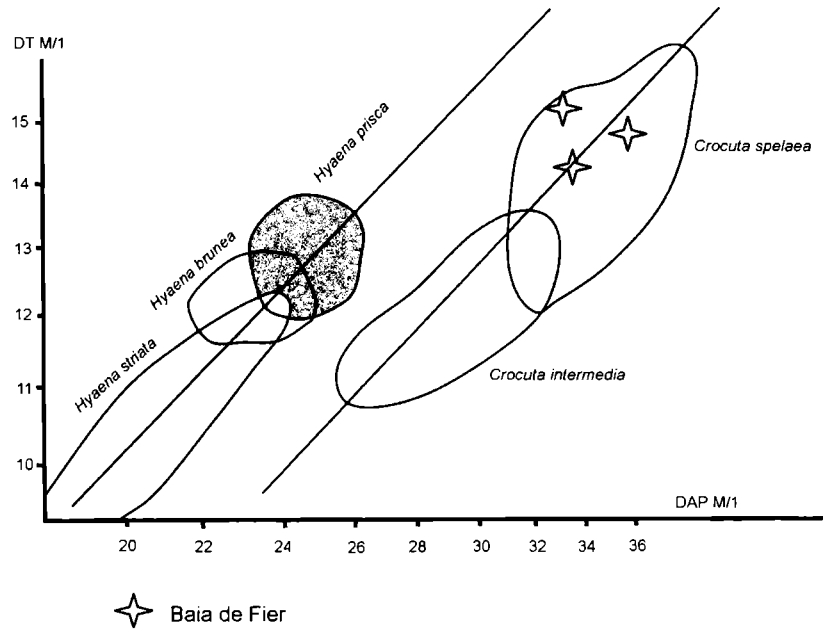

Figure 4. Dividing of *Hyaena* and *Crocuta* genus on the basis of lower carnassial dimension after BONIFAY, 1971
Figura 4. Separarea genurilor *Hyaena* şi *Crocuta* pe baza dimensiunilor carnasierei inferioare după BONIFAY, 1971

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1. The talonid, reduced to a simple burelet, like it was represented by BOULE (1902, Fig. 2) while with *Hyaena* it is well developed.
2. The difference between the APD of the paraconid and the APD of the protoconid varies between 2.5 and 3.8 with a mean of 3.05; these values are in the interval of variation of the *Crocuta spelaea* from Gerde where, on 21 pieces there have been registered values from 1.1 to 4.5 with a mean of 2.82.
3. The cutting posterior lobe may present at the lower side a little tuber with a conic and sharp shape, the metaconid. At our samples it is extremely small and united to the protoconid.
4. Because the molars at Baia de Fier are not worn out, the basal anterior-external burelet is strongly outlined.

CONCLUSIONS

It is not possible to establish a specific barrier for Mindel-Riss to Würm populations, due, on one hand to the relatively short geological period, on the other hand to the fact that there are no major morphological transformations.

The value repartition for the lower carnassial is in the same dispersion cloud from *Crocuta* genus (according to KURTEN's data, 1956), while *Hyaena* genus is on another line (Picture).

At the same time we remark that the Medium Quaternary form and the Upper Quaternary one are easily distinguished with respect to size and they can be good fossil indicators; therefore we agree with the separation of *Crocuta crocuta spelaea* from *C. c. intermedia* proposed by BONIFAY (1971).

Crocuta c. spelaea from Baia de Fier together with *C. c. intermedia* are distinguished by size, but they are both stronger than the current spotted hyena.

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Picture 1. *Crocuta crocuta spelaea* (Baia de Fier), mandible sin with C-P_4, outer view
Foto 1. *Crocuta crocuta spelaea* (Baia de Fier), mandibulă stângă cu C-P_4, vedere labială

Picture 2. *Crocuta crocuta spelaea* (Baia de Fier), mandible sin with P_3-M_1, outer view
Foto 2. *Crocuta crocuta spelaea* (Baia de Fier), mandibulă stângă cu P_3-M_1, vedere labială

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GASTROPODS FROM AN EUTROPHIC LACUSTRINE ECOSYSTEM WITHIN THE OLTENIA PLAIN (preliminary data)

OLIVIA CIOBOIU

Abstract. Cilieni pool is part of the eutrophic ecosystems category. It is characterized by an increased production of the aquatic and paludous macrophytes, of the planktonic and benthonic populations. Gastropods represent the main group of the benthic production, as there appear 10 species. Due to its ecological features and geographical location, Cilieni pool is included in the list of protected areas within Dolj County.

Key words: gastropods, eutrophic system

Rezumat Gastropode dintr-un ecosistem lacustru eutrof din Câmpia Olteniei (Date preliminare). Balta Cilieni face parte din categoria ecosistemelor eutrofe. Se caracterizează prin producţia mare a macrofitelor acvatice şi palustre, a populaţiilor planctonice şi bentonice. Gastropodele constituie un grup principal al producţiei bentale, fiind identificate un număr de 10 specii. Prin particularităţile sale ecologice şi poziţia sa geografică, balta Cilieni este inclusă în lista ariilor protejate din judeţul Dolj.

Cuvinte cheie: gastropode, sistem eutrof

INTRODUCTION

It is well known that gastropods represent a group with multiple ecological valences. Some of the species are cryophilic, others are thermophilic; some of them are characteristic to the oligotrophic ecosystems, while others are eutrophic (BREZEANU, GRUIŢĂ 2002). From this point of view, gastropods are representative organisms for different types of ecosystems with a variable degree of ecological features.

Our research took place on a typically eutrophic lake – Cilieni pool (Băileşti).

MATERIAL AND METHOD

There have been made numerous seasonal field observations between 2006 and 2007. There have also been drawn numerous samples for the physical-chemical analyses of the water and qualitative samples for the determination of the phytoplankton and of the zoobenthos.

PHYSIOGRAPHIC AND ECOLOGIC FEATURES

Located within the Oltenia Plain, Cilieni pool displays a surface of 47 ha and makes part of the Danube lower hydrographical basin. Its main supply source is the Balasan stream and the springs that outlet on the bottom of the pool (Fig.1).

Figure 1. The localization of the Cilieni pool
Figura 1. Localizarea bălţii Cilieni

As it is placed within a plain agricultural area, the pool is influenced indirectly by the human activities. The agricultural crops located nearby represent the source that induces the eutrophic character due to the drainage of the organic nutrients in the pool after each rainfall (Table 1).

The water chemism is characterized by high values of the nutrients (NO_3^-, PO_4^-), which can explain the mass development of the aquatic and paludous macrophytes and of the phytoplankton (CIOBOIU & CHICIUDEAN 2000).

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The main macrophytes species are: *Thypha angustifolia* L., *Phragmites communis* Trin., *Nuphar alba* L., *Ceratophyllum submersum* L., *Alisma plantago aquatica* L., *Sagittaria sagittifolia* L., *Lemna minor* L., *Iris pseudacorus* L., *Schoenoplectus lacustris* L., *Carex elata* All. (LAZĂR et al, 2001).

Table 1. Physical-Chemical Composition of the Water
Tabel 1. Compoziția fizico-chimică a apei

Analysed indicators	Băileşti Cilieni 1	Băileşti Cilieni 2	Analysis method
Concentration of the hydrogen ions (pH), unit. pH	7.2	8.4	STAS 6325-75
Maximum electric conductivity	760	720	STAS 7722-84
Dissolved oxygen (O_2), mg/dm^3, min.	7.4	8.0	STAS 6536-87
Oxidable organic substance CCOCr mgO_2/dm^3,max	11.1	12.0	STAS 3002-85
Total hardness, German degrees, max	16.5	16.7	STAS 3026-76
Ammonia (NH_4), mg/dm^3, max	2.937	3.498	STAS 6328-85
Calcium (Ca^{2+}), mg/dm^3, max	40	38	STAS 3662-62
Magnesium (Mg2+), mg/dm^3, max	47	49	STAS 6674-77
Nitrates (NO_2), mg/dm^3, max	0.201	0.177	STAS 3048-90
Nitrites (NO_2), mg/dm^3, max	16.7	14.1	STAS 3048- 77
Chlorides (Cl), mg/dm^3, max	21	25	STAS 3049- 86
Phosphates (PO^3_4), mg/dm^3, max	0.13	0.12	STAS 3265-66
Sulphates (SO_4), mg/dm^3, max	25	24	STAS 3002-87
Sodium mg/dm^3	58.5	59.5	STAS 3223-52
Potassium mg/dm^3	9.5	9.0	STAS 3223-52

With regard to the phytoplankton, the main groups that intensely develop during summer and lead to the algal blooming of the water are: Cyanophyceae (*Microcystis aeruginosa, M. flos-aque),* Euglenophyceae (*Euglena acus*), Bacilariophyceae (*Achnanthes minutissima, A. microcephala, Cyclotella chaetoceras, Navicula cryptocephala, N. longirostris, Nitzschia acicularis, N. gracilis, Synedra acus*), Chlorophyceae (*Chlamydomonas* sp., *Chlorella vulgaris, Scenedesmus bicaudatus, S. granulatus, Spirogyra* sp., *Volvox aureus*). Similar situations have been identified in other eutrophic lakes located within the Oltenia plain (NICULESCU, CIOBOIU & BREZEANU 1999).

The benthic facies is made up of a thick layer of organic silt and vegetal detritus. This fact explains the clogging tendency of the pool.

The main groups of benthonic invertebrates are: Oligochaeta, Chironomidae, Plecopterae, Bivalves. Gastropods (Table 2) represent the dominant group of the benthos.

The following species are characteristic due to their frequency and numerical density: *Viviparus acerosus, Physella (Costatella) acuta, Radix balthica, Lymnaea stagnalis, Planorbis planorbis, Planorbarius corneus* (CIOBOIU 2002, 2003).

Table 2. Species met within Cilieni Pool
Tabel 2. Specii din balta Cilieni

GASTROPODA CLASS CUVIER, 1798	
PROSOBRANCHIA SUBCLASS MILNE EDWARD, 1848	
MESOGASTROPODA ORDER THIELE, 1925	
Viviparidae family GRAY, 1847	*Viviparus acerosus* BOURGUIGNAT, 1870
Valvatidae family THOMSON, 1840	*Valvata (Cincina) piscinalis* O. F. MULLER, 1774
Thiaridae family TROSCHEL, 1857	*Esperiana esperi* (A. Ferussac, 1829) *Esperiana (Microcolpia) daudebardii acicularis* (A. FERUSSAC, 1823)
PULMONATA SUBCLASS Cuvier, 1917	
BASOMMATOPHORA ORDER A. SCHMIDT, 1855	
Physidae family FITZINGER, 1833	*Physa fontinalis* (LINNAEUS, 1758) *Physella (Costatella) acuta* (Draparnaud, 1805)
Lymnaeidae family RAFINESQUE, 1815	*Lymnaea stagnalis* (LINNAEUS, 1758) *Radix balthica* (LINNAEUS, 1758)
Planorbidae family RAFINESQUE, 1815	*Planorbis planorbis* (LINNAEUS, 1758) *Planorbarius corneus* (LINNAEUS, 1758)

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Viviparus acerosus BOURGUIGNAT, 1862 presents a conical-oval shell of about 50-70 mm. It lives in lakes and marshes, as well as in slow streams.

Physella (Costatella) acuta (DRAPARNAUD, 1805) displays a fragile yellow-reddish shell of about 7-12 mm. It lives in stagnant waters (pools) rich in submerged plants on oozy bottoms.

Lymnaea stagnalis (LINNAEUS, 1758) is a common species for eutrophic pools where it forms entire populations. It displays a height of 45-60 mm, a breadth of 20-25 mm and a fragile shell with a very sharp point.

Radix balthica (LINNAEUS, 1758), a small gastropod (h = 24-25 mm, b = 16-17 mm), has an oval yellowish shell, which is also slightly transparent. Like the other mentioned species, it lives in highly eutrophic lakes, marshes, and rarely in streams.

Planorbis planorbis (LINNAEUS, 1758) is characterized by its disk-like shell (h = 3.5 mm, b = 15-17 mm). It lives in stagnant waters, on oozy bottoms and it is largely spread in the lacustrine ecosystems from Romania.

Planorbarius corneus (LINNAEUS, 1758) is characteristic to slow streams and rivers; it also appears in the lakes from the plain area, as it is the case of Cilieni pool. Its height is of about 11-12 mm, while its breadth of 27 mm (GROSSU 1986, 1987, 1993).

Due to their density and biomass, gastropods represent the main component of the benthic biological production (CIOBOIU 2002).

CONCLUSIONS

- Due to its geographical location, Cilieni pool is representative for the Oltenia Plain. It is part of the Danube lower hydrographical basin.
- It makes part of the protected areas category from Dolj country.
- Taking into account the structural features of the biocoenoses dominated by populations of aquatic and paludous macrophytes, the high quantity of phytoplankton and the composition of the zoobenthos, the pool displays all the characteristics of the eutrophic ecosystems.
- The identified gastropods, which count a number of 10 species presently, represent an important group in the structure of the zoobenthos and in the biological production of the pool.

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DEVELOPMENT AND PROMOTION OF AGRICOLE TECHNOLOGIES NON-POLLUTION ON THE ASH OF LAYERS IN THE CENTRAL AREA OF OLTENIA

CONSTANTIN COTIGĂ

Abstract. Natural conditions offered by the ash layers are proper for setting temporary pastures. A major possibility of growing the fodder production is temporary pastures (C. COTIGĂ, 2004; 2005).
Pastures and meadows must be made more productive by growing the best adapted grasses and legumes. Because of their morpho-biologycal characteristics, perennial plants have the ability of fixing the ash.

Key words: ash, pasture, layer

Rezumat. Dezvoltarea şi promovarea tehnologiilor agricole nepoluante pe haldele de cenuşă în zona centrală a Olteniei. Condiţiile naturale oferite de haldele de cenuşă sunt favorabile pentru înfiinţarea de pajişti temporare. O metodă importantă pentru sporirea producţiei de furaje o reprezintă pajiştile temporare.

Cuvinte cheie: cenuşă, pajişti, haldă

MATERIAL AND METHOD

The experiments are located at the Experimental Field – Işalniţa Craiova and some of the targets were.
It was studied the time to put on practice ammonium nitrate; the effect form of ammonium nitrate but the phosphor and potassium fertilization influence on harvest.

RESULTS AND DISCUSSIONS

Analyzing the results obtained and presented in table number one, we can say that, depending of the time to put on practice ammonium nitrate the crop oscillated from 6,6 t/ha dry substance in 50% variant to sowing 50% spring to 9,3 t/ha dry substance in 100% variant in spring.

Table 1. The effect time to put on practice ammonium nitrate on *Lolium multiflorum* production
Tabel 1. Efectul fertilizării cu azot asupra producţiei de *Lolium multiflorum*

Variants	Production of d.s. t/ha	%	Diff.	Signification
50 % to sowing + 50 % early spring	6,8	100	Mt	-
33 % to sowing + 67 % early spring	8,5	125	1,7	x
100 % early spring	9,3	137	2,5	xx

DL 5%	1,3 t/ha d.s.
1%	2,4 t/ha d.s.
0.1 %	3,2 t/ha d.s.

Considering the effect form of ammonium nitrate on the obtained production (table 2) we can say that it doesn't contribute at significative growth of productions.

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Table 2. The effect form of ammonium nitrate on *Lolium multiflorum* production
Tabel 2. Efectul fomei de azot asupra producţiei de *Lolium multiflorum*

Variants	Production of d.s. t/ha	%	Diff.	Signification
Ammonium nitrate	8,5	100	Mt	-
Urea	8,7	102	0,2	-

DL 5% 0,7 t/ha d.s.
1% 1,3 t/ha d.s.
0.1 % 2,2 t/ha d.s.

Considering the effect of phosphor and potassium fertilization on the obtained production (table 3)

Table 3. The fertilization effect with phosphor and potassium on *Lolium multiflorum* production
Tabel 3. Efectul fertilizării cu fosfor şi potasiu a supra producţiei de *Lolium multiflorum*

Fertilizer doses with P and K	Production of d.s. t/ha	%	Diff.	Signification
P_0	4,1	100	Mt	-
P_{50}	9,7	125	1,7	xxx
P_{100}	9,8	239	5,7	xxx
$P_{100}K_{100}$	9,9	241	5,8	xxx

DL 5% 1,7 t/ha d.s.
1% 2,9 t/ha d.s.
0.1 % 4,8 t/ha d.s.

we can say that the fertilization level with P50 represent optima variant to obtain an economical production (9,7 t/ha dry substance)

CONCLUSIONS

Temporary pastures represent an essential method of growing the fodder production in the experimental area. The new set pasture covers the tagers for a longer period of time.

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CONTRIBUTIONS TO THE STUDY OF THE MACROZOOBENTHIC INVERTEBRATE FAUNA FROM TWO TEMPORARY POOLS FROM FOIENI AREA (SATU-MARE COUNTY)

DIANA CUPŞA, SEVERUS DANIEL COVACIU-MARCOV, HAJNALKA KOVACS, ŞTEFANIA LIANA FĂGĂRĂŞAN

Abstract. The present paper deals with a study upon the macrozoobenthic invertebrates from two temporary pools placed closet o Foieni village (Satu-Mare County) on the both sides of a road which crosses a forest. The samples were taken during the spring period, in April and May. In the following months the pools dried out. The macrozoobenthic invertebrate fauna in the both pools is scarce in taxonomic groups, because of the temporarily character of these water bodies, which do not let the settling of a stable benthic community. The groups we found are mostly from those which do not have great oxygen needs or are not exclusively benthic and can swim to the surface of the water where the amount of the oxygen is greater. The most frequent groups in the both pools are the Isopoda and Gasteropoda, founded in all samples. The taxonomic diversity is relatively small because a small number of benthic groups are dominant. I the two pools are differences between the benthic macroinvertebrate fauna, because the settling of the benthic community in these habitats which are sitting close one another is mostly the result of the hazard.

Key words: temporary pools, macrozoobenthic invertebrates, benthic community.

Rezumat: **Contribuţii la studiul nevertebratelor macrozoobentice din două bălţi temporare din zona Foieni (Judeţul Satu-Mare).** Lucrarea de faţă prezintă un studiu asupra faunei de nevertebrate macrozoobentice din 2 bălţi temporare situate în apropierea localităţii Foieni (jud. Satu-Mare)pe cele două margini ale unui drum forestier. Probele au fost prelevate în perioada de primăvară, în lunile aprilie şi mai, după care bălţile au secat. S-a constatat că în ambele bălţi fauna este relativ săracă în grupe de nevertebrate, tocmai datorită caracterului temporar al apei, fapt ce nu permite instalarea unei comunităţi bentonice stabile. Grupele prezente fac parte în general dintre cel care nu au pretenţii foarte mari în ceea ce priveşte gradul de oxigenare al apei sau chiar grupe care nu sunt exclusiv bentonice şi pot înota spre suprafaţa apei, unde oxigenarea este mai bună. S-a constatat că cele mai frecvente grupe în ambele bălţi sunt Izopodele şi Gasteropodele, prezente în toate probele. Diversitatea taxonomică este relativ mică, datorită dominanţei unui număr mic de grupe de nevertebrate bentonice. În cele două bălţi s-a constatat că există diferenţe în ceea ce priveşte fauna de nevertebrate bentonice, datorită faptului că popularea acestor habitate aflate la distanţă mică este în mare parte rezultatul hazardului.

Cuvinte cheie: bălţi temporare, nevertebrate macrozoobentice, comunitate bentonică.

INTRODUCTION

In this paper we try to highlight the importance of the temporary pools, which have the tendency to disappear because of the agricultural usage of the lands. The temporary pools are not considered nowadays to have a great importance, although they have a specific fauna (vertebrates and invertebrates as well) with an important role in the ecosystems from which they are part of (BĂNĂRESCU P. M., 1995)

The composition of the benthic fauna of the pools gives us information about the general state of the studied habitat from the pollution point of view and the hydrological regime. Some species act as indicators, especially of the organic pollution and the oxygen content of the water. Their massive development is an indication of the above mentioned conditions. Various species of bacteria, worms, insect larvae are very sensitive to the presence or absence of some organic compounds in water.

The research of the aquatic invertebrate fauna has multilateral importance, for different purposes as fishery, sanitary hygiene, water protection, utilisation of the natural waters for domestic use, etc. A great significance has the water as natural environment for patogen agents which can affect the human health.

The aquatic invertebrates can be found in a great variety of aquatic habitats and they have important roles in the ecosystems from which are part of. The insect larvae are important components of the trophic chains because they process, transform the organic substances and provide food for other invertebrates and vertebrates (fishes, amphibians and birds) (BOUCHARD R. W. JR., 2004).

Regarding to all of these, our main aim of this study is to determine the benthic invertebrate fauna composition from two pool represented by two ditches situated at the both sides of a forest road near the Foieni village (Satu-Mare County). The study was carried out in 2005 in April and May.

The Foieni village is situated in Satu-Mare County, around the meridian of 22. 5° and between the parallels of 47. 5-48, northern latitude (GREGORIAN E. C. et al., 1992, TUFESCU V. et. al., 1995). The Foieni village is located in the Careiului Plain (Câmpia Careiului) (POSEA G., 1997). Satu-Mare County is in the north-western part of Romania, in the contact area between the Tisa Plain (Câmpia Tisei) with the Oriental Carphatians and the Somes Plateau (Podişul Someşan). It is marked off at east by Maramureş County, at south-east by Sălaj County, at south by Bihor County, at west by the state border with Hungary and at north by the state border with Ukraine.(BOGDAN A. & CĂLINESCU M., 1976) (Fig. 1)

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Figure 1. Foieni village from Satu-Mare County
Figura 1. Localitatea Foieni din județul Satu-Mare

MATERIAL AND METHODS

The samples were collected in April and May 2005 from two pools with a 0.1 m^2 surface benthometer. The samples were preserved in 4% formalin solution. In the lab there were sorted under a 400X magnifying stereomicroscope and transferred in 70% etilic alcohol. The invertebrate groups were determined under a stereomicroscope or under the microscope as whole mounted slides.

RESULTS AND DISCUSSIONS

The main aim of this research was to determine the composition of the benthic fauna from two pools with look like ditches and are situated on both sides of a road which crosses a forest in the Carei Plain (Câmpia Careiului) close to the Foinei village. We also wanted to show the possible differences between the two biotopes which have the same environmental conditions.

The both pools are situated in the forest and are bordered by herbaceous vegetation a tone side and trees at the other side. They have appreciatively the same depth and muddy substrate and well developed submerged vegetation.(Fig. 2a, b)

These pools are forming in the spring as a result of the snow melting and spring rains. Considering the fact that this region has very hot summers, the pools almost every summer dry out.

From the abiotic characteristics and faunistic compound the temporary pools are a distinguish category of continental waters (WILLIAMS D. D., 1997) they play an important role in maintaining the humidity of the area from they belong and represent the breeding habitat for several Amphibian species (*Bufo viridis*, *Pelobates fuscus* etc.), which are important in the control of the harmful insect populations. The most of the temporary pools, especially those which have a typical fauna, are situated in arid areas, where the short rainy period (usually in spring) is followed by a longer drought period, when the pools dry out.

a b

Figure 2. The aspect of the pools: a - in the right side of the road, b- in the left side of the road
Figura 2. Aspectul bălților: a – balta din partea dreaptă a drumului, b - balta din partea stângă a drumului.

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Along our researches carried out in the two months of study (April and May 2005) in the two ditches, which are temporary pools we have identified 9 groups of invertebrates. The most of them are benthic or have some species adapted to the benthic life.(Table 1)

Table 1. Invertebrate groups identified during the research period, 2005
Table 1. Grupe de nevertebrate macrozoobentice semnalate în crsul studiului

Nr.	Sampling site	Right pool		Left pool	
crt.	Date (2005)	2.IV.	4.V.	2.IV.	4.V.
1	Oligochaeta	-	+	+	-
2	Gasteropoda	+	+	+	+
3	Crustaceans-Isopoda	+	+	+	+
4	Plecoptera-larvae	-	+	+	
5	Coleoptera-imago	-	+	+	+
6	Coleoptera-larvae	-	+	-	+
7	Trichoptera-larvae	-	-	+	-
8	Diptera-larvae-Nematocera-Culicida	+	-	+	-
9	Diptera-larvae-Nematocera-Chironomida	+	-	+	-
	Total	**4**	**6**	**8**	**4**

Of the 9 invertebrate groups, some have the whole life cycle in the water (Oligochaeta, Gasteropoda, Crustaceans-Isopoda), and the other have only the larval stage adapted to the water environment and are represented by insect larvae (Plecoptera, Trichoptera, Diptera) (CRANSTON P. S., 1995, PAULIAN R., 1971, RADU GH. V. & RADU V. V., 1967). The higher percent is reached in each habitat by the insect larvae, namely the mosquito larvae. This fact shows that the pools have a temporary hydrological regime. Some of the identified groups can resist even in the absence of the water, because they lay durable eggs which can stand the drought.

In the right pool we have found 4 groups in April and 6 in May. Of these we found in both months only Gastropods and Isopods. The total number of individuals was 322, of which 275 we found in April and 47 in May. The drastic diminution of the individuals in May is due of the lack of the mosquito larvae, which in April represented 210 individuals.(Table 2)

In April the Diptera-Culicida larvae form 76.36% of the whole benthic fauna of this pool. These larvae have a high adaptability to the special conditions of some biotopes (CHIRIAC & UDRESCU, 1965). They are followed by Isopods (specimens of the genus *Asellus* – prefers food of many aquatic animal species), whose abundance reach 22.91%. The other two groups: Gasteropoda and Chironomida have very low abundances. (Table 2, Fig. 3)

Table 2. The abundance of the macrozoobenthic invertebrate groups from the two pools
Tabel 2. Abundenţa grupelor de nevertebrate macrozoobentice din cele două bălţi

Sample sites	Right pool				Left pool			
Date (2005)	2.IV.		4.V.		2.IV.		4.V.	
	Nr.ind.	A (%)	Nr.ind.	A (%)	Nr.ind.	A (%)	Nr.ind.	A (%)
Oligochaeta	0	0	1	2.128	1	0.44	0	0
Gasteropoda	1	0.364	10	21.28	5	2.20	17	62.96
Crustacean-Isopoda	63	22.91	15	31.91	18	7.93	5	18.52
Plecoptera-larva	0	0	1	2.128	1	0.44	0	0
Coleoptera-imago	0	0	1	2.128	1	0.44	2	7.40
Coleoptera-larva	0	0	19	40.43	0	0	3	11.11
Trichoptera-larva	0	0	0	0	2	0.88	0	0
Diptera-larva-Nematocera-Culicida	210	76.36	0	0	195	85.90	0	0
Diptera-larva-Nematocera-Chironomida	1	0.364	0	0	4	1.76	0	0
Total	**275**	**100**	**47**	**100**	**227**	**100**	**27**	**100**

In May the benthic fauna composition diversifies, but the mosquito larvae disappear, because they become adults in few weeks. In this study period the highest abundance is reached by the Coleoptera larvae 40.43%, followed by Crustaceans-Isopoda with 31.91%. In this month the abundance of Gastropoda grows significantly to 21.28%.(Table 2, Fig. 3)

The presence of the coleopteran larvae which are zoophagous in such high abundance shows that the conditions are optimum for their settlement in the community, namely they have enough trophic resources for living. (Table 2).

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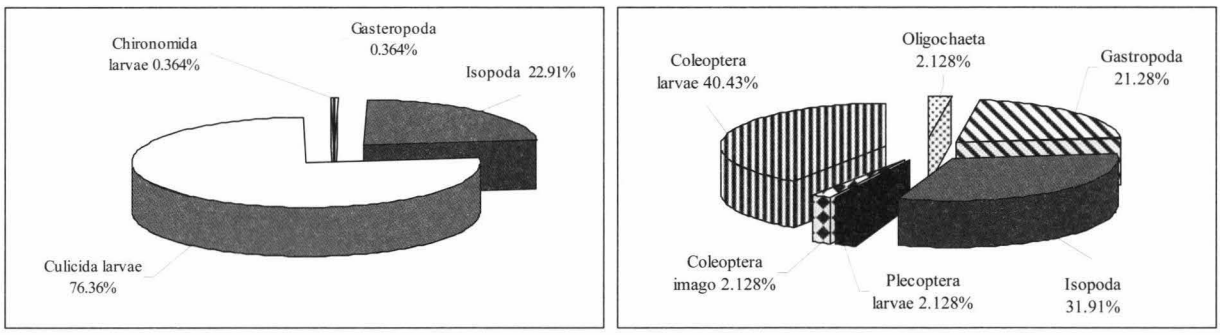

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Figure 3. The abundance of the macrozoobenthic invertebrate groups in the right side pool, in the two month of study
Figura 3. Abundența grupelor de nevertebrate macrozoobentice în balta din partea dreaptă, în cele două luni de studiu

We can observe that the main invertebrate groups which enlighten the community in this biotope are the Culicidae larvae and the Isopoda. the Gastropoda and the Coleoptera larvae are also important. These are less exacting groups regarding the water quality. The scarce presence or even the absence of some oxyfilous groups shows an oxygen deficiency in the water.

The left pool is less rich in species than the other. Here we found also Trichoptera larvae, but in a very small proportion, only 2 specimens. In April we have found 9 invertebrate groups and in May only 4. The total number of individuals varies in the two periods of sampling alike in the right pool. Because of the high number of Culicide larvae, in April the total number of individuals is 227 and in May this number drops to 27, as the result of the disappearance of the Culicida larvae.(Table 2)

The abundance of the Culicida larvae is very high in the first period reaching 85.90%. Their presence in such high number provides an important source of food for the frogs found in this habitat. (COGĂLNICEANU D. & VENCZEL M., 1993)(Table 2, Fig. 4)

An relative high abundance is reached also by the Isopoda with 7.93 % and Gastropoda with 2.20%. Also in this pool we found two Trichoptera larvae. Their presence in such small number shows the oxygen deficiency in the water.

In May the highest abundance is reached by the Gastropoda (62.96%). This fact is due to the great abundance of the submerged vegetation in the pool, and the most of the snails are fitophagous. Other abundant groups in this month are Isopoda (18.52%), the larvae (11.11%) and the adults of Coleoptera (7.40%).(Table 2, Fig. 4)

The mosquito larvae are absent from the sample taken in May, probably because they already turned in adults.

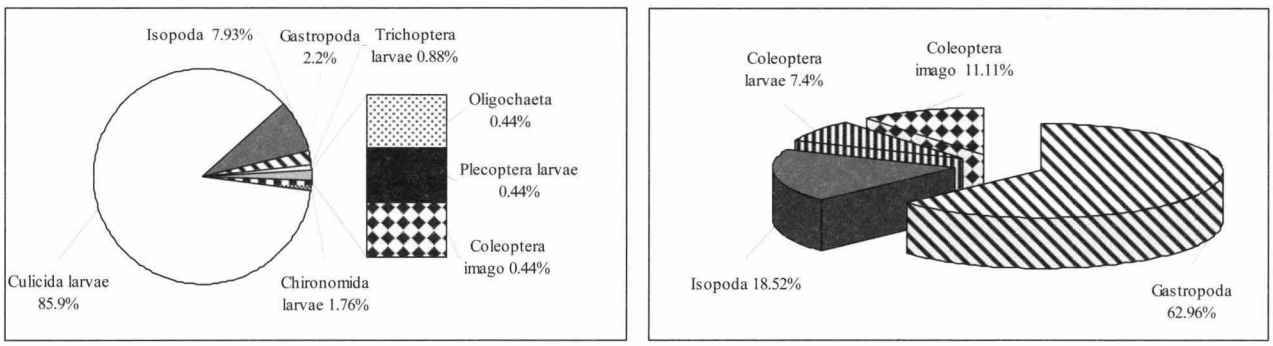

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Figure 4. The abundance of the macrozoobenthic invertebrate groups in the left pool, in the two month of study.
Figura 4. Abundența grupelor de nevertebrate macrozoobentice în balta din partea stângă, în cele două luni de studiu.

We can see that, as in the other sample site, the most abundant groups are the Culicida larvae, the Isopoda and Gastropoda. The rest of the invertebrate groups have a small abundance.

From the frequency point of view there are two groups with maximum frequency 100%: Gastropoda and Isopoda. Although the highest abundance was reached by the Culicida larvae, their frequency is only 50%, because they are absent in May. Higher frequency is reached also by the Coleoptera-imago, which although appear in small quantities, were identified in 3 from the 4 sampling periods.(Table 3)

Together with the mosquito larvae, the most of the invertebrate groups have a frequency of 50% (Oligochaeta, Plecoptera larvae, Coleoptera larvae and Chironomida larvae). The smallest frequency is reached by Trichoptera larvae (25%) found only in one sample. (Table 3)

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Table 3. The frequency of the macrozoobenthic invertebrate groups during the study
Tabel 3. Frecvenţa grupelor de nevertebrate macrozoobentice în perioada de studiu

Sample site	**Right pool**		**Left pool**		**F(%)**
Date (year 2005)	**2.IV.**	**4.V.**	**2.IV.**	**4.V.**	
Oligochaeta	0	1	1	0	50
Gastropoda	1	10	5	17	100
Isopoda	63	15	18	5	100
Plecoptera-larvae	0	1	1	0	50
Coleoptera-imago	0	1	1	2	75
Coleoptera-larvae	0	19	0	3	50
Trichoptera-larvae	0	0	2	0	25
Diptera-larvae-Nematocera-Culicida	210	0	195	0	50
Diptera-larvae-eNematocera-Chironomida	1	0	4	0	50

The diversity indexes represent a measure of the distribution of the individuals from different species in a sample (MAGURRAN A. E., 1998, SÎRBU I. & BENEDEK A. M., 2004). A community of invertebrates formed from species relatively equal distributed is considered more natural than a community with a simple structure owed by the dominance of a small number of taxa. Although we must consider also that a simple community can be also a result of natural conditions (WINGET R. N. & MANGUM F. A., 1979).

The diversity of the benthic fauna of the studied pools is reduced because of the dominance of a small number of invertebrates. (Table 4)

Table 4. The values of the diversity during the study period
Tabel 4. Valorile diversităţii în perioada de studiu

	Right pool			Left pool		
	2.IV.	4.V.	**T**	2.IV.	4.V.	**T**
Diversity	0.58	1.30	**0.94**	0.72	1.04	**0.88**

Comparing the diversity of the samples from April and May, we can see that in both pools, the samples collected in May have a greater value. In this month the Culicida larvae are absent. Their high abundance in April causes a smaller diversity in this month. (Table 4)

For the two different pools the values of the diversity are alike, just a little higher in the pool from the right side of the road.

CONCLUSIONS

The number of invertebrate groups found in the studied pools is 9, the majority have exclusively benthic representatives of species adapted to this environment. Some of them are living permanently in the water (Oligochaeta, Gastropoda, and Isopoda). The others have only the larval stage adapted to the water environment (Plecoptera, Trichoptera, Diptera larvae). The abundance of the individuals in the samples is for the two biotopes higher in the case of insect larvae especially the mosquito larvae.

In both pools in the samples collected in April, the mosquito larvae are dominant, followed by the Isopoda. In the month of May, the mosquito larvae are absent because they have transformed into adults.

So in May in the benthic fauna in the right side pool prevail the Coleoptera larvae together with the Isopoda and Gastropoda ,and in the left side pool the Gastropoda followed by the Isopoda and Coleoptera larvae and adults.

From the point of view of the frequency the Gastopoda and Isopoda reaches the highest frequency of 100%. Although the highest abundance was reached by the Culicida larvae, their frequency is only 50%, because they lack in May. High frequency is reached also by the Coleoptera, but these are not characteristic for the benthic fauna.

The diversity of the benthic fauna is not too high, because of the dominance of a small invertebrate group. The diversity is higher in the case of the samples collected in May and very close for the two different habitats.

The composition of species from the two studied pools is characteristic for stagnant water types with a benthic fauna dominated by the Diptera larvae adapted to the oxygen deficiency in the environment. Also here the species with increased oxygen needs are very less abundant or absent. (Plecoptera, Trichoptera larvae).

The relatively small number of invertebrata groups identified during the study is due to the fact that is a temporary pool in which cannot be set a stable community with a rich and highly structure. In these pools the presence of some invertebrate groups is often the result of the hazard (KENK R., 1949, CUPŞA et al., 2002)

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TAXONOMIC STRUCTURE OF INVERTEBRATE FAUNA AS A PARAMETER FOR SOME AQUATIC ECOSYSTEMS FROM PIATRA CRAIULUI NATIONAL PARK MONITORING

VICTORIA TATOLE

Abstract. The taxonomical researches on aquatic invertebrate fauna concretized with establishing the species inventory, with the estimation and analysis of some structural parameters, permitted the evaluation of diversity level on spatial-temporal scale, support for the monitoring of the selected ecosystems and, implicitly the optimization of the protection strategy for this reserve. In this context, a special attention was paid to reophilous species, indicator species and dominant species. From the 27 analyzed aquatic ecosystems, the following were selected: Bârsa Tămaşului River, Bârsa Mare River, Bârsa Mare Pond, Râul Mare al Zărneştilor, Vlăduşca River, Curmătura River, Dâmbovicioara River, Dâmboviţa River, placed inside all the five core sites – Valea Bârsei, Prăpăstiile Zărneştilor, Cheile Brusturetului, Cheile Dâmbovicioarei, Cheile Mari ale Dâmboviţei, of the Piatra Craiului National Parck.

Key words: aquatic invertebrates; taxonomical research; Piatra Craiului National Park; monitoring activity.

Rezumat. StructurA taxonomică a Faunei de nevertebrate ca parametru de monitorizare a unor ecosisteme acvatice din Parcul Naţional Piatra Craiului. Cercetările taxonomice asupra faunei de nevertebrate acvatice soldate cu stabilirea inventarelor de specii, cu calcularea şi analiza unor parametri structurali permit estimarea nivelului de diversitate la scară spaţio-temporală, susţinerea activităţii de monitoring a ecosistemelor selectate şi implicit optimizarea strategiei de protejare a ariei respective. În acest context, s-a acordat o atenţie deosebită speciilor reofile, speciilor indicatoare şi speciilor dominante. Din cele 27 ecosisteme acvatice analizate au fost selectate următoarele: râul Bârsa Tămaşului, râul Bârsa Mare, balta Bârsa Mare, Râul Mare al Zărneştilor, râul Vlăduşca, râul Curmătura, râul Dâmbovicioara, râul Dâmboviţa, amplasate în toate cele cinci core sites – Valea Bârsei, Prăpăstiile Zărneştilor, Cheile Brusturetului, Cheile Dâmbovicioarei, Cheile Mari ale Dâboviţei, ale Parcului Naţional Piatra Craiului, şi totodată componentă a Reţelei Naţionale NATURA 2000.

Cuvinte cheie: nevertebrate acvatice; cercetări taxonomice; Parcul Naţional Piatra Craiului; monitoring.

INTRODUCTION

In the process of declaring the Piatra Craiului Massif as a protected area, only the flora and vegetation information and the geomorphologic and speologic particularities were used like scientific proofs; the fauna diversity of the area being almost unknown. This huge lack of information has been addressed after the declaration the PCNP, when the management staff launched, in 2000, a program for biodiversity assessment, implicitly of the terrestrial, aquatic and ecotonal fauna. The MNINGA experts were invited to participate at this project, in which the researches on aquatic ecosystems occupied an important place. We investigated 27 different types of aquatic ecosystems (rivers, brooks, springs, ponds), obtaining original data referring to the aquatic invertebrates. Parts of them are already published (V. Tatole, 2004).

In the same time we developed during 2003 – 2005, the Grant named *Evaluation of Piatra Craiului taxonomical dynamics*, financed by the National Council of Scientific Research and High Education (CNCSIS). This paper includes some data resulted in the frame of the grant researchers.

MATERIAL AND METHODS

The biological material was sampled from the following nine aquatic ecosystems of the Piatra Craiului Massif:

1 – Bârsa Tămaşului River springs at the foot of the north-western mountainside of Piatra Craiului and is a tributary of Bârsa Mare River. Its valley is about 15 m wide, but non-unitary, the water flowing in many threads, three of them being more important. The river bed is graveled and rarely rugged, the stones reaching 30-40cm in diameter. The water flow is rapid.

2 – Bârsa Mare River is formed by the confluence of Bârsa Groşetului, Bârsa Tămaşului and Vlăduşca rivers that spring at the foot of the Făgăraş Mountains, with Bârsa lui Bucur and Bârsa Fierului, that spring from Ţagla Mountains. The valley is wide, the flow is slow, the river bed is covered by stones of 5-40cm, rounded, without heavy stones emerging from the water;

3 – Bârsa Mare Pond is placed near the road, at 2km from Gura Bârsei. It's a permanent pond, being supplied by limnocrenous springs. It is formed by a system of puddles and channels. It has a rich aquatic and palustrian vegetation, developing the optimal condition for a high biotope diversity;

4 – Râul Mare al Zărneştilor is a tributary of Bârsa Mare River, that springs at the foot of the eastern mountainside of Piatra Craiului, constituted from a few aquatic sources;

5 – Vlăduşca River's valley is about 1m wide, the flow is slow, the river bed is covered with small stones and gravel;

6 – Curmătura River is a tributary of Râul Mare al Zărneştilor, its valley is about 1-1.5m wide, the flow is very low, especially in summer and autumn, the river bed is covered by stones;

7 – Dâmbovicioara River (at Brusturet Gorges) flowing in the south of Piatra Craiului Massif, the valley is very savage, being marked by the high water flow and speed, the river bed is preponderantly formed by stones, covered in algae and mosses;

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8 – Dâmbovicioara River (at Dâmbovicioara Gorges); the sampling station was placed at the entrance in the gorges, the valley is 4-6m wide, the flow is fast, the river bed is covered by large stones, but the gravel is present, too, some stones are covered by bioderma;
9 – Dâmbovița River (Dâmbovița Large Gorges), the valley is about 15-20 m wide; the water flow is moderately, the river bed is formed by large rounded stones covered by bioderma.
The samples were taken with a hydrobiological net (Haveneau type), with a square area of 0.500 m^2. We have considered the biotope zoning: substratum nature (stones, bioderm, sand, mud), flow rapidity (stream, slow waters), river bed topography (center, bank, sunny areas, afforested areas). For each station the relative abundance of the aquatic invertebrate groups was calculated, and where the sampling was done on 100m transects, numeric abundance gradient of dominant taxa was also estimated.

RESULTS AND DISCUSSIONS

Remarks on the structure of aquatic invertebrate fauna from the selected ecosystems

As a result of sample processing we identified the organisms, the following list of taxa being established: Turbelariata, Nematoda, Oligochaeta, Hirudinea, Gastropoda, Amphipoda, Copepoda, Ostracoda, Arachnida, Colembolla, Ephemeroptera, Plecoptera, Heteroptera, Trichoptera, Coleoptera and some families of the order Diptera: Culicidae, Tipulidae, Simuliidae, Psychodidae, Chironomidae, Tabanidae, Rhagionidae.

In Fig. no. 1, the values of the relative abundances are shown, which permitted the assessment of the taxonomical dynamics level of aquatic invertebrates.

In decreasing order we can signal the presence of 18 macrotaxa in Bârsa Tămașului River, 11 in Dâmbovița and Bârsa Mare River, 10 in Bârsa Mare pond, 7 in Vlăduşca and Dâmbovicioara River (Cheile Brusturetului), 6 in Dâmbovicioara River (Cheile Dâmbovicioarei) and finally, 5 in Râul Mare al Zărneştilor and Curmătura River.
In taxonomical order, we can observe that the dominant groups are the following:

- Gastropods (18.40%) in Bârsa Mare Pond;
- Amphipods in Dâmbovicioara River, with 38.61% at Brusturet Gorges and 54.22 % at Dâmbovicioara Gorges;
- Ephemeroperans in Curmătura River (11.27%), in Dâmbovița River (19.00%), in Bârsa Tămașului River (20.50%), in Dâmbovicioara River–Cheile Dâmbovicioarei (33.73%), in Bârsa Mare River (42.49%) and 54.05% in Dâmbovicioara River–Cheile Brusturetului;
- Plecoprans in Bârsa Tămașului River (29.35%), trichopterans, also in Bârsa Tămașului (15.74%);
- Chironomids in Bârsa Mare (20.33%), in Bârsa Tămașului River (21.58), in Bârsa Mare Pond (59.05%), in Curmătura River (66.20%), in Dâmbovița River (68.78%), in Râul Mare al Zărneştilor (83.4%), in Vlăduşca River (90.00%).

All the other groups, although, are much more poor represented in the studied ecosystems, their presence guaranteeing the species richness and some of them having a major ecological importance.

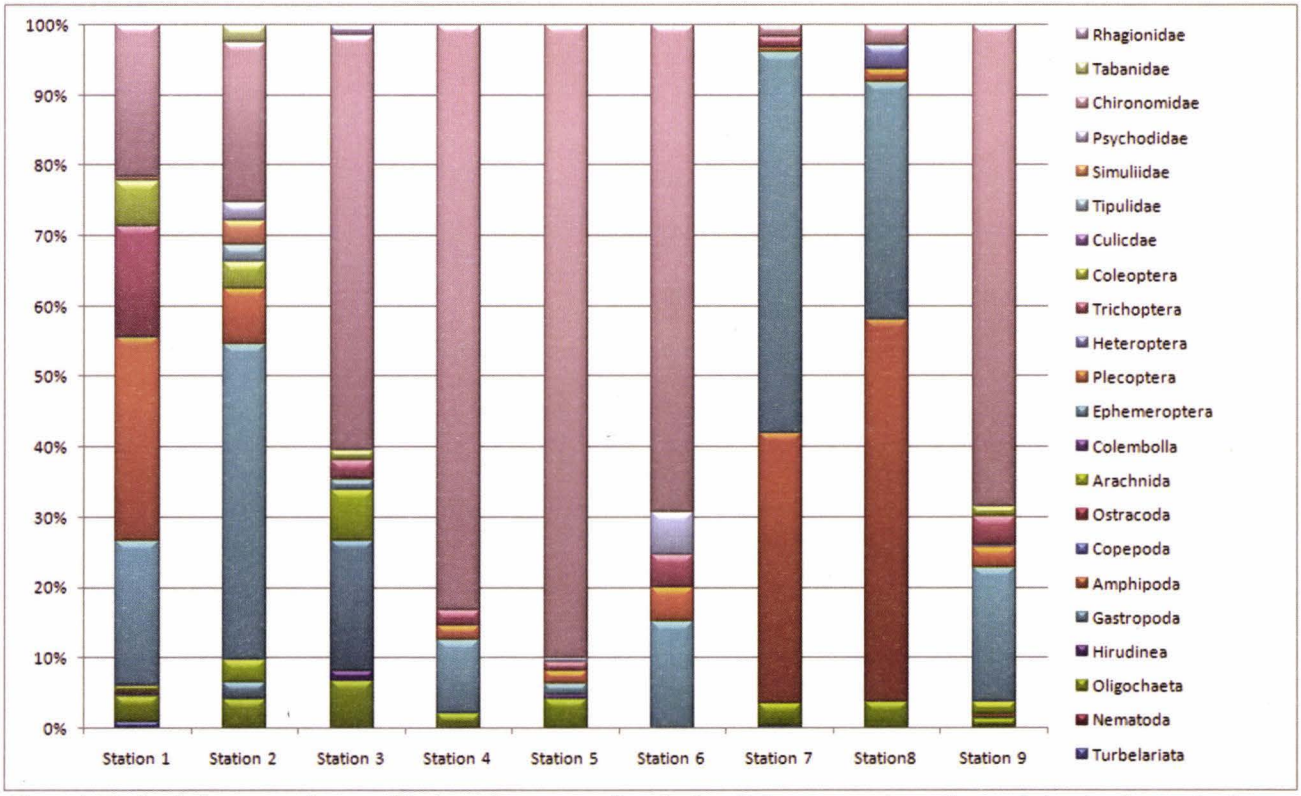

Figure 1. The level of representativeness of the invertebrate groups from the 9 studied ecosystems (according to relative abundance values).
Figura 1. Nivelul de representativitate al grupelor de nevertebrate în cele 9 ecosisteme (după valorile abundenței relative).

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The estimate of the status conservation of studied ecosystem can be made by the selecting and identifying all the species groups considered important. So, the reophile elements (ephemeropterans, plecopterans, trichopterans), indicator species (Turbelaria, efemeropterans, plecopterans, trichopterans, some dipterans), dominant elements (dipterans – chironomids, efemeropterans, plecopterans) were put in evidence. All these species are presented in next table.

Table 1. The species list of the main invertebrates groups from the studied aquatic ecosystems
Tabel 1. Lista de specii a grupelor de nevertebrate importante din ecosistemele acvatice studiate

TAXA	1	2	3	4	5	6	7	8	9
TURBELARIATA *Planaria torva* MÜLLER, 1784	+						+		
HIRUDINEA *Glossiphonia complanata* L., 1758	+		+						
CRUSTACAEA AMPHIPODA *Gammarus balcanicus* SCHÄFERNA, 1922	+						+	+	+
OSTRACODA *Candona* sp.	+								
COLEMBOLLA *Podura aquatica* L. ,1758	+								
Sminthurides aquaticus (BOURLET, 1843)					+				
EPHEMEROPTERA POTAMANTIDAE *Potamanthus luteus* (L., 1767)	+								
EPHEMERIDAE ***Ephemera danica* MÜLLER, 1764**		+							
***Ephemera lutea* LINNÉ, 1767**			+						
EPHEMERELLIDAE *Ephemerella ignita* (PODA, 1761)	+	+		+	+	+	+	+	
CAENIDAE *Caenis macrura* STEPHENS, 1836				+				+	+
BAËTIDAE *Baëtis carpaticus* MORTON, 1910	+								
***Baëtis rhodani* (PICTET, 1843-45)**		+	+						+
Baëtis melanonix (PICTET, 1845)		+							
Baëtis scambus EATON, 1870									+
Baëtis vernuus CURTIS, 1834									+
Centroptilum luteolum (MÜLLER, 1776)		+	+						
Centroptilum pennulatum EATON, 1870	+								
Cloëon dipterum (L., 1761)			+						
OLIGONEURIIDAE *Oligoneuriella rhenana* (IMHOFF, 1852)		+				+	+	+	+
ECDYONURIIDAE *Heptagenia flavipennis* (DUFOUR, 1841)	+	+					+		
Ecdyionurus fluminum EATON, 1887	+								
Ecdyionurus insignis (EATON, 1870)	+								
Ecdyionurus venosus (FABRICIUS, 1775)	+								
Epeorus assimilis EATON, 1885	+						+	+	
Rhithrogena diaphana NAVÁS, 1917									+
Rhithrogena semicolorata (CURTIS, 1834)	+						+	+	
PLECOPTERA TAENIOPTERYGIDAE *Brachiptera risi* (MORTON,1896)								+	
Brachyptera seticornis (KLAPÁLEK, *1902)*	+								
Rhabdiopteryx alpina KUEHTREIBER, 1934	+								
Taeniopterix sp	+								
LEUCTRIDAE *Leuctra carpathica* KIS, *1966*	+								
Leuctra fusca LINNAEUS, *1758*	+	+	+	+	+	+		+	+
Leuctra inermis KEMPNEY, *1899*		+							
Leuctra mortoni KEMPNEY, 1899	+								
Nemoura cinerea RETZIUS, *1783*	+	+							
CAPNIDAE *Capnia vidua* (KLAPÁLEK, *1904)*	+								
CHLOROPERLIDAE *Chloroperla kisi* KIS, *1966*	+								
TRICHOPTERA Hydropsychidae *Hydropsyhe* sp.	+								
HYDROPTILLIDAE *Hydroptilla* sp.			+						
RHYACOPHILIDAE *Rhyacophila laevis* PICTECTETI 1834									+
Rhyacophila obliterata MCLACHLAN, 1865	+	+							

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TAXA	1	2	3	4	5	6	7	8	9
Rhyacophila tristis PICTET, 1834					+	+	+	+	+
Agapetus sp.	+								
Drusus sp.		+							
POLYCENTROPIDAE *Polycentropus sp.*	+								
GOËRIDAE *Goera* sp.	+		+						
Silo sp.			+						
LIMNEPHILIDAE *Chaetopteryx polonica* DZIĘDZIELEWICZ, 1889	+	+							
Limnephilus decipiens (KOLENATI, 1848)									+
Limnephilus sp.	+		+	+					
SERICOSTOMATIDAE *Sericostoma* sp.	+								
LEPTOCERIDAE *Mystacides* sp.	+								
DIPTERA CULICDAE Culex sp	+								
SIMULIIDAE *Simulium reptans* (LINNAEUS, 1758)	+	+							
PSYCHODIDAE *Pericoma canescens* (MEIGEN, 1804)	+	+							
CHIRONOMIDAE *Ablabesmyia longistyla* FITTKAU, 1962			+	+		+			
Ablabesmyia monilis (LINNAEUS, 1758)	+		+	+		+		+	
Ablabesmyia phatta (EGGER,1863)						+			
Brillia bifida (KIEFFER, 1909)	+		+						
Brillia longifurca KIEFFER, 1921	+								
Cladotanytarsus mancus (WALKER, 1856)	+	+	+			+		+	
Conchapelopia pallidula (MEIGEN, 1818)		+	+			+			
Corynoneura celeripes WINNERTZ, 1852	+					+			
Corynoneura scutelata WINNERTZ, 1846	+		+			+			
Cricotopus algarum (KIEFFER, 1911)	+		+					+	
Cricotopus curtus Hirvenoja, 1973		+							
Cricotopus flavocinctus (KIEFFER, 1924)		+							
Cricotopus fuscus (KIEFFER, 1909)	+	+				+			
Cricotopus tibialis (MEIGEN, 1804)	+		+						
Cricotopus tremulus (LINNAEUS, 1758)	+					+			
Cricotopus triannulatus MACQUART, 1826		+				+			
Cricotopus ***vierriensis*** GOETGHEBUER,1935		+	+			+			
Diamesa insignipes *Kieffer in Kieffer and* THIENEMANN, *1906*					+	+			
Diamesa tonsa (WALKER,1856)	+					+			
Dicrotendipes nervosus (STAEGER, 1839)						+			
Epoicladius flavens (MALLOCH, 1915)	+								
Eukiefferiella brevicalcar (KIEFFER, 1911)	+	+				+			
Eukiefferiella clypeata (KIEFFER, 1923)	+	+			+	+			
Eukiefferiella gracei (EDWARDS, 1929)	+		+			+			
Heleniella ornaticollis (EDWARDS, 1929)						+			
Lauterborniella agrayloides (KIEFFER, 1911)				+					
Limnophyes minimus (MEIGEN, 1818)	+	+				+			
Limnophyes prolongatus (KIEFFER IN THIENEMANN, 1921)			+						
Macropelopia nebulosa (MEIGEN, 1804)					+				
Mesosmittia flexuella (EDWARDS, 1929)									+
Metriocnemus fuscipes (MEIGEN, 1818)									+
Metriocnemus hygropetricus KIEFFER, 1912		+			+				
Micropsectra curvicornis CHERNOVSCKI, 1949		+	+						
Micropsectra junci (MEIGEN, 1818)	+	+	+			+	+		
Micropsectra lobatifrons BOTNARIUC ET CURE, 1956			+						
Microtendipes-tarsalis (WALKER, 1856)		+		+					
Nanocladius bicolor (ZETTERSTEDT, 1838)		+							
Neozavrelia luteola (GOETGH. *in* GOETGH. & THIENEM, 1941)		+		+					
Nilotanypus dubius (MEIGEN, 1804)	+	+			+				
Orthocladius rivicola KIEFFER, 1921	+	+							
Orthocladius saxicola KIEFFER, 1911		+	+						
Paracladius alpicola (ZETTERSTEDT, 1850)				+					+
Paraorthocladius rufiventris (MEIGEN, 1830)					+				
Paraphaenocladius impensus (WALKER, 1856)									+
Paratanytarsus bituberculatus (EDWARDS, 1929)									+
Paratanytarsus austriacus (KIEFFER in ALBRECHT,1924)		+							
Paratanytarsus penicillatus (GOETGHEBUER, 1928)									+
PolypedilumTripodura aegiptium KIEFFER, 1925									+

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TAXA	1	2	3	4	5	6	7	8	9
Potthastia longimana(KIEFFER, 1922)		+							
Prodiamesa olivacea (MEIGEN, 1818)		+			+	+	+		
Psectrocladius calcaratus (EDWARDS, 1929)	+			+					
Psectrocladius octomaculatus WÜLKER, 1956	+			+					
Psectrocladius psilopterus KIEFFER IN KIEFF. &THIENEN, 1906	+								
Psectrotanypus varius (FABRICIUS,1787)			+	+					
Pseudodiamesa branickii (NOWICKI, 1873)	+								
Pseudodiamesa nivosa (GOETGHEBUER, 1928)	+	+				+			
Rheosmittia spinicornis (BRUNDIN, 1956)				+					
Rheotanytarsus nigricauda FITTKAU, 1960						+			
Stempellina bausei (KIEFFER, 1911)									+
Stempelinella brevis (EDWARDS, 1929)				+		+			
Tanytarsus curticornis KIEFFER, 1911						+			
Tanipus punctipennis MEIGEN, 1818	+			+					
Tanypus vilipennis (KIEFFER, 1918)									+
Thienemanniella clavicornis (KIEFFER, 1911)	+			+					
Tienemannimyia lentiginosa (FRIES, 1823)		+			+	+			
Tienemannimyia geijeskesi (GOERTGHEBUER, 1934)				+					
Tvetenia bavarica (GOETGHEBUER, 1934)	+					+			
Tvetenia verralli (EDWARDS, 1929)	+					+			
Zavrelemyia melanura (MEIGEN, 1804)			+	+		+			
TABANIDAE *Tabanus* sp.		+							
RHAGIONIDAE *Atherix variegata*			+						

Referring to the level of representation of the significant species for the conservation status, we listed in decreasing order the following data records: 64 species in Bârsa Tămaşului River, 40 in Bârsa Mare River, 33 species in Curmătura River, 28 species in Bârsa Mare Pond, 20 species in Dâmboviţa River, 19 species in Râul Mare al Zărneştilor, 12 species in Vlăduşca and Dâmbovicioara River, at Dâmbovicioarei Gorges, and finally, only 10 species species in Dâmbovicioara River, at Brusturet Gorges.

It can be observed from table no. 1, that the first three stations have the highest diversity.

We consider that all the 9 analyzed aquatic ecosystems are:

- representative by the invertebrates taxonomical structure;
- permanently or almost permanently in aquatic status, a most important quality in the context of geological condition from the Piatra Craiului Massif, where the limestone substrate are preponderantly;
- easy accessible, implicitly representing a large opportunity for monitoring activity.

Consideration on some aquatic ecosystem monitoring from Piatra Craiului National Park

The Directive of the Parliament and European Council and the *Law no 310/06.28.2004 for the modification and completion of the Law of waters no 107/1996* are important elements in establishing the legislative framework for considering water "*a natural patrimony which has to be preserved, treated and protected as such*".

Also these documents include the *benthic invertebrates' fauna* as one of the four estimation criteria for the ecological state of the rivers, alongside phytoplankton, macrophytes and phytobenthos, and ichthyofauna.

The using of biological indexes has to follow some complex studies, developed along several years, and which can present a real evaluation, usable in establishing the management and integrated monitoring plan.

The many taxa of invertebrate fauna offer an important source for monitoring testing in the ecosystem quality evaluation. So, the benthonic invertebrates represent correct and adequate criteria in establishing the global quality of the aquatic surface ecosystem, being in the same time, easy to use.

From the European Biological Index applied by the European Community we selected the one, which is best fitted with the biotic component of aquatic ecosystems from Romania, being in the same time very accessible.

The one selected is the Biological Monitoring Working Party Score (BMWP). This biotic index is created and was initially standardized for the evaluation of the quality of the national network of flowing waters from the United Kingdom (Armitage, P.D., D. Moss, J.F. Wright & M.T. Furse, 1983, Wright, J.F., D. Moss, P.D. Armitage, M.T. Furse 1984). Later this index was adapted and standardized in Spain (Alba-Tercedor 1992 – cited by Alba-Tercedor, 2000).

For each taxon of "family" level a score between 1 and 10 is given (according to the sensibility of the respective taxon to pollution). Plecopterans, some ephemeropterans, trichopterans, dipterans, known to be the most sensitive to pollution (especially to the organic one) get the highest score (10). The more tolerant organisms to pollution, as the oligochaetes and chironomids, culicids, thaumaleids get the lowest score (1, respectively 2).

The score of each identified family is summed up and according to the total value of the BMWP' biotic index the quality class is established.

Briefly, we can observe, after summarizing the value of the taxa, the following:

- the three ecosystems, Bârsa Tămaşului River, Bârsa Mare River and Bârsa Mare Pond are corresponding, after BMWP, to the Ist class of quality, scoring 270, 151 and 106 points;

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- three ecosystems, Curmătura River, Dâmbovicioara River – Brusturet Gorges and Dâmbovița River are corresponding, after BMWP, to the II[nd] class of quality, scoring 87, 81 and 65 points;
- the three ecosystems, Râul Mare al Zărneştilor, Vlădușca River and Dâmbovicioara River –Dâmbovicioara Gorges are corresponding, after BMWP, to the III[rd] class of quality, scoring 58, 49 and respectively 40 points.

Sampling station	Râul Bârsa Tămașului	Râul Bârsa Mare	Balta Bârsa Mare	Râul Mare al Zărneștilor	Râul Vlădușca	Râul Curmătura	Râul Dâmbovicioara – Cheile Brusturetului	Râul Dâmbovicioara – Cheile Dâmbovicioarei	Râul Dâmbovița
	1	2	3	4	5	6	7	8	9
Score	270	151	106	58	40	87	49	65	81

The same observation is true for some dipteran families, different evaluated.

It must be mentioned that this system can not reflect the real situation entirely, for example, it is known that in the chironomids case many very sensitive species exist, which can be used as indicators for oligotrophic ecosystems, but by applying the BMWP, the whole family is evaluated at only 2 points. But, the ecological plasticity of the majority of species in this family, and the great difficulty of species identification, can lead to the confirmation of BMWP.

The monitoring activity must be based on efficient and accessible methodology. However, we consider that it is appropriate to be developed only by expert teams. Aquatic ecosystems are influenced by anthropic pressure, like the forestry activities, uncontrolled tourism.

Recommendations

Biological indexes represent indispensable tools for the integrated monitoring.

The using of biological indexes is useful during the monitoring of the quality of all the aquatic ecosystems.

The using of biological indexes has to follow some complex studies, developed along several years, and which can present a real evaluation, usable in the establishing of the management and integrated monitoring plan.

More specific:

- benthic invertebrates are generally abundant, sedentary and have a relative long life cycle; therefore they can be used as indicators for a longer period of time;
- being heterogeneous, zoobenthic communities offer the chance that at least one or several groups of organisms to be sensitive to the changes of the aquatic environment;
- excepting large rivers, biological samples can be taken without difficulties.

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ASSESSMENT OF THE ECOLOGICAL STATUS OF VARIOUS LOTIC ECOSYSTEMS FROM THE H.B. JIU USING BIOTIC COMMUNITIES ACCORDING TO THE WFD REQUIREMENTS

CHIRIAC GABRIEL, VINTILĂ FLORENTINA, GALASIU LUMINIŢA, LUNGU AURICA, URECHE DOREL

Abstract. The paper presents aspects regarding assesment of ecological status of some aquatic lotic ecosystems and characterization of biotic typology by inventorying the biotic communities according to the E.U. Framework Directive in the field of water policy and Romanian Law 310/2004. The following biotic communities were inventoried in the chosen 8 river sections: phytoplankton, phytobenthos, macrophytes, macroinvertebrates, fish fauna. Specific parameters were calculated, then bioindicator values for each case and subsequent ecological status were assessed. Anthropic impact was generally of low importance or not visible in upstream/reference sections. A more important impact was observed on the mainstream of Jiu river, amplified by human settlements (Tg.Jiu, Craiova) and by mining facilities from sub-mountain areas.

Key words: Jiu river, biomonitoring, aquatic biotic communities, ecological status assessment

Rezumat. Evaluarea stării ecologice a diferitelor sisteme ecologice acvatice lotice din bazinul hidrografic Jiu pe baza comunităţilor biotice conform Directivei Cadru a apei. Lucrarea prezintă aspecte privind evaluarea stării ecologice a unor ecosisteme acvatice lotice şi caracterizarea tipologiilor biotice prin inventarierea comunităţilor biotice în conformitate cu Directiva Cadru a Uniunii Europene din domeniul politicii apei şi cu legea 310/2004. Următoarele comunităţi biotice au fost inventariate în cele 8 secţiuni de râu studiate: fitoplancton, fitobentos, macrofite, macronevertebrate şi fauna piscicola. S-au calculat parametri specifici, apoi au fost evaluate valoarea bioindicatoare pentru fiecare caz şi starea ecologică respectivă. Un impact mai important a fost observat pe cursul principal al Jiului, amplificat de aşezarile umane (Tg. Jiu, Craiova) şi de exploatarea minieră din zonele submontane.

Cuvinte cheie: râul Jiu, biomonitoring, comunităţi biotice acvatice, evaluarea stării ecologice

INTRODUCTION

The ecological status evaluation of the aquatic ecosystems has to be done based on several biological elements: phytoplankton and fish fauna from water column, phytobentos, macrophytes and macroinvertebrates from substrate, according to WFD and Law 310/2004 requirements. These elements and their parameters have to be used for biotic typology definition, reference conditions and ecological status limits, as well. Studying the above mentioned biological elements allows these 5 ecological status to be defined: high, good, moderate, poor, bad.

Therefore, for complete characterization of the lakes and rivers in Romania it is absolutely neccesary to use data about aquatic flora and fauna. Methodologicaly speaking, based on case studies, biological elements are studied according to WFD and Law 310/2004 requirements. The main biotic communities are catalogued and the WFD recommended parameters are mentioned. The determinations are made down to the lowest level possible: species, genus, family, in order to permit the best and complete characterization of the rivers and lakes types and their differentiation.

The aspects taken into account for lotic aquatic ecosystems are: compozition and abundance of the macroinvertebrates fauna, compozition and abundance (biovolume) of the aquatic macrophytes, compozition, density and abundance of the phytobenthos, compozition, abundance and age structure for fish fauna, taxonomic diversity and biomass of the phytoplankton.

The following objectives were: the inventory of biotic communities specific to different lotic aquatic ecosystems, based on tipologic categories and ecoregions, with case study within catchment area and ecoregion (Jiu); bringing the information up to date about representative biotic elements belonging to aquatic ecological systems, according to WFD and Law 310/2004 requirements; the evaluation of actual ecological status of different aquatic ecological systems based on biological elements and charaterization of biotic typology.

MATERIAL AND METHOD

In order to reach the targeted objectives, together with MMGA (MMDD) and ANAR reprezentatives it has been agreed to investigate aquatic ecosystems belonging to Jiu river catchment area. The following sections from 4 rivers have been investigated: : Jiul de Est – Cimpa, Jiu – Balteni, Jiu – Malu Mare, Jiu – Zaval; Gilort – Bengesti; Motru – upstream Valea Mare reservoir, downstream Valea Mare reservoir; Balasan – upstream Motatei. These sections have been selected based on actual monitoring network and accesibility.

The 8 investigated sections belong to several types: RO 01a, RO 02a, RO 03a, RO 15a, RO 17a and RO 18[a]. All these sections have silicious substrate.

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The next steps have followed after identifying the representative sections: field evaluation, sampling (quantitative and qualitative sampling using Romanian and European methodologies) followed by laboratory analysis, data processing and ecological status evaluation according to WFD requirements. Phytoplankton, phytobenthos, macroinvertebrates, macrophytes have been sampled and fish fauna was investigated by Bacau University specialists as well.

A new element is represented by macrophytic vegetation inventory using Kohler method in its modified form made by prof. Georg Janauer (Viena University), a modern method with minimum impact on this biotic community, the samples being qualitative ones, for confirmation of species identification, the qualitative aspects (biovolume in corelation with biomass) being estimated by standardized precedures.

The method is based on aquatic macrophitic vegetation (characeae, aquatic briofite, ferns, spermatofite – hydrofite and helofite as well, and in special cases filamentous algae) within continous inventory units with an individual length, each one being a unit with ecologic uniformity. For all presented species in each inventory unit the EMP is estimated (Plant Mass Estimate, *"Pflanzenmenge"*, Kohler et al., 1971 – mass plant estimation) using a 5 level scale: 1 = rare; 2 = occazional; 3 = frecvent; 4 = abundant; 5 = very abundant, prevailed. EMP takes into account the vertical development of the plants groups, not only the horizontal one. In general, EMP is equivalent with 3-D abundance, plants quantities and bio-volume. AS numerical interpretation, the used scale respect a mathematical function a 3rd power (Melzer et al. 1986; Janauer et al. 1993; Schneider 2000).

The results have been presented within standardised form, developed by prof. Janauer based on Kohler method. The automatic calculation of parameters was available using electronic access starting in 2002 (web address www.midcc.at). The recorded data has been processed and the numerical derivation of EMP has been obtained, with graphic inter-comparison representation. The distribution diagram shows each species quantity/biovolume (EMP) within each inventory unit.

The data regarding EMP field colected is the base for numerical calculation of MRP *(Relative Plant Mass)*, abundance index/average mass *(Mean Abundance/Mass Index)* and Distribution Ratio (Steinberg et al. 1995, Janauer at al. 1993; Kohler&Janauer 1995; Pall&Janauer 1995) and standard diagrams allow the comparison between quantitative relations on macrophytes within lotic and lentic ecosystems and avoiding the errors.

Romanian and European key works have been used for the identification. Lists with identified species and parameters for each sample have been made. The taxonomic identification have been performed in ICIM.

RESULTS AND DISCUSSIONS

Phytoplankton

Regarding the phytoplankton, hydrological conditions and anthropic impacts were the main factors that had a strong influence on the specific composition of this community and specific quantitative indicators.

A limited specific composition was observed with 28 taxa belonging to Bacillariophyta and Chlorophyta. The diatoms were prevailed (80%).

The algal density showed values between 10.000 cel/l (Jiu river– Zaval, Motru river – upstream Valea Mare) and 59.000 cel/l (Gilort river – Bengeşti), the diatoms being the most abundant group (until 100%).

The phytoplaktonic biomass has varied between 0,02 Motru river – downstream Valea Mare and 0,11 Gilort river – Bengeşti, with predominance of diatoms.

Both, oligo- and oligo-betamezosaprobic organisms (clean water specific: *Ceratoneis arcus, Coconeis placentula, Diatoma hiemale, Gomphonema constrictum, Actinastrum hantzschii, Ulotrix tenuissima*), and beta and beta-alfamezosaprobic organisms (polluted water specific: *Nitzschia sigmoidea, Pinnularia viridis, Synedra ulna*) were observed in different investigated stations.

Phytobenthos

The phytobenthos is considered a representative community for watercourses. The phytobenthos analysis is consisted of specific composition, density, abundance. 70 taxa belonging to the following groups have been inventoried: Cyanophyta, Pyrrophyta, Bacillariophyta, Euglenophyta, Chlorophyta. The most taxa belong to diatoms – 53, then cloroficee – 11, euglenoficee – 4. Some phytobenthos taxa have been observed within phytoplanktonic communities as well.

In some water bodies the diatoms were the prevailed algae – 100% (Jiu river – Balteni, Motru river – downstream Valea Mare). The common taxa were: *Ceratoneis arcus, Coconeis placentula, Diatoma hiemale, Mastogloia Braunii, Melosira granulata, Nitzschia linearis, Nitzschia sigmoidea, Chlorella vulgaris, Genicularia spirotaenia.*

The numerical abundance shows the dominance of the diatoms – 75,5%, and then cloroficee – 15,7%, euglenoficee – 6%, cianobacteria and piroficee – 1,42 %.

The densities of the benthonic algal communities have varied between 11.000 ex/m ^{2} (Jiu river – Cimpa) and 53.000 ex/m^2 (Gilort river – Bengeşti). The abundances again show the dominance of diatoms.

Based on bioindicators and using the Pantle-Buck method, the saprobic index was calculated with values between 1,10 upstream Valea Mare and 1,71 Balasan river – Motatei (tabel 1).

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Table 1. Values of saprobic index (s) calculated considering phytobenthos from watercourses belonging to Jiu River catchment area (september 2006)
Tabelul 1. Valorile indicelui saprob (s) calculat pe baza fitobentosului din râuri aparţinând b.h. Jiu (septembrie 2006)

No.	Sampling station	Saprobic Index	Saprobic zone	Ecological status
1	Gilort - Bengesti	1,20	oligosaprob	high
2	Jiu - Cimpa	1,14	oligosaprob	high
3	Jiu - Balteni	1,56	o-β - mezosaprob	high
4	Jiu - Malu Mare	1,65	β - mezosaprob	good
5	Jiu - Zaval	1,40	oligosaprob	high
6	Motru - up. Valea Mare	1,10	oligosaprob	high
7	Motru - do. Valea Mare	1,50	o-β - mezosaprob	high
8	Balasan - up. Motatei	1,71	β - mezosaprob	good

A light increasing of contamination was observed alos upstream and downstream along Jiu river. The Valea Mare dam and reservoir influenced the development of phytobenthos communities, downstream the composition and the density of benthonic algae were decreased.

Macroinvertebrates

110 taxa from different groups have been cattalogued: Oligochaeta, Gasteropoda, Bivalvia, Hirudinea, Isopoda, Amphipoda, Ephemeroptera, Plecoptera, Trichoptera, Odonata, Coleoptera, Diptera. The distribution was the following: true flies – 39 taxa, mayflies – 21 taxa, caddis flies – 20 taxa.

The number of taxa was low. Between 6 (Jiu – Malu Mare) and 42 (Jiu de Est – Cimpa) taxa per station were calculated depending on abiotic characteristics and the value of anthropic impact. A dramatical decrease of taxa number was observed along Motru river due to hydromorfological changes and other disturbance factors, from 26 (upstream Valea Mare reservoir) to 9 (downstream Valea Mare reservoir) taxa. Along the Jiu river a decrease of taxa number was observed from upstream (Cimpa) to downstream (Malu Mare) due to anthropic impact. At Zaval, an increase of taxa number was established, most likely due to the Danube water influence.

The proportions of different groups were different. On Gilort river the mayflies represented 38% from the total number of taxa, while the true flies and caddis flies were 19% each. Along Motru river, upstream reservoir, the mayflies represented 38%, followed by caddis flies (28%) and true flies (24%).

A certain number of taxa exist in more than one investigated stations. For instance, *Acentrella sinaica, Eukiefferiella gracei, Baetis rhodani, Limnodrilus udekemianus* and *Baetis* sp.

The most determinations were achieved at the species and genus level. The ratio of determinations varied between 89-100% (Balasan river – upstream Motatei). The number of the groups varied from 3 (Jiu river – Malu Mare) to 7 (Balasan river – upstream Motatei). The presence of many invertebrates groups and their balanced development shows the potential of reference station.

Quantitatively, the densities have varied in large limits. For instance, along the Jiu river the densities decreased from upstream to downstream, except Zaval station. At upstream Motatei on Balasan river the densities showed the dominance of mayflies (44%) and true flies (39%).

The most identified forms were bioindicators for oligosaprobic, oligo-betamezosaprobic and betamezosaprobic zones, taking into account the specific of investigated stations as reference or the best available sections for different types. Upstream Valea Mare reservoir on Motru river, 12 oligosaprob taxa and 2 oligo-betamezosaprob taxa were identified from a total number of 25 taxa (56%). These taxa are considered sensitive. At Bengesti station, on Gilort river, 5 oligosaprob taxa and 1 oligo-betamezosaprob taxa represented 50% from all taxa in the sample. On Jiu river, at Malu Mare, sensitives taxa have not observed.

In order to point out the presence of sensitive taxa, the ecological status of rivers and the intensity of anthropic impact EPT (efemeroptera-plecoptera-trichoptera) index was used. The value of this index increases with water quality. The EPT index is given by the number of 3 mentioned groups divided to the total number of taxa and shows the richness of sensitive taxa (table 2).

Table 2. Variation of EPT index from watercourses belonging to Jiu River catchment area (september 2006)
Tabel 2. Variaţia indicelui EPT în cursuri de apă aparţinând bh Jiu (septembrie 2006)

Investigated station	Total no.of taxa	EPT Index				
		(absolute value)				(%)
		Total	E	P	T	
Gilort - Bengesti	**16**	11	6	2	3	69
Motru - up. Valea Mare	**25**	19	8	4	7	76
Motru - do. Valea Mare	**9**	6	3	0	3	57
Balasan - up. Motatei	**26**	6	4	0	2	23
Jiu - Cimpa	**42**	22	6	7	9	52
Jiu - Balteni	**12**	6	4	0	2	50
Jiu - Malu Mare	**6**	1	1	0	0	17
Jiu - Zaval	**16**	4	3	0	1	25

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The EPT index values were higher on Gilort river (69%) and Motru – up. reservoir (76%). Due to human impacts the values of EPT index decresed along the Jiu river.

Taking into account the position of investigated stations within mountain and hill areas, the dominance of scrapers, shredders and predators feeding groups was observed. At the downstream stations the number of detritivourous and filtrators increases. The presence of scrapers and shredders deepend on subtrate bioderma. The analysis on feeding groups for all taxa in a sample shows for instance at Cimpa the balance among scrapers (13-31%), predators (12-29%) and shredders (11-26%).

Fish fauna

37 fish species have been identified in all investigated water bodies. Some species have been observed only in mountain rivers, very well oxygenated ones, belonging to oligosaprobic zone. For instance, the trout was observed on Jiu de Est river, Motru river – upstream and downstream reservoir.

All data regarding numerical and gravimetrical fish stock have been recorded. The ecological status of species: indigenous or introduced, feeding regime, ecological preferences were recorded as well. From 37 observed species only 2 are acclimatized: *Pseudorasbora parva* and *Lepomis gibbosus*.

The biggest number of taxa were observed at Zaval (20) on Jiu river, and the smallest number on Motru river – downstream reservoir and on the Jiu de Est river at Cimpa (2). Regarding the number of captured specimens the most representative fish assemblages were on Jiu river at Zaval (276) and at Balteni (516). The densities at 100 m2 varied, taking into account the station and the water body specifics, from 2,5 at Motru - downstream reservoir to 48,75 at Balasan, upstream Motatei.

On Gilort river, at Bengesti, most of the 167 observed fish specimens belonged to the species *Barbus petenyi* (99), *Phoxinus phoxinus* (32) and *Orthrias barbatulus* (20). The dominant species were *Romanogobio kessleri* and *Carassius gibelio* on Jiu river at Malu Mare; *Proterorhinus marmoratus* and *Gobio obtusirostris* on Balasan river; *Rhodeus amarus*, *Squalius cephalus* and *Alburnoides bipunctatus* on Jiu river, Balteni; *Phoxinus phoxinus* and *Salmo trutta fario* on Motru river, upstream reservoir; *Barbus petenyi*, on Motru river, downstream reservoir Valea Mare; *Salmo trutta fario*, on Jiu de Est river at Cimpa; *Carassius gibelio*, *Idus idus* and *Alburnus alburnus* on Jiu river, at Zaval.

The repartition of species is characteristic to existing habitats, the number of species depending on their size and existing impact. The number of species gradually increased starting from the springs of the rivers and with the size of habitats. Moreover, the salmonicol species present in some sections are indicators of natural or almost natural conditions, with minimal human influences. The salmonids allow for identifying the reference conditions along the rivers and the types of the rivers.

The age structure of fish population shows the potential of that population, increasing or decreasing trend respectively.

Macrophytes

This biological community was superficially considered in the past, so the main objective of inventorying the macrophyte communities from Jiu catchment was obtaining reliable, actual information by using a standardized methodology, information to be used in conjunction with the one obtained for other biotic communities for asessment of current ecological status of the studied aquatic ecosystems according to WFD.

Quality parameters for macrophyte communities are taxonomic composition and abundancy (E.U. 2000).

For each section (either with our without macrophytes) habitat parameters were recorded. Various sets of habitat parameters were considered, to allow for relating growth forms with abiotic conditions.

A total of 31 different macrophyte taxa were recorded in all 4 inventorying sections from Jiu river - Cimpa, Bâlteni, Malu Mare şi Zăval.

For the other three rivers, results were as follows :

- Motru river (upstream and downstream Valea Mare reservoir): 7 and 15 species;
- Gilort (Bengeşti) river: 15 species;
- Balasan (upstream Moţăţei): 21 species.

For each river section a *concise species list* was composed, mentioning species name and author, standard abbreviation and growth form. From the DCA or other monitoring schemes perspective only a concise species list fulfills the monitoring requirements. For each species Plant Mass Estimates were recorded for each of the survey units where the plants were seen.

Overall, the recorded 42 taxa were distributed by growth forms as follows :

- acro-pleustophytes (plants floating on the water surface): 1 species;
- submersed pleustophytes (plants neither floating on the water surface, nor being really attached to the sediment): 1 species;
- submersed anchored (plants are fixed in the sediment or attached to the bottom: 4 species;
- amphiphytes (plants grow in the same survey unit on the bank, like a helophyte, and at the same time in the water body, like a submersed anchored plant): 6 species;
- helophytes (all bank vegetation still clearly associated with the water body): 30 species.

In every case helophytes were dominant plants, amphiphytes being relatively under-represented. Submersed anchored macrophytes were recorded in most sections, but in small amounts, represented only by a species of chlorophyta (*Cladophora glomerata),* one bryophyta (*Fontinalis antipyretica*) and 2 species of spermatophyta (*Cardamine amara* and *Ceratophyllum demersum*).

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It is known that reference sections of rivers from mountain areas are generally unfavourable for macrophyte growth. Water flow is generally high and the sediment type (gravel, stones, rocks, sand) is not suitable for proper anchoring, so only a limited number of aquatic macrophytes can be found in these habitats, helophytes being always dominant. Yet generally helophytes are not very suitable as quality indicators, hence it is difficult or impossible to assess the ecological status of those sections based only on macrophyte community.

In our survey such situations were found in several sections from Jiu river (Cimpa, Malu Mare) and Gilort (Bengesti). Anyway, inventorying the macrophyte communities allowed for some conclusion to be drawn and it proved useful for present comparisons and it will be useful for future ones.

The two sections from Motru river were interesting because they were chosen upstream and downstream Valea Marea reservoir, the upstream section being a reference one. Macrophytes were poorly represented in this section (only 7 species of helophytes, with low biovolumes), while in the downstream section they showed a marked difference: more species and higher biovolumes, together with occurrence of few indicator species allowed for concluding that even if both sections have good ecological status, there was a subtle nutrient increase from upstream to downstream sections, confirmed also by analysis of other biological communities.

On Balasan river, the last river inventoried in Jiu catchment, upstream Moţăţei section was chosen. The macrophyte communities were quite well represented, being recorded 4 species of hydrophytes, 2 amphyphyte and 15 helophyte species. Low water flow was associated with general occurence of *Lemna minor,* the only acro-pleustophyte found. The assemblage of indicator species (*Sparganium erectum, Ceratophyllum demersum* together with *Lemna minor*) in significant biovolumes marked a higher nutrient load of the water, probably caused by nearby crop fields and the pollution from fertilizers. A moderate ecological status was assigned to this section.

CONCLUSIONS

Adding up all the data obtained by studying certain biotic communities from different water bodies along the rivers allows for drawing a wide range of conclusions.

The phytoplankton had low taxonomic diversity. The diatoms were the dominant algae.

The phytobenthos communities were diversified with 70 identified taxa from different groups: Cyanophyta, Pyrophyta, Bacillariophyta, Euglenophyta, Chlorophyta. Most taxa were from diatoms..

110 macroinvertebrates taxa were inventoried in all studied rivers with organisms belonging to different taxonomic groups: Oligochaeta, Gasteropoda, Bivalvia, Hirudinea, Isopoda, Amphipoda, Ephemeroptera, Plecoptera, Trichoptera, Odonata, Coleoptera, Diptera. The number of taxa was generally low per station. The majority of identifications have been achieved at the species and genus level. Most identified forms were bioindicators and sensitive species. The values of EPT index showed the presence of natural or almost natural conditions on Gilort river – Bengesti, on Motru river – upstream reservoir, and a dramatic anthropic impact on Jiu river at Malu Mare (17%).

The saprobic index values based on phytobenthos and macroinvertebrates bioindicators revealed the high and good ecological status of investigated stations. Based on saprobic index, in general, the surveyed stations stayed within oligosaprobic, oligo-beta-mezosaprobic or beta-mezosaprobic zones. The lowest values were observed on Motru river – upstream Valea Mare reservoir and Jiu river at Cimpa, stations with little anthropic impact. On Balasan river, upstream Motatei, because of the characteristics of the station the ecological status was good. Along the Jiu river a decrease of the ecological status and water quality was observed from upstream to downstream.

37 fish species have been identified in the investigated water bodies. The biggest number of taxa was observed at Zaval (20) on Jiu river, and the smallest number on Motru river – downstream reservoir and on Jiu de Est river at Cimpa (2). The presented taxa depended on specific characteristics of the investigated water bodies. The trout was observed only on upstream stretches of the Jiu and Motru rivers, for instance. The species repartition is characteristic to existing habitats, the number of species depends on their size and human impacts. Regarding the number and spatial distribution of fish species collected in 2006 as compared with the previous situation (before 1960), a decrease of species number from springs to mouth of the rivers due to anthropic impact was noticed. The exception is at Zaval, where the Danube has influenced the fish fauna of the Jiu river.

Overall, it can be stated that significant anthropic impact was detected for the main channel of Jiu river, starting from Petrosani, impact amplified by important human settlements (Tg.Jiu, Craiova) and by mining facilities from pre-Carpathian area. Main tributaries (Motru, Gilort, Amaradia) and rivers from mountain and sub-mountain area are much less affected, native fish fauna being present in greater ratio. For a proper, precise ecological diagnosis there is a need for other surveys for the next two years, coupled with increased frequency of sampling points and sampling campaigns.

In lotic systems occurrence and distribution of macrophytes is influenced by to several significant parameters: water flow regime, river bottom type, availability of light, physico-chemical conditions of aquatic environment. All these criteria have impact upon general patterns of distribution of individual species and macrophyte assemblages. From the six groups of macrophyte species considered (Chlorophyta, Bryophyta, Spermatophyta – submersed anchored, Spermatophyta – plants floating on the water surface, Spermatophyta – amphiphytes, Spermatophyta – helophytes), three groups can be useful as water flow indicators, i.e. Bryophyta, Spermatophyta – submersed anchored, Spermatophyta – submersed pleustophytes.

As previously mentioned, there are some sections where abiotic parameters are not suitable for any macrophyte growth, not only for indicator species. Anyway, even if macrophytes are completely absent or only species without indicator value appear, there is impossible to drawn any conclusion regarding water quality and ecological

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status if no other biological community, better represented, is assessed. It can be noticed that for the river sections where macrophytes were present and indicator species appeared in significant amounts, the results were similar to those obtained by studying other biological communities, such as phytobenthos. It was even possible to determine relatively small differences between water quality from one section to another, on the same river (as for sections from upstream and downstream Valea Mare reservoir, Motru river).

The investigated water bodies and rivers belonged to different types: RO01a – Jiu de Est river (Cimpa), RO02a – Motru river (upstream and downstream Valea Mare reservoir), RO03a – Gilort river (Bengesti), RO15a – Balasan river (upstream Motatei), RO17a – Jiu river (Malu Mare) and RO18a – Jiu river (Balteni and Zaval).

Sometimes it is difficult to confirm abiotic typology using biota, due to disturbance factors. For instance, on Motru river, upstream and downstream Valea Mare reservoir, there are not too many similarities between the two water bodies, even though they belong to the same type. The changes arise because of the dam and reservoir impacts which modified the hydrologic characteristics with consequences on biota.

On RO01a, RO02a and RO03a types or upper stretches of the rivers, respectively, stoneflies, together with mayflies and caddies flies have been observed. The stoneflies are missing in the middle and downstream stretches of the rivers due to human impacts. The trout characterizes only RO01 and RO02 types. Other species, like *Thymallus thymallus*, have not been captured, though they may be present in those water bodies and rivers.

Very detailed identification of aquatic flora and fauna, down to subspecies and variety level, are needed for biotic typology characterization in order to reveal the differences. The abiotic typology confirmation will take a long time, due to lack of enough specialists. A grouping of different abiotic types and also dampening their number is possible.

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WHAT IS LIFE?
or
$\alpha + \beta + \omega = \infty$

ION BĂRA

Summary. From long times, our ancestors asked themselves "**What is life?**" In order to answer this question, we have to establish what the Universe is, how it appeared, and how the material world was formed. Further on, we have to establish how life appeared. These are questions to which, both Religion and Science, represented by many currents tried to answer at. Among this survey, there we present the answer of Professor Ion I. BĂRA at the question "**What is life?**", and also to the mechanisms that lead to the appearance of first forms of life and their development. The answer to this question can be expressed by the relation $\alpha + \beta + \omega = \infty$, i.e. substance, energy and information.

Key words: life, substance, energy, information.

Rezumat. Intrebarea **Ce este viata?** a fost pusă de strămoşii nostrii, din cele mai vechi timpuri. Pentru a răspunde la această întrebare, trebuie să stabilim ce este Universul, cum a apărut el, cum a apărut lumea materială. Iar ulterior, cum a apărut viaţa. Sunt întrebări la care a căutat să răspundă atât Religia, cât şi ştiinţa, reprezentată prin diferite curente. În paginile de mai jos, este prezentat răspunsul dat de **Profesorul Ion I. BĂRA**, la întrebarea **Ce este viata?**, precum şi la mecanismele care au condus de la apariţia primelor forme de viaţă şi la perfecţionarea acestora. Răspunsul la întrebarea **Ce este viata?**, poate fi exprimat prin relaţia $\alpha + \beta + \omega = \infty$, adică substanţă, energie şi informaţie.

Cuvinte cheie: viaţă, substanţă, energie, informaţie.

What is life? This is the trembling question from the past; it deeply influences our present and will always be. It is the interrogation that preoccupies science men and priests, and artists, philosophers, all people that have the gift of thinking. Priests have revelations, science men discover hidden laws of the **Universe**, artists create, and philosophers elaborate fascinating conceptual systems. But, for the time being, no one was till able to give an answer to this long debated question. As Petre Tutea stated (1993): questions like that ***"situate the human spirit in the world of questions".***

Meanwhile, the large number of thinkers that passed on **Earth,** elaborated, simultaneously or successively two categories of hypotheses: **creationism and evolutionism.**

The former category places the issue of life in **God**'s matter; the latter, is attributed to the inexorable moves and transformations of universal matter. We have to be more specific. For real, there is no opposition between the two categories, rather a complementary relation, for both are looking for and propose an answer to the same question, but use different methods to do it. On the other side, **the problem of origin of life on Earth** is a false matter, and this is why it is considered so: **Life** is an intrinsic component of **Universe** itself, and **Universe** has no beginning and no end, in time and space. In its turn, **Life** is infinite in time and space, even if it is not permanent in a certain point of the **Universe**. But, as existential structures, nor galaxies, stars or planets are permanent. Everything is continuously transforming in the spatial and temporal infinity of the **Universe**. But, what is **Universe?** The human mind does not have the capacity to accept this notion, for, the human being generally does not accept what it can not explain and imagine. The notion of Infinite too is part of the things that the human being can not imagine. B. Pascal defined **Universe** as a circle, whose center was all over, and whose circumference was nowhere. Interesting and majestic definition this is. For us, **Universe** can have at least two representations, namely: the unique and infinite **Universe**, and the **Universe** that can be known, touched, and which, because of the limits of science is finite. For this definition, there was approved that the **Universe** "began" about 18-20 billions years ago. With all these, the nature of the **Universe** that can be known and is accessible is limited. We are talking here about the *Planck limit*, which was fixed, by calculations at the 10^{-43} sec from its beginning). There is no possibility to reach it beyond, even if by thinking. It is admitted that gravity was so powerful, that space and time, the two fundamental judgments curved at some point. It can not be anything thought about the state of the Universe at the initial moment, the "0" moment. Mihai EMINESCU, in ***LUCEAFARUL*** elegantly suggests, with his genial capacity, the events that developed at the beginning of the Universe:

"And from the Chaos' vales he sees
How in an immense ring
Round him, as in the World's first day,
Lights from their sources spring;

How, springing, they hem him like an
Ocean that swimming nears...
He flees carried by his desire
Until he disappears.

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For that region is boundless and
Searching regards avoids
And Time strive vainly there to come
To life from the dark voids.

'Tis nought. 'Tis, though, thirst that sips him
And which he cannot shun,
'Tis depth unknown, comparable
To blind oblivion."

EMINESCU suggests that the Evening Star (*Luceafărul*) had reached to **God**. But, **God** has *no end and no beginning*. **Universe**, too is has *neither end nor beginning*. Therefore, **God** is **The Universe, Universe** is **God.** There is no other possibility. Then, if **God** would be after the **Universe**, then, it means that **Universe** is superior to **God**. And, this is not possible! The, if the **Universe** is **God**, life being a part of it, then it is true and possible that it has been always been and will always be. If **God** created the **Universe**, there is no sense for us to wonder how Life appeared on **Earth**. In a **Universe** that was created, everything else that appears after, as a consequence of some inexorable laws belongs to creation. Punctum!

And then, **what is Life?** Is it just substance? Indubitable, NO! Or, in another way of saying it, not juts substance. Is life substance + energy? Again, NO! If to the two components of life we add another one, which is immaterial, i.e., **Information** we come closer and closer to the essence of life. And, not just that! We shall notice that we are facing some new and fascinating questions, whose answers are incomplete. Lucian Blaga (1990), one of the greatest philosophers of Romanian literature stated that: *there are things that can only be vaguely understood. We, humans are trying to deeply understand them and, sometimes we are finding ourselves that we do not understand them at all.*

So, given this, what is **Information**? How did it appear, how does it accumulate, how is it transmitted? **Information**, as an intrinsic extra material component of the **Universe** must be perceived and analyzed carefully, so that any confusion should be avoided.

In **The Bible**, considered **the book of all books**, in Chapter I from the Holy Gospel after John, in the New Testament, we find the following verse:" *At the beginning, there was the **Word**, and the **Word** was at **God**, and **God** was the **Word**!"* Thus, at the beginning, there was **the Word**, i.e. **Information**, i.e. **God**! This means that the first was **Information**. Constantin NOICA, another titan of the Romanian Philosophy, stated: "*Liberty is given by the Word!"* Translated in scientific terms, there is a direct correlation between the informational content and the degree of independence of a system. This aspect of this matter will be detailed later on. We must say that there is a clear indetermination between the degrees of liberty of the subsystems of a system, and the quantity of information held by the integrated system. In **The Bible**, referring to the relation **Word = God**: "All *things were done by **Him**, and, nothing without **Him**; **Life** was within **Him**, and **Life** was the light of people"*. In the verses above, **God** is equal to the **Word**, i.e. with the **Information**. As we are going to find out, **Information** is self-creating, it appears without any energy consumption. There can be stated that **Information** appears out of nothing (ex nihil). But, again, what is **Information**?

In a definition, **Information** can be perceived as *a message about the events that happened or are about to happen within a system* (THEODORESCU and GUIASU, 1965). HARKEVICI (1963) considered that **Information** is the subject matter of the stocking, transmitting and processing actions; A. I. BERG (1963) - **Information** characterizes the degree of the organization of the substance or of energy. Norbert WIENER (1963), the father of Cybernetics states that: ***Information*** is ***information**; it is not substance or energy*. Mihai DRĂGĂNESCU (1989, 1990) points out: "**Information** *is not matter"*, even if there can not be ignored the relation between information and matter; he also points out that the notion of notion can be considered a primary notion of philosophy and science, and there can be admitted that the unity of the physical forces in the **Universe** has an informational origin. This acknowledges the godly role of the Information. The complexity and mystery of this component of the **Universe** can be suggested by certain examples that reflect enigmatic phenomena. Telepathy and teleportation, the auras of living beings, the ungentropic behavior (for self, but entropic for the surrounding environment) is characteristic for biotic systems; "the memory" of the sub-atomic particles are only a few of the dimensions of the informational component that can be known.

Telepathy, as a reality became interesting in the XIX the century, due to a strange happening. One day, on a street in Paris, a child began to beg that his father be saved from drowning. Later, there was found out that, in those very moments, a few km way, the child'father died drowned in a river. A pair of twins lived in different towns, far away from one another. Suddenly, one of the two brothers fell sick of measles. Simultaneous, the other brother fell sick of measles in the same time, as his twin brother did. Individuals belonging to the water hyacinth have been separately cultivated in two crystal neighboring vases. In one of the two vases, poison was added. Obviously, the plants dried. Concomitantly, the ones in the other vase dried, too.

By experiments taken in our laboratories, in order to check the *COMOROSAN effect*, there was possible to notice some strange events that could not be explained. By X-raying with green light, which is known as being non-energetic, a crystalline substance (potassium), which was, then used on other plants, there were noticed stimulating effects for the assimilation and growing processes, that were superior to the ones inducted by the same substance, but without X-rays. We have to mention that the effect can be noticed when X-raying was done at least 5 seconds, or at

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least a multiple of 5. According to the laws of Physics, the X-raying with green, non-energetic light should not have an effect at all.

Very interesting, indeed are the experiments taken in modern Physics laboratories. Two sub-atomic particles were put in contact, by collide. Both got deformations. Then, they were separated. There were also noticed that, even separated, when one of the particles suffered different transformations, the other one behaved exactly like the one that was damaged. The conclusion is the two particles have informational memory and stay in contact, one with the other by "unknown mechanisms", and each of the two still has memories about the other one. DRAGANESCU speaks about the deep information of the matter, and one of the non-Darwinian evolutionist theories, i.e. the theory of self-evolution states that, within the deep information of the matter all there are anticipated all the sequences, and events that the matter will follow in its dynamics, from inorganic to organic, to life (LIMA-DE-FARIA, 1988). But, from the point of view of the constitution of lively systems, it is interesting to find out how hereditary information appeared and developed, under the determination of the specific individual and group qualities of lively systems. Both the matter of transmitting hereditary information, from one generation to another, and the matter of the information characteristic to individuals, more complex than the hereditary one must be debated. **Information** represents a component of the **Universe**, along with substance and energy. Thus, **Universe** can not be reduced to matter. But, **Information** itself is the component of lively systems. Therefore, likewise the **Universe**, **Information** has three main components. **Life** can not be equaled, nor as a notion nor as a structural reality to **the living matter.** On the other side, taking into consideration that **Life,** as infinity is extremely complex; any attempt to characterize it is extremely difficult.

Information, likewise any component of the **Universe** can be evaluated and measured, too. C.E. SHANON, mathematically basing the notion of "information" established its measure unit, i.e. the **BIT**. In order to comprehend its meaning, under an informational report, a human organism, for example, we must make the following mentions: On a CD-ROM there can be stocked about one million (1000000) books, of an average format. In order to describe the details of the human body, it takes 10^{11} **bits**, i.e. 100 billions **bits** or, 10 CD-ROMS, i.e. 10 million books, of an average format.

But, where does this large amount of information come from? How does it constitute, how does it accumulate and, especially, how does it transmit from one generation to another? Does it exist in every individual? Well, there can be proved that the amount of information that a lively system holds, be it bacteria, plant, animal, human, biocenosis, is created itself, and amplifies with the development of ontogenesis, and of phylogenies. Only the information specific to one species or another and catalogued as hereditary is constant, and is stocked and transmitted codified, from one generation to another. But, hereditary information, likewise the universal **Information** appeared all of a sudden, on the basis of objective causal laws. In order to explain the succession of the processes that lead to the self constitution of specific hereditary information, we need to make an incursion in the *Pythagorean* philosophic system.

According to the *Pythagorean* doctrine, each element of the **Universe** is based on the trinity: "beginning, middle, end", and each of the element of this trinity corresponds to a symbol that generated all the things. **Monad**, i.e. **1** is the perfect principle, the beginning; **Dyad**, **2** is the unlimited principle and, together with unity it generates the number series that are considered principles of all things in the **Universe**. **Dyad** is the **Universe - Unity** relation, the relation in which the **Infinite** takes part at the finite represented by the **Unity. 3** and **1** is a prime number couple that limits the indetermination of the Dyad. Analyzing the steps in the formation of a nucleotide, that is a key element in assuring the hereditary determinism, we notice a similar situation with the **monad-dyad-triad** succession, in the way that the nitrogen basis (purinic or pyramidinic) is the main component with a sematic role within the nucleotide. Or, it is the **Monad**, which units with pentose and forms **Dyad**. The latter, by uniting with the Phosphoric radical loses its indetermination and forms the **Triad.**

The number **1** and **3** are present in the religions, myths and superstitions of most indo-European peoples. Given this context, the **Vedic Triad,** the **Capitol Trinity, the Greek Triads, Zeus- Hera- Athens**, or **Zeus- Hera- Dionysus**, **the Holy Trinity** at Christian peoples(**Father, Son, the Holy Ghost**), **the three daughters of Allah (Al Hat, Al Uza and Manat)** at Muslim peoples, **the Six-Cornered Star of David (three times two)**, in Jew religions.

PYTHAGORAS thought soul was made-up of three elements: reason **(nous)**, thought **(phrens)** and passion **(thymos)**. **ARISTOTLE** stated that "in the composition of reasoned being, one part is divinity; another is human and another one, the **Pythagoras** way". The number **3** signifies the triangle, the surface, the width, the masculine, and is considered the starting point in genesis. As we previously stated, the nucleotide (the triad) is the starting point in constituting the hereditary information; at the Chinese people, **3** is a sequence of Creation. LAO ZI, for example mentioned that **Dao** is the image of the order principle, the image of a path that is about to be walked upon. **Dao**, the perfect and undifferentiated being gave birth to the **One**, that, in its turn gave birth to **Two** (Heaven and Earth), which also gave birth to the **Three**, of which the 10 thousands beings were born, and carry **Yin** and embrace **Yang**.

For **PYTHAGORAS**, **3** stands for the first impair and asymmetric complete number, the second triangular number in the formulae: n (n+1) / 2, with the following representation:

Within the Romanian spirituality, number **3** is a very important leitmotif of myths, beliefs and superstitions. In all fairytales, there are, either 3 kings, or 3 daughters, or sons; 3 rivers to pass, 3 forests, 3 mountains; fights last 3 days, 3 years; there are also 3 weddings: silver, gold and platinum; in ***Miorita"*** there were 3 flocks, 3 shepherds, 3 pipes (made of beech tree, of elder tree and made of bone), the sheep spoke for 3 days, and many more. There is Hell, Purgatory and Heaven; Jesus was crucified with 3 needles, he preached for 3 years, he resurrected in the 3rd day, he showed to others 3 days after; Peter denied 3 times(the rooster sang 3 times), there are 3 fates, Christmas and Easter last 3 days each, there are 3 evil hours, the dead is watched for 3 days, weddings lasted 3 days, a long time ago, Voroneţ Monastery was built in 3 months, 3 weeks and 3 days and many more.

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α
1

α
α α
3 = 1 + 2

6
α
α α
α α α
6 = 1 + 2 + 3

α
α α
α α α
α α α α
10 = 1 + 2 + 3 + 4

It is very interesting that **number 3** is present in the most diverse natural phenomena and processes. It must be mentioned that the essential processes in the becoming of the cognoscible Universe lasted 3 seconds, the radiation of the Universe is of about 3 K, by disintegration, atoms emit radiations, i.e. α, β, γ, the atom is made up of electrons, protons and neutrons, baryons (subatomic particles) are made up of 3 quarks and 3 anti quarks, there are 3 mesons, 3 neutrins, and 3 leptons, the light speed is of 300. 000 km/s, π= 3.14, insomnia are removed by imagining an immense white 3, on a black board, the force field in the pyramid effect is 6.666, the segregation, in the Mendelian laws is a report of 3:1, in case of a character pair, 9 : 3 : 3 : 1, in case of 2 pairs of characters, 27 : 9 : 9 : 9 : 3 : 3 : 3 : 1, in case of 3 pairs of character.

Analyzing the characteristics of the genetic code, by which, hereditary information is stocked and transmitted, there is noticed the obsessive presence of **number 3.**

Hereditary information, characteristic to every human being is stocked and codified in genes that are made up of codons, which, in their turn are made up of nucleotides. In the specialty terminology, a nucleotide is a code letter, a codon represents a code word, and the gene is a sentence, or even a phrase, representing, in its turn a specific text.

It is a truism the fact that a nucleotide, made up of 3 components (as we previously proved) and not 2, 4 or more. These components are: **the nitrogen base, the pentose and the phosphoric radical.** The **RNA** molecule contains ribo-nucleotides, which have in their composition the purinic bases, *Adenine* and *Guanine*, and the pyramidinic bases, *Cytosine* and *Uracile*. The macromolecules of **DNA** have the same purinic bases, but, as pyrimidinic bases they have *Timine* (instead of *Uracile)*, and *Cytosine*. The DNA macromolecules have the two catena assembled in a double propeller, by the hydrogen bridges that form between the *Adenine* and the *Timine* (two bridges), and between the *Guanine* and the *Cytosine* (three bridges). It is interesting to remark that the maxim stability of the double propeller is given by the triple bridges. A codon as it can be noticed in the table below is made up of 3 nucleotides (and not 1, 2 or more); there are 3 STOP codons (**UAA, UAG, UGA**).

The RNA Genetic Code

The first nucleotide of the codon	The second nucleotide of the codon				The third nucleotide of the codon
	U	C	A	G	
U	UUU	UCU	UAU	UGU	U
	UUC	UCC	UAC	UGC	C
	UUA	UCA	UAA	UGA	A
	UUG	UCG	UAG	UGG	G
C	CUU	CCU	CAU	CGU	U
	CUC	CCC	CAC	CGC	C
	CUA	CCA	CAA	CGA	A
	CUG	CCG	CAG	CGG	G
A	AUU	ACU	AAU	AGU	U
	AUC	ACC	AAC	AGC	C
	AUA	ACA	AAA	AGA	A
	AUG	ACG	AAG	AGG	G
G	GUU	GCU	GAU	GGU	U
	GUG	GCC	GAC	GGC	C
	GUA	GCA	GAA	GGA	A
	GUG	GCG	GAG	GGG	G

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By the genetic code, the hereditary information, specific to each individual biotic system is stocked and codified in genes, which are billeted on chromosomes. During the ontogenetic development, by transcription and translation processes, the characters stoked and codified in genes are phenotype like. It is interesting that, during phenotype process (i.e. the decoding of the hereditary information), we notice the existence of **3** components: ***DNA*** (***the gene***), ***RNA***, and ***Protein***; in the transcription and translation processes there are involved **3** types of ribonucleic acids, namely: ***RNA-m***, ***RNA-t*** and ***RNA-r***. More than that, biosynthesis process has **3** mechanism of self adjustment: **induction, gene repression,** and **enzymatic retro-inhibition**. The operon, on the other side is made up of **3** main components: **promoter**, **operator**, and **structural genes**. Recently, after elaborate laboratory experiments; it was obtained the assembly of **tri-catena RNA**, with special implications, both theoretical, and practical. The reversed transcription, which is a possible explanation for the processes that evolved at the beginning of life, also implies **3** sequences of circulation, namely: **RNA-DNA- RNA.**

Therefore, for the constitution and functionality of the hereditary information, **number 3 is** determinant. Although in the constitution of the **DNA** there are 4 nucleotides (**A, G, T** and **C**), which represent the same number of code letters, codons are made up of **3** code letters and not **1, 2, 4** or more. Mathematic calculations prove that this is the optimum relation that can establish between an amino acid (of the 20 ones existent in nature), and a codon which has a minimum number of letters. If a codon had just one letter, there would have been only 4 (**U, C, A, G**), and only 4 amino acids could have been specified. If a codon had two letters, there resulted 4^2 (16 combinations), and only 16 protein amino acids of the 20 could have been specified. In this latter situation, the codons would have been, as it follows:

UU	**CU**	**AU**	**GU**
UC	**CC**	**AC**	**GC**
UA	**CA**	**AA**	**GA**
UG	**CG**	**AG**	**GG**

Obviously, the next chance was of e letters/codon, i.e. a combination of **3** nucleotides, in order to specify one amino acid. But, given this situation, there results 4^3 codons, meaning 64 different codons for only 20 protein amino acids. This difference was "solved" by the lack of parity of the relation **codon - amino acid**, on one side, and, on the other by the "specialization" of the **3** triplets (codons), in order to stop the transcription process of hereditary information on the DNA macromolecule in the one of the messenger **RNA** (**RNA** $_m$). The genetic code like any reality in the cognoscible **Universe** allows forming infinite informational entities diversity. In other words, the genetic code allows forming 4^N different sequences of **DNA**, where **N** is the number of letters in a sequence. For example, a bacterium contains genes made up of 1500 nucleotides (or, made up of 1500 letters). But, according to the formulae 4^N, the potential number of different genes (having the mentioned size) is of about 4^{1500}, a higher value than the total number of genes that appeared on Earth, 3.8 billion years ago. On the other side, the formation and assembly of codons in genes (in a certain number and order), are processes that evolved independently on the quantity of substance or energy, to which it correlated. It is obvious that the 4 nucleotides transmit a certain informational message, when being in the order **AGTC**, another one, when being in the order **GATC** and so on. The material support is remains the same, the order is still independent and does not require an energetic consumption. Therefore, the **information** is self creating, it appears out of nothing.

It is interesting and worthy to be mentioned the following fact. The existence of triplets as a possibility to code the hereditary information was discovered and commented upon recently. Thousands years ago, the Chinese proved that, by trigrams (combinations of **3** moving lines) there existed 64 different combinations, meaning there existed, too 64 human characteristics. We are dealing here with the **I CHING oracle**, the oldest and most relevant system of describing and foreseeing the destiny of humans.

Morse allows transmitting unlimited amount of information, by repeating combinations of a line, dot and the spaces between them (we are dealing with **3** elements, again).

No doubt, the genetic code reveals only an aspect of the constitution and accumulation of individual information. But, as we stated previously an individual, at the peak of is ontogenesis has a larger amount of information than the one determined by the genetic code and the one transmitted on hereditary ways. More than that, it was proved that living systems have an anti entropic behavior, in comparison with the rest of systems in the **Universe**. Where there is life, the amount of entropy increases, as well. Calculations proved that the **Universe** directs to a thermal death, in the way that, in time the "chaos" in the **Universe** will come at its peak and as a consequence, the temperature will uniform, gradients will disappear and everything will collapse. In spite of this somber perspective, there is a **paradox**, **the Life Paradox**, which seems to gain, on and on in organization and informational content. On the other side, a biologic system has a larger amount of information, than the sum of the component systems, in spite of the fact that these, by interacting lose their degree of freedom, and even their information. Given this situation, where does this large amount of information come from? Calculations were made and it was proved that additional information is self creating, appears as the result of the organizational interactions that establish between the subsystems of a system. Here is an important example.

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The I CHING Oracle

Triagrams	☰	☱	☲	☳	☴	☵	☶	☷
☰	1	11	34	5	26	9	14	43
☱	12	2	16	8	23	20	35	45
☲	25	24	51	3	27	42	21	17
☳	6	7	40	29	4	59	64	47
☴	33	15	62	39	52	53	56	31
☵	44	46	32	48	18	57	50	28
☶	13	36	55	63	22	37	30	49
☷	10	19	54	60	41	61	38	58

Phosphoric acid, pentose (ribose or dezoxiribose) and nitrogen bases (purinic or pyrimidinic) have an amount of information, as well as some degrees of freedom. If a nitrogen bases interacts with a pentose and forms a nucleoside, both the base and pentose have lost a degree of freedom, each. But, the information held by the nucleoside is superior to the information of the nitrogen base and pentose. When the nucleoside reacts with the phosphoric acid, each of them loses a degree of freedom, but the information of the nucleotide is superior to the information of the nucleoside and phosphoric acid. The nucleotide is the first semantic element, one of the letters characteristic to the genetic code. Then, nucleotides form the codons, which, in their turn form the genes. The zygote heirs the necessary hereditary content for self development (it represents half of the legacy of one parent, and half legacy of the other). But, after the first cell division, the dyad has more information than the double zygotic information, i.e. the information resulted from the interactions established between the two cell results. This piece of information determines a certain behavior of the nucleons of the two cells (rotations in different senses), which induce successive divisions on different plans. In its turn, this process lead to the creation of certain structures (organizations) that lead to informational increase. This way, the information determines organization, which, in its turn develops information, and so on. One creates the other, the result being self development, self information and self evolution of biologic systems.

More frequent, we hear that the **Universe** remains constant, just like the sum of substance and energy, but it continuously gains **Information**, by the informational contribution of biotic systems. **Universe is an integrating supra-system, whose intelligence self accumulates**. But, **Universe** is a circle, with its center everywhere, and circumference, nowhere. What about **Life?** What is **Life?** We can define it scientifically, such as: **Life** is a component of the **Universe**, and which has a history, information, self regulation, programs, self organization, self reproduction, and self evolution, dynamic equilibrium, anti entropic behavior, integrality and self maintenance. We can define **Life** in a poetical way: according to VLAHUȚĂ, life is "a second between two eternities". COȘBUC, in ***Death of Thunder*** stated: "Lady, love your life/ do not seek for the world law/ do not seek these laws/ for you are mad to understand them". REINER MARIA RILKE wrote, in 1963: "Do not try to understand life/ When you do, it is a celebration/ Start your day/ Like a child on a path/ Who gets the flower/ Of the years going by".

Many feared at the beginning of a new millennium, thinking **Apocalypse** is now! **We are in the 3rd Millennium! Fear no more! Life is an experiment of the Universe. With Life, the Universe enriches, from an informational point of view. And, we know the Universe has no beginning, and no end. LIFE...**

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THE CAPITALIZATION OF THE NATURE SCIENCE COLLECTIONS FROM THE OLTENIA MUSEUM FOR THE ELABORATION OF PHD THESES

ELENA BAZILESCU

Abstract. The paper underlines the scientific importance of the patrimony belonging to the Natural Sciences Department of the Museum of Oltenia Craiova and its relevance for the elaboration of PhD theses by the experts of the department in the period since 1972 until now.

Key words: scientific patrimony, The Museum of Oltenia, PhD theses.

Rezumat. Valorificarea colecţiilor de ştiinţele naturii din Muzeul Olteniei în elaborarea tezelor de doctorat. Lucrarea prezintă importanţa ştiinţifică a patrimoniului Secţiei de Ştiinţele Naturii a Muzeului Olteniei Craiova în elaborarea tezelor de doctorat de către specialiştii secţiei în perioada 1972 până în prezent.

Cuvinte cheie: patrimoniu ştiinţific, Muzeul Olteniei, teze de doctorat (doctorate)

The nature sciences patrimony of the Oltenia Museum from Craiova is structured on different collections, as it follows: mineralogy, paleontology, botany, and zoology. These were permanently enriched for multiple purposes: permanent, temporary, and itinerant exhibitions; courses with different subjects, as well as the elaboration of certain scientific papers, including the PhD theses.

We further render the PhD theses of the naturalist museographers who, by means of hard field and laboratory research, contributed to the knowledge of the flora and fauna from Oltenia and its neighbouring areas, so of Romania.

The study of the avifauna from the Parâng-Vâlcan Mountains and Petroşani Depression

Sustained by Dr. **MIRCEA POPESCU** in 1972.

Dr. MIRCEA POPESCU has no longer been among us beginning with 1988.The respective paper was achieved by studying the Ornithological Collection of the Oltenia Museum and by adding the results of the avifauna field research, as well as the data from the literature in the field. There were captured 444 common and rare birds. The author approached issues such as systems, migrations, distribution, food, nesting; he also gathered data regarding the study of the populations. There were collected 40 layings summing 162 eggs. This area had not been previously studied, so the paper in question was a novelty. Besides the observations made in the field, there were captured 444 individuals, 320 males and 124 females, belonging to 126 species and subspecies, which can presently be found in the ornithological collection of the Oltenia Museum from Craiova and of the Biology Faculty from Bucharest. In the area, there were identified 133 species belonging to 12 orders and 34 families, which represent 34% of the total number of 391 species and subspecies of Romania avifauna. Of the 133 species and subspecies, 126 were collected and 9 observed. *Emberiza cirlus, Emberiza cia, Eremophilla alpestris balcanica, Carduelis carduelis balcanica, Carduelis chloris mihlei, Apus melba, Tichodroma muraria, Parus lugubris lugubris, Alcedo atthis ispida, Monticola saxatilis, Falco peregrinus, Aquila chrysaetos* etc. are very rare species and there were noticed in Oltenia for the first time. In the area of the Parâng-Vâlcan Mountains and Petroşani Depression, there were identified 36 sedentary species, 27% of the area hatching avifauna, 25 sedentary-erratic species, 18.7%; 52 migratory species, 39%; 14 winter guest species, 10% of the total avifauna of the area; 4 transitory species, 3.4%, and 2 accidental species, 1.5%. Of the 36 sedentary species, one species is in the alpine area, 23 in the forest area – 8 in the coniferous forest, 8 in the beech forest, 7 in the oak tree forest, and 12 species in the valleys and depressions areas.

The data regarding the arrival of certain migratory birds in Oltenia, as well as their ascension in the Parâng-Vâlcan Mountains complete the knowledge we have gathered in the field so far.

Contributions to the knowledge of Chiroptera from Oltenia

Sustained by Dr. **BAZILESCU ELENA** in 1977

The geographical location of Oltenia within Romania together with a series of geomorphologic features determined the presence of a special vegetation and fauna, which belong to a specific biogeographical unit.Thus, it was studied the geographical distribution of the chiropters, as well as their ecology, biology, and practical importance in comparison with other regions, as bats are extremely important because they consume harmful insects for silviculture and agriculture. With regard to the systematic composition of the chiropters from Oltenia, there were identified 18 species, belonging to 8 genders from the Rhinolophidae and Vespertilionidae families. The 18 species represent 64.3% of the 28 species known in the country, while the 8 genders, 90% of the total taxonomic units from Romania. There were made numerous observations of the colonies from the caves, bridges, tree cracks and rocks and there were captured 515 individuals, which make up the chiropters collection of the Oltenia Museum from Craiova; thus, the main goal of a zonal museum was achieved – the research of the fauna located within the area the museum team studies and the gathering of a collection useful for both the scientific research and the cultural-educative activity.

Among the species signaled within Oltenia, *Nyctalus leisleri, Vespertilio murinus, Myotis mystacinus* and *Myotis emarginatus* were extremely rarely noticed in the European and Romanian fauna, while *Rhinolophus ferrum equinum, Rhinolophus*

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blasii, Myotis myotis, Miniopterus schreibersii are quite common in the studied area and form colonies of thousands of individuals, not only here, but in the other regions of the country (Dobrogea, Banat, Transylvania) and in Europe. A special importance is held by our contribution referring to the distribution of chiropters species within Oltenia and the country, as we extended the studied area with new settlements: Berleşti, Bistreţ, Craiova, Maglavit, Negoeşti, Radovan, Rânca, Gura Motrului, Hobiţa, Drobeta-Turnu Severin, Măldărăşti, Bulzeşti, Sopot, Tălpaş, Terpezita, Tismana. Thus, it was elaborated the map rendering the distribution in Europe of the 18 species of bats identified in Oltenia with the completion of the species *Myotis emarginatus, Myotis mystacinus, Barbastella barbastellus* for Romania. From the geographical origin point of view, the chiropters species from Oltenia are: *Myotis myotis, Myotis emarginatus, Myotis mystacinus, Myotis bechsteni, Nyctalus noctula* of European origin; *Plecotus auritus, Vespertilio Murinus* of paleoarctic origin; *Barbastella barbastellus* central-European; *Rhinolophus hipposideros* central-European and West-Asian; *Nyctalus leisleri, Pipistrellus pipistrellus* central-European and Mediterranean; *Miniopterus schreibersi* European-Mediterranean; *Myotis capaccinii* central-European and circum-Mediterranean; *Rhionolophus blasii, Rhynolophus euryale* circum-Mediterranean; *Myotis oxignathus* circum-Mediterranean and South-west Asian; *Rhinolophus ferrum equinum* of Mediterranean origin. Together with the activity of systemic study of the chiropters within Oltenia, we also made research regarding their way of living. The biology of these mammals is interesting, as many of their life aspects are not quite well known. For example, we do not know many things about their behaviour during the seasonal and circadian departures. The microclimate of each shelter used by bats is mainly influenced by the geographical location and secondly by the internal abiotic and biotic factors: the morphology of the shelter, altitude, temperature, humidity, light, air currents, the trophic factor and man-induced factor. By analyzing 80 samples of stomach contents, we established that the food is composed of Lepidoptera, Diptera, and Orthoptera. With regard to the trophic chain, bats are secondary consumers (predators), while they are eaten by night and day birds of prey and by reptiles (snakes). Their enemies are considered tertiary consumers in the trophic chain. Bats are active during night when there fly diverse kinds of insects that are harmful for silviculture and agriculture. Bats play an important role in the biological control of the enthomofauna. Thus, the economic importance of bats is obvious. Worldwide, the importance of bats is also unquestionable as they live in all the ecosystems. Consequently, their knowledge and protection must be taken into account as an issue closely related to the economy of each country.

All the researchers who studied and are still studying the Chiroptera fauna agree that their number is currently decreasing due to urbanization. The main causes are pollution due to insecticides, the decrease of the number of dispensable habitats, the destruction of old and hollow trees, the occupation of the caves for different activities. Of course, there are also meteorological factors that contribute to the decrease of the number of bats. A large number of bats is directly destroyed by man.

Many countries recognized the importance of bats' preservation and adopted a law for their protection. As many of the bats' species are migratory, all the countries should take equal measures of protection.

The enthomofauna of the sandy terrains located in the neighborhood of Craiova

Sustained by Dr. Dr. **FIRU ION**, 1982

According to the field research, there was noticed a number of 77,800 species of insects. Part of them represents the collections of the Oltenia Museum. The studies were made between 1963 and 1977. There were identified 672 species, which belong to 509 genders, 135 families, and 14 orders. There can also be noticed certain adaptations to the environment of the eremic and arenicole insects. Some of them display special adaptations to digging. They have protective colours and certain heteropters have long and thin shapes and, thus, they can "stick" to the soil in order to protect themselves from wind and natural enemies. It is rendered a zoogeographical list for 424 species of insects that are grouped in 32 areas. Overall, the Palearctic insects display the highest rate followed by the Holomediterranean West – Palearctic (European), the European-Mediterranean ones etc. On orders, the succession is as it follows: in the case of Orthoptera and Heteroptera: the Palearctic species followed by the Holomediterranean one; in the case of Neuroptera and Hymenoptera, the Holomediterranean, then the palearctic; in the case of Coleoptera, the Holomediterranean, then the European species; in the case of Lepidoptera, the Palearctic and Holarctic species; in the case of Diptera, the European species and, then the European-Mediterranean ones.

The research took place in three locations representative for the sandy area of Oltenia: Craiova-Obedeanu, Secui (12 km South of Craiova) and Prunet (22 km South of Craiova). In these locations, there were established 44 types of biotopes: dune, interdune, dried pool, and the skirt of the acacia forest. The enthomofauna of the sandy terrains according to the representative biotopes of these terrains were studied for the first time (dune, interdune, dried pool, and the skirt of the acacia forest).

Ion Firu died in 1983, shortly after he had obtained the scientific title of Doctor in Biology sciences.

The systematic and ecologic study of the Helicacea – Gastropoda superfamily from the lower and middle catchment area of the Jiu

Sustained by Dr. **PĂUNESCU IRINA** in 1982

There was made a systematic and ecological research of the Helicacea superfamiliy from the middle and lower catchment area of the Jiu, in natural conditions registered in 43 stations and in laboratories; thus, more than 14,000 de measurements, weighings, and coloration analyses were performed. There were noticed 22 species, among which *Helix lucorum* and *Campylaea trizona* were identified for the first time in Oltenia. There appears a polymorphic variability between populations and within the same population, which is conditioned by the factors specific to the biotope they live in. Gastropods are indicators of the pollution with harmful metals. The analyses of the shells from the area Tismana-Gorj proved the presence of lead from the exhaust gases. The high quantity of iron at the Helicella species might be an iron indicator for the soil compositions within its habitat.

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There was also render the economic importance of some species. The species *Helix pomatia* and *Helix lucorum* are used in the people's nourishment, as well as by certain animals. Within the middle and lower catchment area of the Jiu, there were established areas and biotopes for the natural breeding of different species of Gastropods by taking into account the ecological features of the respective biotopes. The following areas were recommended: Tismana, Bucovăţ forest and Branişte, and the Jiu area for the species *Helix pomatia* and *Helix lucorum.* Gastropods play an important role in the ecosystems, as they are part of the trophic chains and networks, mainly as primary consumers. 90,000 species belong to this large group. The representatives of this class play an important role in hydrobiology as they represent part of the fishes' food. Another valuable aspect is that they represent stone documents for the geological eras.

Certain representatives are indicators of pollution and they are used in pharmacology. Worldwide, Gastropods are an important gastronomic element. The seasonal dynamics of the total biomass emphasizes the fact that the lowest one is registered in spring (487g/m^2), then it increases during summer (721g/m^2) and reaches a maximum in autumn (1,437g/m^2).

There were made certain studies regarding the divergence of the characters on the slope/clină and it was elaborated an optimization program by measuring the factorial parameters regarding the optimum conditions for reaching a biological mass. This method can be also used in the case of other economically important animal breeds, such as the pigs and the cows.

The dynamics of the structure and of the production of the Gastropoda populations within the Oltenia Plain

Sustained by Dr. **CIOBOIU OLIVIA**, 2000

The author studied the Preajba Valley, an area that has not been minutely studied so far and brought many new data about the hydrobiology.

The Preajba Valley is located 6 km south of Craiova; it is a hilly unit disposed within the platform of the Oltenia Plain. The researcher approached for the first time the ecological study of certain populations of Gastropods populations belonging to a special category of aquatic ecosystems – small basins. The basins are part of the Preajba Valley catchment area, which covers a surface of 20.2 km^2. It is quite important that the basin, even if it covers a small geographical space, comprises a wide diversity of ecosystems: springs, streams, rivers, small basins. The research of the numerical dynamics emphasized important numerical differences between populations according to the seasonal periods – population reaching a maximum number: in spring – *Vivipara viviparus, Vivipara acerosus, Radix ovata, Radix peregra*; in summer – *Raxid auricularia, Physa fontinalis, Planorbis planorbis, Segmentina nitida, Fagotia auricularis, Fagiotia esperi, Succinea elegans*; in autumn – *Physa acuta, Aplexa hypnorum, Valvata piscinalis, Anisus spirorbis*. This structure proves the capacity of the Gastropods' populations to integrate in variable environmental conditions and to capitalize the available resources. According to the analysis of the numerical evolution of the populations and of the seasonal dynamics on age categories of the individuals, it results that the Gastropods experiences an increasing process both as number of species and as number of individuals belonging to each species, which represents an answer to the favourable environmental factors.

The calculus of the affinity index emphasizes that the populations of *Viviparus acerosus, Viviparus viviparus, Physa acuta, Radix ovata* and *Aplexa hzpnarum* are the best consolidated from the ecological point of view. The production of the Gastropods' populations expressed by the values of the individuals' biomass shows the increased biological production of the studied basins. The total annual production of biomass oscillates between 1,291 g/m^2 and 8,245 g/m^2.

Taxonomic and ecological research of the Scarabaeidae family (Insecta: Coleoptera) within Oltenia

Sustained by Dr. **CHIMIŞLIU CORNELIA** in 2004

The list of the Scarabaeidae identified in Romania so far was updated (exclusively the Lucanidae family), by adding the species signaled by other authors to the species and subspecies mentioned by S. Panin (1955, 1957) and by excluding the species erased from the fauna of the country.

With regard to the contributions to the research of the Scarabaeidae from the fauna of Oltenia, we brought up-to-date the research and knowledge study of the species from Oltenia, by synthesizing all the faunal data mentioned in the literature in the field from the beginning of the 20th century (1904) till nowadays; we also used personal data gathered during our own field research. Our own research took into account both the material collected by us between 1979 and 2007 and the material preserved in the entomological collections of the Section of Nature Sciences of the Oltenia Museum from Craiova (collected between 1951 and 2004), of the Section of Nature Sciences of the Museum of the Region Iron Gates Drobeta Turnu Severin (collected between 1964 and 1986) and of the Horticulture Faculty of the University of Craiova (collected between 1961 and 1981). We processed and determined from the scientific point of view 13,310 samples, which were gathered in 52 years, from 182 places located in the five counties of Oltenia. According to our research, there were identified 139 species and subspecies, included in 54 genders, 21 tribes, 14 subfamilies, 6 families; they represent 69% of the species and subspecies of the Scarabaeidae fauna of Romania, 81% of the genders, 91% of the tribes, 93% of the subfamilies, 86% of the families. Among the identified taxons, 48 species and subspecies, 4 subgenders, 4 genders, 2 subfamilies and 2 families have been signaled for the first time in the fauna of Oltenia. It was identified a new gender for the Romanian fauna – *Triodonta Mulsant*, 1842 and a new species – *Triodonta flavimana* Burmeister, 1855, included in the Sericini tribe, Melolonthinae subfamily, Scarabaeidae family.

Information about the newly mentioned species can be found in the papers elaborated between 1999 and 2004.

Presently, the taxonomic specter of the Scarabaeidae superfamily within the Coleoptera fauna of Oltenia emphasizes a number of 159 species and subspecies, respectively 69% of the 229 species mentioned in the fauna of

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Romania. They belong to 54 genders, included in 21 tribes, 14 subfamilies and 6 families. Only one family (Glaphyridae – mentioned only in the fauna of Dobrudja) has not been identified in the fauna of Oltenia so far.

Of the 159 species and subspecies, 48 (respectively 30%) are newly mentioned for the fauna of the region, 91 (57%) are previously mentioned by other authors in their own research studies, and 20 (13%) were mentioned by other authors in the past, but not discovered in the present. 24 species and subspecies were identified and mentioned for the second time within Oltenia. 3 of them are secondly mentioned even for the Romanian fauna: *Aphodius (Melinopterus) pubescens* Sturm, *Copris hispanus* L. and *Onthophagus (O.) joanne* Goljan.

With regard to the distribution of the Scarabaeidae species within Oltenia, there were identified 182 sampling places, 93 of which were new and 89 previously mentioned and found by us, as well. In the entomological literature, there are mentioned another 59 sampling places, which were not identified by us; thus, the collecting of the Scarabaeidae has been made in 241 places, so far.

With reference to the ecology of the identified species, we noticed that the trophic preferences are quite diverse: 61 species are phytophagous, 71 coprophagous, 5 necrophagous, one species is micetophagous and another one sarcophagus. For some phytophagous species, there were identified new host plants, which had not been previously mentioned in the literature in the field. The research regarding this Coleoptera group was the subject of many scientific papers, among which the PhD thesis.

The research of the sand flora from the Southwest of Oltenia

Sustained by Dr. **NĂSTASE ADRIAN** in 2005.

The psamophile flora is made up of a series of plants with special adaptations; the most important ones are the xeromorphous plants (with very well developed roots, glaucous, tomentous leaves, sclerenchymatic, rich tissue etc.) and the ones with an active vegetative regeneration.

According to the increased variation of the environmental conditions, the vegetal cover of the sandy areas displays as a variety of associations, which have different compositions and structures corresponding to the sand settling degree and to the depth of the aquifer. Except for some areas covered by mobile sand (new accumulations or reactions, such as the ones from Hunia-Maglavit, Southeast of Calafat and South of Băileşti), the dunes are fixed and solidified; thus, the relief displays a wavy aspect. The research upon the sand flora from the Southwest of Oltenia identified 116 species in the area Cetate-Bistreţ. Within the studied area, due to the geographical location, relief, hydrographic net, and soil varieties, to the local and general factors, a rich and interesting psamophile flora developed. There were identified 738 species (65 represented by subspecies) and 9 subspecies, 10 varieties, 8 forms, and 2 hybrids, distributed in 276 genders and 87 families belonging to Pteridophyta and Spermatophyta divisions. A significant contribution is the discovery of 3 new taxons for the flora of Romania: *Daucus broteri* Ten., *Hypericum olympycum L.* and *Ranunculus neapolitanus* Ten. The richest families in species are Asteraceae (99 sp.), Fagacee (68 sp.), Poaceae (66 sp.), Brassicaceae (45 sp.), Lamiaceae (44 sp.), Apiaceae (28 sp.). By comparing the sand flora from the analysed are to the one from the left of the Jiu, we noticed that 27 species could not be found on the terraces located in the East of Oltenia. With regard to the ecological features according to the main factors (M,T,R), the identified flora is characterized by:

From the moisture factor point of view, although the conditions are different (dune, alluvial plain), the xeromezophyt-mezophyt display the highest rate – 125 sp. (17%), followed by xeromezophyt – 98 sp. (13%), xerophyt-xeromezophyt – 76 sp. (11%), xer – 42 sp. (8%).

a) from the temperature factor point of view, we notice the predominance of subthermal species – 96 sp. (13%).

b) from the qualitative point of view, the most numerous group is represented by the therophytes – 231 sp. (30%) and hemicriptophytes – 226 sp. (28%), the main elements of the dunes and interdunes. Together with the geophytes (8%), they make up more than 66% of the flora in the area, while the phanerophytes represent only 9%. This statistics proves the forest steppe character of the area. The increased presence of the therophytes (30%), most of which being segetal and ruderal weeds, can be explained by the strong influence of the zoo-anthropic factor in the area.

By analyzing the present state of the flora, we noticed that 70 species are jeopardized; they are on the red list of vascular plants from the southwest Oltenia. The degradation of the floristic biodiversity is mainly due to the man-induced impact upon the natural ecosystems in the area, which is mainly about deforestation.

The following PhD theses are going to be elaborated:

1. The avifauna of the Danube alluvial Plain (sector Calafat-Zăval – Dolj County), the biology, ecology, and preservation status of the species of birds. PhD student, **MIRELA RIDICHE**;
2. The faunas of Pliocene-Pleistocene mammals from Oltenia. PhD student, **AURELIAN POPESCU**.

CONCLUSIONS

I considered it was necessary to present the seven PhD theses realized by the naturalist museographers from the Oltenia Museum, as well as to mention the other two theses that are to be finished in the near future in order to achieve the title of doctor in biological sciences, as I wanted to underline the field and laboratory research and the ways the museum collection can be enriched.

We also underline the contribution of the zonal museums to the knowledge of the floral and faunal reaches of Romania.

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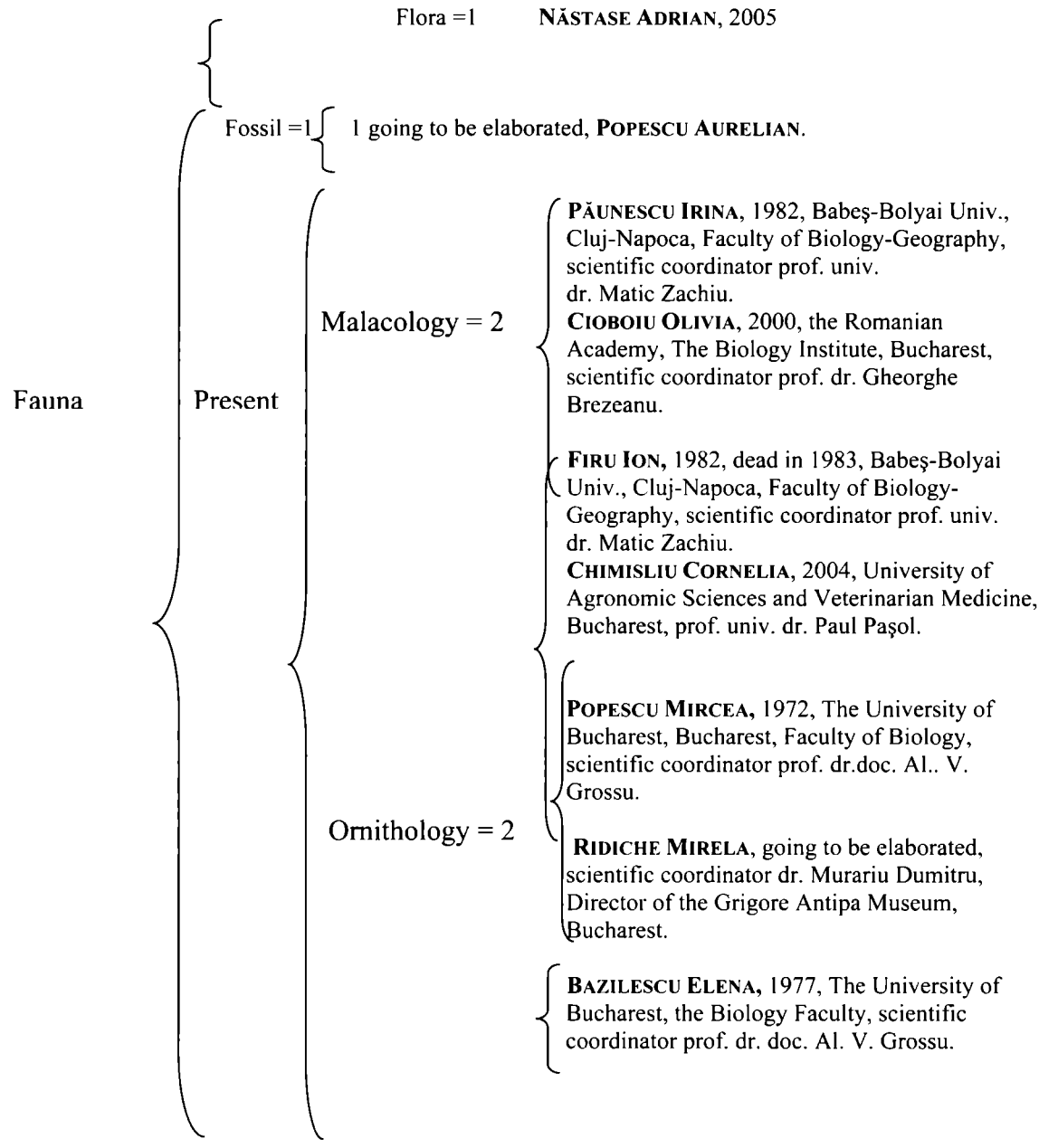

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THE MUTAGEN EFFECT OF THE IONIZED RADIATIONS

RAMONA LINDA PĂTRUŢOIU

Abstract: The radiations are the most known and utilized physical factor for inducing mutations. Classified by their nature, the radiations are of two types: non-ionized and ionized. The non-ionized ones are: infrared radiations, ultraviolet radiations, while the ionized ones are: electromagnetic, represented by X radiations and gamma radiations; corpuscular, represented by neutrons, alpha radiations, beta radiations, accelerated nuclei fluxes, HYE particles etc. Some of the sequels produced by exposure to radiations are: lung cancer, thyroidal cancer, osteosarcoma, skin cancer, acceleration of the ageing process.

Key words: radiation, mutagen effect, diagnosis, treatment

Rezumat: **Efectul mutagen al radiaţiilor ionizante.** Radiaţiile sunt cei mai cunoscuţi şi mai utilitizaţi factori pentru inducerea mutaţiilor. După natura lor, ele se clasifică în: radiaţii neionizate şi radiaţii ionizate. Cele neionizate sunt: radiaţoo infraroşii, radiaţii ultraviolete, iar cele neioniyate sunt: radiaţii electromagnetice, reprezentate de radiaţiile X şi radiaţiile gamma, şi radiaţii corpusculare, reprezentate de meutroni, radiaţii alfa, radiaţii beta, fluxuri de nuclee accelerate, particule HZE etc. Câteva din urmările produse de expunerea la radiaţii sunt: cancerul pulmonar, cancerul tiroidian, osteosarcomul, cancerul de piele, accelerarea procesului de îmbătrânire.

Cuvinte cheie: radiaţie, efect mutagen, diagnostic, tratament

The mutation notion was introduced by *Hugo de Vries* (1901) who elaborated the mutation theory after researches made over *Oenothera lamarckiana.*

The discovery of the radioactivity at the beginning of the 20th century and its effects over the cell was followed by the appearance of a new domain, the radio genetics. The researches of H.J. Műler concluded that the genes suffer mutations with a higher frequency, under the influence of the radiations rather than under the influence of natural phenomena.

The **radiations** represent the most known and utilized factor in inducing mutations. Classified by their nature, the radiations are of two types:

1. Non-ionized radiations, that are not generating photochemical reactions directly and they are represented by infrared and ultraviolet radiations.

The **infrared radiations** are a component of the atmosphere, found at the superior limit of the visible light specter. They can increase or decrease the effects of the mutagen factors when they are administrated together with them, dependent on the administration type (before or after the irradiation with X radiations).

The **ultraviolet radiations** are also a component of the atmosphere, found at the inferior limit of the visible light specter. The have the wave length between 136Å - 4000Å. They are formed of photon with energies of 3-5 ergi/m^2. They present mutagen effect, especially the ones with the wave length of 2580Å, which corresponds with the wave length absorbed by the nitrate alkalis from the nucleic acids structure.

The UV radiations can induce mutagen and lethal effects. Those are caused by the chemical modifications at the nitrate alkalis level in the DNA molecule, due to the absorption of energy. After the DNA irradiation with UV it is formed a thymine dimer, if there are two adjacent T nucleotides in the same chain. In the T-T thymine dimer's region, it can be formed a curl determined by the breaking of the H bonds in the considered region, followed by the elimination of a sequence of nucleotides (with the alteration of the genetic material), or the breaking of the of the DNA molecule (genetic mutation), sometimes the breaking of the chromosome (chromosomal mutation).

2. Ionized radiations, that generate directly photochemical reactions in the living tissues, are after their nature, of two types:

-electromagnetic radiations, represented by the X radiations and gamma radiations;

-corpuscular radiations, represented by neutrons, alpha radiations, beta radiations, accelerated nuclei fluxes, HYE particles etc;

Electromagnetic ionized radiations

The **X radiations** (Roentgen radiations) were discovered in 1895, by bombarding a target (metal plate, tungsten) with high speed electrons (freed by an overheated filament). The X radiations impress the photo plate. They are electromagnetic radiations similar with the light ones, but having higher energy. They have the wave length of 0.06-100Å, and energy between 0.01-0.1 MeV.

The **gamma radiations** are emitted in the same time with the disintegration of the radioactive elements. They are not deviated into a magnetic field. They have the wave length between 0.005-1.4Å, and the energy between 1-1000 MeV.

Electromagnetic ionized radiations

The **alpha radiations** are helium nuclei, formed by 2 protons and 2 neutrons, being liberated after the radioactive disintegration. They are attracted by the negative pole of a magnetic field, because of their positive electric

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charge and high mass. Their penetration power is very low. Their effect is high if they are liberated in the organism by radio nuclides.

The b**eta radiations** are electrons liberated after the radioactive disintegration of unstable radio nuclides. Their penetration power is low. They are attracted by the positive pole of a magnetic field, because of their negative electric charge.

The n**eutrons** are neutral elementary particles, emitted by the disintegration reactions of the heavy metals (uranium, plutonium etc.). They are classified, after their energy, like this: thermal, slow, medium, fast. They have high ionization and penetration power.

The **accelerated nuclei fluxes** are obtained in heavy particles accelerators (cyclotron, synchrophasotron etc.).

The **HZE particles** are found in the cosmic space and are the result of the stellar reactions. They have a very high speed and penetration power (they can cross the planet).

The ionization of the living matter takes place after the interaction of ionized radiations with it. The ionization reactions are due to the water radiolysis at its interaction with an electromagnetic particle, followed by the creation of radicals filled with high energy:

$$H_2O \rightarrow H_2O^+ + e^-$$
$$H_2O^+ + e^- \rightarrow H_2O^-$$
$$H_2O^* \rightarrow H^+ + OH^-$$
$$H_2O^- \rightarrow H^* + OH^-$$

By combination, the free radicals resulted in this manner can yield the following reactions:

$$H^* + H \rightarrow H_2$$
$$H^* + OH^* \rightarrow H_2O$$
$$OH^* + OH^* \rightarrow H_2O_2$$

The free radicals, H*, OH*, and H_2O_2, loaded with energy and resulted due to the ionization reactions, interact with the cellular structures (membrane system) and with the organic substances in the cell (in the nucleic acids and proteins case, there is induced serious damage), being responsible for the radio induced effects. They destroy the membrane systems of different cellular organs; they break the purine and pyrimidine rings, determining the induction of a large number of mutations and many other modifications.

The ionized radiations effect unit of measure is Gray (Gy). 1 Gy represents the energy of 1 Joule absorbed uniformly by 1 kg of mass of living matter from an ionized radiations field:

$$1 \text{ Gy} = 1 \text{ J/1 Kg.}$$

In medical practice it is utilized the old unit of measure **rad (r),** because the dose of 1 Gy is too high.
1 rad is the radiation dose absorbed, in which 1kg of living matter absorbs uniformly from the ionized radiations field energy of 0.01 Joule. Analogously, it can be said that the rad is the energy of 100 ergs absorbed by 1 gram of living matter from the ionized radiations field.

$$1 \text{ r} = 10^{-2} \text{ J/kg or } 1 \text{ r} = 100 \text{ ergs/g}$$
$$1 \text{ Gy} = 100 \text{ r.}$$

Gy replaces the old measure called Roentgen. 1 Roentgen (R) represents the quantity of radiations capable of producing $2{,}08 \times 10^9$ pairs of ions in $1 cm^3$ of air at the atmospheric pressure of 760 mmHg.

The ionization density is represented by the number of ion pairs produced on the unit of capacity by different types of radiation. After their value of ionization density, the radiations are of two types:

-radiations with low ionization density (called also low-LET radiations, are with low energy linear transfer). They produce a low number of ion pairs on the capacity unit, inducing a low ionization and a low biological effect. The X radiations and gamma radiations are included in this category.

- radiations with high ionization density or high-LET radiations have a high energy linear transfer. They produce a high number of ion pairs on the capacity unit, their radiobiological effect being much higher. For instance, the ionization density of the neutrons is about 10-20 times higher than the one induced by the X radiations or gamma radiations. The biologic importance of the ionization density is logically explained: the number of points where there are impacts (and possibly breakings) between free radicals and biologic structures or molecules is much higher, because the ionization density being higher. In these points there are breakings in the DNA molecule, in chromosomes, cellular membranes etc; the effects being much important in the case of high density of ionization radiations.

If there is a relation without threshold between the genetic effect of the radiations and the irradiation dose, the dose of irradiation must go beyond certain threshold to induce a form of cancer.

The ionized radiations induce an evident genetically instability, a radio induces cancer being frequently linked with other mutations too, fact that determines the function loss of one or more genes. The mutagen process is composed of many phases and it is of long period of time through specific translocations or loss or deletion of chromosomes.

The most frequent radio induced neoplasies are leukemia, lung cancer, thyroidal cancer and osseous cancer.

In the first place of radio induced cancers it is found the leukemia, being frequently found between radiologists, survivors of the Hiroshima and Nagasaki bombardments, radioactive contaminated persons after nuclear hazards, sick people with ankylosing spondylitis which are irradiated etc.

The induction of leukemia in experiments on mice shows the two main factors:

- the age of the animals in the time of the exposure, the younger individual are more exposed then the adults

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- the dose of irradiation and the manner of exposure of the fractioned irradiations administrated to the whole body are more efficient, the males being more exposed than females.

The causes of irradiations:

- professional (radiologists)
- nuclear explosions (Hiroshima, Nagasaki)
- exposure in therapeutically purpose

Lung cancer

It is the most found form of cancer induced by radiations. It was found frequently to miners, the cause being the exposure to radioactive gases (radon, radio nuclides of the radium, uranium etc.).

Thyroidal cancer

It can be induced by internal or external irradiation (with radioactive iodine from the environment, assimilated after by the thyroid). The threshold dose for inducing the carcinoma is 200 R. Externally; the iodine source is represented by nuclear accidents (Chernobyl explosion).

Osteosarcoma

After the radioactive contamination it can be constituted deposits of radium and thorium in the bones, which can realize in time high cumulative doses. The values for the appearance of these effects are of 30 kR, accumulated by summing the effect. SR 90 can participate in the forming of the radioactive deposits. It can get in the animals food and then in the human organism, especially through milk.

Skin cancer

It appears after many years of irradiation with high doses (over 1000 R in the case of unique sources and over 4000 R in the case of fractional cumulative doses). The risk of appearance is linked with the age at which the exposure took place: the lower the age, the higher the risk.

The acceleration of the aging process

Through experiences on mice, it was observed that the irradiation shortens the survival duration, by cancer appearance or by inducing degenerative phenomena in the structure of organs and tissues. It can be said that these phenomena of accelerated aging are similar with the physiological ones.

The effects of aging acceleration depend of:

- Sex
- Professional activity
- The type and dose of radiations (the thermal neurons have more power than gamma radiations, X rays etc.)
- Irradiation conditions

The mechanisms through the aging processes are accelerated, are:

- Cellular death
- The wound of stem cells
- The affectation of the defense mechanisms through antibodies
- Perturbations in development
- Somatically mutations

The irradiation disease

It comprises the modifications produced in the organism under the influence of the ionized radiations.

Etiology: the irradiation disease is produced by ionized agents (that produce ions), like the electromagnetic radiations (Roentgen rays) or corpuscular radiations (a, b with neutrons).

The irradiation disease can supervene in the following circumstances:

- in medical explorations (radioscopy, repeated radiographies or explorations with radioactive isotopes);
- in the treatment, especially of malignant tumors, with ionized energy (Roentgen rays, radioactive isotopes);
- in other explorations, in industry, where with the help of ionized radiations it can be verified the quality of some materials;
- by explosion of atomic bombs.

Pathogenesis: the irradiation can be external (Roentgen rays, gamma radiations) or internal (through radioactive powder, which can get inside the organism by digestion, inhalation or much rarely by wounds).

Through irradiation, metabolic, endocrine or nervous disorders can be produced. The symptomatology is variable and can take many clinical forms, depending on the irradiation quantity induced, on the surface and volume irradiated, on the individual sensibility, on the manner of irradiation (fractional etc).

We can distinguish, two clinical forms:

a) the acute form that can be produced by limited and general irradiations

The local effects prevail in the limited irradiations: dermatitis, vesicles, ulcerations and necrosis. The general irradiations are more important than the partial ones, especially when they are unique and with a big dose. They can produce the following clinical forms:

- the mild form (at 200 – 300 r) which is characterized by vomiting, cephalic disorder, diarrhea, anorexia, leucopenia, hair loss;

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- the medium form (at 400 r) is characterized by agitation state, cephalic disorder, vomiting, diarrhea, anorexia, hair loss, leucopenia etc and it is deadly in 50% of the cases;
- the critical form (at 600 r) and
- the instantaneous forms are deadly and are characterized by hallucinations, intense excitation state.

b) the chronic form appears after general, small, repeated irradiations

There are three degrees depending on the gravity of the disorder, which in some cases can succeed one another being progressive phases.

- First degree: general disorders, reversible – asthenia, cephalic disorder, vasomotor disorders, insomnia, sanguine modifications (eosinophily, leucopenia)
- Second degree: at the disorders from the first degree there can be added: diarrhea, anorexia, pruritus etc.
- Third degree: same symptoms as in the first and second degree, but there are more accentuated acute crises and local lesions.

The **diagnosis** of the irradiation disease is determined taking in consideration the symptoms presented by the patient and of the circumstances.

The **prognosis** depends on the intensity of the disorders and on the complications that can supervene.

The prophylactic **treatment**:

- must include avoiding the futile radiological investigations and radioactive isotopes investigations;
- must include the rigorous respecting of the labor protection rules in the radiological system and isotopes system, or in other working places where ionized radiation sources intervene.

The **curative treatment** must include: first of all, the patient must get out of the influence of the radioactive substances. The local lesions (radio epidermatitis, radio epithelium diseases, scars etc) are treated by medicines (calming pomades etc), physical agents (infrared rays 20 – 30 sessions) or chirurgical (extirpating the lesion, eventually plasty).

Radiations doses in the irradiation disease

Exposition time	**Supra lethal dose 10 Gy**	**Medium dose 5 Gy**	**Sublethal dose 2 Gy**
First week	Nausea and vomiting in the first day		
Second week	Nausea, vomiting, diarrhea, fever, neck swell, depression, dehydration, asthenia, decease		
Third week		Bad general state, loss of appetite, alopecia, bleedings, pallor, diarrhea, neck swell, asthenia, decease	-Loss of appetite, alopecia, neck swell, pallor, bleedings, diarrhea; -the patient enters in the recovery period; -no decease if there aren't any complications

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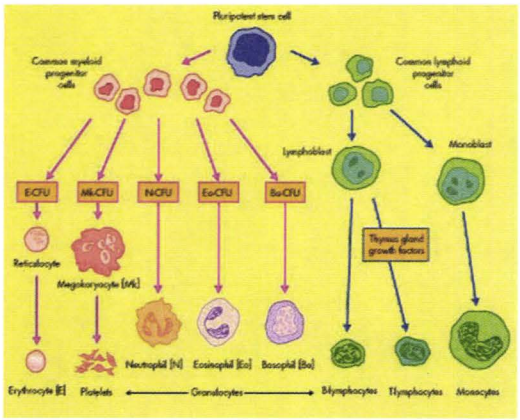

Figure 1. Sanguine elements filiation
Figure 1 Filiaţia elementelor sanguine
(after RĂILEANU C & RĂILEANU MOŢIU I-1974)

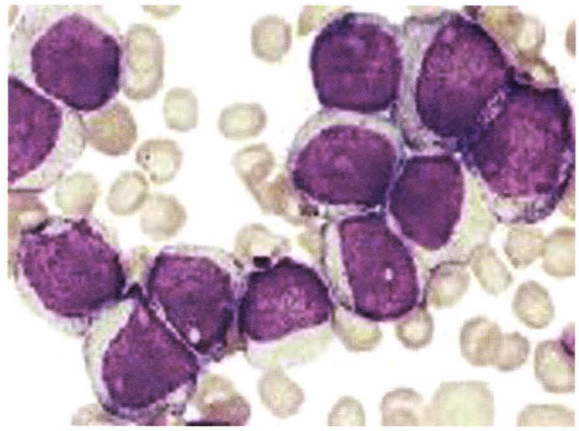

Figure. 2 Sanguine smear – leukemia
Figure. 2 Frotiu sanguin – leucemie
(after RĂILEANU C & RĂILEANU MOŢIU I-1974)

a

b

Figure 3 Lung cancer aspects a-macroscopically b-radiological
Figure 3 Aspecte de cancer pulmonary: a-macroscopic, b-radiologic
(AFTER RĂILEANU C. & RĂILEANU MOŢIU I-1974)

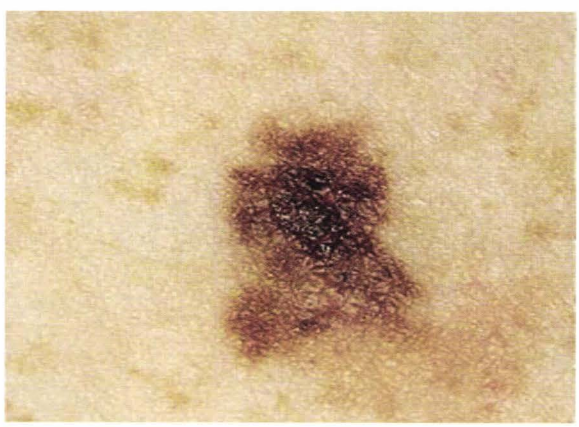

Figure 4. Malignant melanoma
Figure 4. Melanom malign (after TOLEA -2000)

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110 YEARS FROM THE BIRTH OF THE DISTINGUISHED BIOLOGIST PROF. ACAD. EMIL POP (1897 – 2007)

ŞTEFAN NEGREA, ALEXANDRINA NEGREA

Abstract. Short description of the life and work of the Professor Academician Emil Pop (13 April 1897 – 14 July 1974), distinguished botanist, founder of the Romanian Paleopalinology and of the Romanian schools of Fitofiziology, Citofiziology, Fitogeography and Palinology, a conservationist and a brilliant science historian from our country – at 110 years from his birth.

Key words: Emil Pop, life and work, 110 years from the birth

Rezumat. 110 ani de la naşterea eminentului biolog Prof. Acad. Emil Pop (1897 – 2007). Articolul conţine o succinta prezentare a vieţii şi operei profesorului Emil Pop (13 aprilie 1897-14 iulie 1974), eminent botanist, fondator al paleopalinologiei româneşti, creatorul şcolilor romaneşti de fitofiziologie, citofiziologie şi palinologie, protagonist al ocrotirii naturii şi strălucit istoric al ştiinţei - cu prilejul împlinirii a 110 ani de la naştere.

Cuvinte cheie: Emil Pop, viata şi opera, 110 ani de la naştere

In 1997, the Romanian Academy paid homage in a festivity to the distinguished botanist Emil Pop, founder of the Romanian Paleopalinology and of the Romanian schools of Fitofiziology, Citofiziology, Fitogeography and Palinology, a conservationist and a brilliant science historian from our country. Since then a decade passed. Due to the importance of his academic, didactic and scientific work, we regard as welcome a short description of the life and achievements of the famous Romanian scientist.

Emil Pop was born at 13 April 1897 in Bucerdea Vinoasă from the Alba county. His father, Antoniu Pop and his mother, Lucreţia, were peasants with progressive views, deeply involved into the village life and the scientist was proud of them. Between 1903 and 1907, he graduated the first four classes at the romano-catholic primary school of Hungarian language from Alba Iulia, then, between 1907 and 1912, he followed five classes at the romano-catholic high-school of Hungarian language from the same town. He followed the last three high-school classes at the famous Romanian orthodox "Andrei Şaguna" high-school from Braşov where he graduated in 1915. After three years of teological studies, he graduated in 1918 the "Andreian Seminary" from Sibiu, while after his marriage with the Natural Sciences Professor Florica Silvia Ioana Oană, in 1922, he was ordained a priest. However, destiny, but especially his obvious passion for the study of nature, stopped him from embracing a priestly career. This passion made him to enter in the next year, in 1919, the newly founded Science Faculty of the Upper Dacia University from Cluj. Noted by his professors for his interest in Botanic, the student Emil Pop was, between 1920 and 1922, a preparatory at the Botanic Institute for the course of Botanic Systematics for the pharmacy candidates. Also, in 1920, he began his collaboration with the Professor Alexandru Borza for the first "current botanic bibliography", published in the Bulletin of the Cluj Botanical Garden – a collaboration which was to last until 1948.

In 1922, he graduated his bachelor degree with the speciality "Geography-Botanic", being considered "*the first bachelor degree in Natural Sciences of the young Science Faculty from Cluj*" (Sidonia Puiu, 1999). The original thesis, for which he obtained his diploma of "*bachelor degree in Natural Sciences with distinction*", elaborated under the supervision of the scientist Al. Borza, and named "Romanian peat-bogs from a botanical point-of-view", already foretold the excellent specialist with essential contributions to the study of this type of ecosystem from Romania.

After his bachelor degree, at 1 October 1922, Emil Pop was appointed assistant at the Science Faculty from Cluj and a year later, assistant at the Botanic Cathedra from the Academy of Agronomic High Studies from the same town. Between, 1923 and 1925, the young Emil Pop travelled the entire country collecting a rich floristic and paleo-floristic material. In the 154 field trips (see S. Puiu, 1999) he investigated especially the marshes and the forests from Bucovina, Maramureş, Apuseni Mountains, Oltului Valley and Bucegi Mountains but without neglecting the surroundings of Cluj.

Starting from 1925, Emil Pop became one of the lecturers of the "Extensiunea universitară" Association which had proposed a cultural campaign through conferences and publications, and of the ASTRA who switched its centre from Sibiu to Cluj; two years later, in 1927, he was elected member of ASTRA, where, up to 1946, he will be a vice-secretary of the Natural Sciences section.

The years passed and, despite his remarkable scientific activity, there was no appointment for him at the Science Faculty. This is why, in 1926, he passed his capacity exam for high-school teachers with the speciality Natural Sciences (main) and Geography (secondary). Taking the first place on the country, he was appointed secondary professor at the Boys High-School "Titu Maiorescu" from Aiud. But very soon, he was moved, by ministerial decision, at the Cluj University. Here, at 1 November 1926, he was appointed lecturer (firstly suplinitor, titular from 1930, then definitively from 1932) at the Botanical Institute of the Science Faculty – a place he held for 13 years, until 1939. During the first 8 years (1926 – 1936), he also was a professor in high-schools from Alba Iulia, Aiud and the Pedagogic Seminary from Cluj.

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1928 is linked with two major events in the life of Emil Pop: the organization of the first Naturalists Congress from Romania (Cluj, 18 – 22 April), as a vice-secretary and editor of the papers of this congress (together with Al. Borza) and the defending of his Ph.D., under the supervision of the same professor. His thesis, named "Pollen analysis from peat-bogs in Eastern Carpathians (Dorna-Lucina)" was distinguished with "*magna cum laude*", while Emil Racoviţă proposed it "without any doubt" for the prize "Gheorghe Lazăr", being "one of the best natural sciences papers, written after the war, in our country".

In August 1930, Emil Pop travelled in Austria, Switzerland, France, Belgium and England, at Cambridge, where he presented at the Vth International Botanical Congress the work "Post-glacial succession of the forests from Romania in comparison with those from Central and Northern Europe". 1932 was an important year in Emil Pop's career: he held the first course of Geobotanics from our country at the Science Faculty from Cluj; he was elected member of the International Association for the Study of the Quaternary, from Vienna; he defended his docency in botanical geography, named "Contributions to the history of the Quaternary vegetation from Transsylvania". From this year up to his retirement (1967) he had an intense and rich didactic activity with many courses underlining his erudition and his passion for botanical disciplines: plant systematics, Romanian Quaternary flora and vegetation, Earth flora and vegetation, genetic and historical fitogeography, plant anatomy and fiziology, general botanic, botanic geography and many others.

In the same time, Emil Pop began studies on the Romanian flora, mainly studies of paleobotanics. With this goal, he made hundreds of field travels, collecting a rich material which he carefully studied and publishing numerous papers. Also, when he travelled in Europe at various congresses and symposiums in order to present his results, he went through the museum laboratories to study fossil plants coming from our country or from other parts of the continent. His last travel took place in 1972 in Germany, at Heidelberg and Tübingen, where he held a conference about the peat-bogs of Romania and established, with the help of Prof. B. Frenzel, the age of the peat-bogs from us by the C_{14} method (details about Emil Pop's researches in the "Cronology" made by S. Puiu, 1999, pp. 67-93).

Also from 1932, Emil Pop showed a special interest for the science history, being a member, right from its founding, of the "Romanian national group for the Science History", made up by doctors, naturalists, physicians, etc., a group affiliated to the International Union of Science History from Paris. Beginning from this year and until his death, he was preoccupied by the problems of the history of biology. A proof of this, are the more than a hundred of studies concerning the life and the work of important naturalists or other aspects of the history of botanics and other biological disciplines. Worth remembering, in 1961, Emil Pop was elected correspondent member, and from 1963 a full member, of the "Académie Internationale d'Histoire des Sciences" (AIHS). In the next year, he was elected a member in the Romanian Committee for the Science History and Philosophy (CRIFS), Mihai Ralea being the president.

In 1939, Emil Pop was appointed titulary professor at the Cathedra of Plant Physiology of the Science Faculty from Cluj. He opened his course with a memorable speech, "The old age and the death of plants", published in 1940 – " a true pedagogic, scientific and original document, a synthesis subject of the biologic sciences for the philosophical meditation on life" (S. Puiu, 1999).

During the war (1940 – 1945), E. Pop followed the Science Faculty into the refuge at Timişoara, where he held his course and the function of vice-dean (1942-1944). In 1943 he was invited in Germany where he held a cycle of conferences at numerous universities and visited various institutes and laboratories from Berlin, Halle, Vienna and Graz and other towns. It was a good occasion to establish direct relationships and to work with specialists in plant physiology, fitocenology and palinology.

Returning from the refuge, in 1945, the Cluj University and its professors had difficult times: drought, famine, social upheavals. In 1946, Emil Pop declined the position of plant physiology professor at the Science Faculty from Bucharest, being totally linked to the Cluj Faculty. In 1947, he was strongly affected by the death in poverty and depression of the scientist Emil Racoviţă, his scientific and spiritual model. The next year, came with the education reform and his appointment as a director of the Botanical Garden from Cluj. But the hardest blow came in 1950, when his course of Plant Physiology was criticised by Al. Bogdan and Andrei Roth from the "Marxism cathedra" of the University in front of the didactic and technical staff. He was especially accused of lacking the knowledge of the "Marxist science", not using the soviet bibliography but using excessively the western one and a low politic and ideological level.

An important moment in his scientific career was his election, in 1955, as a full member of the Academy of P.R. of Romania; 8 years later, in 1963, he was elected president of the Biological Sciences Section – a function he held up to his death. With this occasion, he held a memorable "reception speech", named "History of the Romanian forests" written both with scientific objectivity, erudition and love for nature and country. Worth remembering, also as a member of the Academy, he was the active president of the Natural Monuments Board. Also within the Academy, Emil Pop led the Centre for Biological Research from Cluj, transformed by him in the Institute of Biology from Cluj by uniting some research collectives which worked separately; this is the reason why he can be regarded as the founder of this institute. In 1964, he was awarded with the title of "Emeritus Scientist" and in 1966 with "Scientific Merit class. I". In 1973, he was elected honorary member of the Hungarian Science Academy.

The last two decades of his life (1954 – 1974) were the richest ones from a scientific point of view. In this period, Emil Pop had elaborated synthesis papers. Thus, in 1957 and 1964, he published volume I and in 1960, volume II, of the "Plant Physiology" written together with N. Sălăgeanu, Şt. Péterfi and H. Chirilei. Among his scientific synthesis papers, we note: "Botanical studies in our pet-bogs" (1954) – a work of great theoretical and practical

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importance; "Peat-bogs from Romania"(1960) – valuable monograph, the first of its kind in our country; the chapter "Vegetation" from "Geographic Monograph of P.R. of Romania", volume I (1960); "Natural Monuments from Romania", edited together with N. Sălăgeanu (1965); "History of the sciences from Romania – Biology", volume edited with R. Codreanu, published posthumously (1975). Each of his syntheses represents fundamental works for the main research directions he followed, working with passion until the end of his life.

The manifold activities of Emil Pop in the biological sciences domain, resulting in original papers with a great value, made him famous both in our country and abroad. A proof lies in his election in various academic societies, among which we note: International Union for the Science History (UIHS), Finnish Society for Zoology-Botanics (Helsinky), Unional Botanical Society (Sankt Petersburg), International Society for Quaternary Studies, "Leopoldina" Naturalists Academy (Halle), International Society for Peat-Bogs Studies and others. This universal recognition is due to his works in the field of palinology (he is regarded as the founder of the Romanian palinology), fitogeography , cito- and fitofiziology, in the field of science history and nature conservation. We should add at all these his incontestable merit for the founding of the Institute of Biology from Cluj and master in the fields of citofiziology, fitofiziology, fitogeography and palinology.

The human Emil Pop was at the height of his scientific and didactic work. His native qualities and his moral principles learned in the high-school and the seminary made him appreciated and admired by colleagues and friends and loved like a father by his scientific pupils. His humaneness, his encyclopaedic culture, was doubled by his scientific carefulness and exigency in research and by a distinguished and complete professor of the Cluj University. All these qualities, and many others, were publicly emphasized at the celebration of his 60 years (13 April 1958). Here are just a few of them: "At the cathedra of plant fiziology he proved to be not only a worthy follower of his predecessors, Teodorescu and Grinţescu, but also a creator of new ways in the Romanian science, such as the peat-bogs studies..." (Iuliu Prodan). "The gentle, luminous face, always ready to help with a kind advice, endorsed by a keen observation and endowed with a generous and infectious humour, makes the Professor Emil Pop the most pleasant and complete interlocutor. You feel a real pleasure under the spell of his personality and his charming words. His love for the sustained and minutely work in laboratory and in the field, serves superior scientific goals, ensuring the solid base for the achievements built with the tenacity of every-day work of our erudite Professor and Academician..." (Eugen Stoicovici). "The abnegation with which he knew how to inspire his disciples with love for the research of truth, made us to always know him as a representative of firm ethical attitudes. He gave himself so much for some of us, that our gratitude cold never be expressed by the sonority of words" (N. Boşcaiu). "When I bring to the scientist our homage and gratitude for the scientific works of his life, with the same high esteem and warm affection, I also think at the upright, kind and helping friend on which you can always count" (V. L. Bologa). "Now on the doorway of autumn, I wish many years and works to my friend Emil Pop, the distinguished naturalist and eminent stylist."(Lucian Blaga). "Since I had the chance to know each other and befriend you, I always found you reading and looking into the microscope, on herbariums or travelling the country to investigate its flora. As one who closely watched your brilliant career, I can only wish you, even now when old age knocks at the door, two things: may God gives you good health to finish successfully your researches, your treaties, and especially your syntheses; while the years to came may not diminish your health and soul harmony, so we can enjoy for a long time your wonderful humour which unwrinkled our brows so many times" (Ion Muşlea). "I admire at my colleague, Academician Emil Pop, the erudition, the talent of a beautiful speech, the cult for our scientific predecessors, the patriotism and the noble passion with which he works to preserve the beauties and the natural monuments" (Gh. Ionescu-Şişeşti).

And now, in the end, what else can we add? Only that I had the happy chance to know personally the professor Emil Pop in two occasions – enough to realize how true are the above mentioned remarks. The first time was in 1959, when I, together with my colleague Lazăr Botoşăneanu, asked him to make a short travel to the spring complex with relict fauna from Corbii Ciungi, which we had just discovered, in order to collect pollen samples from the peat deposit. The eminent specialist came immediately, studied the eutrophic peat and sent us the results we used in our monograph about the biology of the springs and the phreatic waters from the Romanian Plain (C. Motaş, L. Botoşăneanu, Şt. Negrea, 1962). The second and last time, we met him in 1967, at the Academy, when we asked him, as president of the Section of Biological Sciences, to intercede beside the Academy Publishing House which asked me to reduce by half a synthesis regarding the parietal biocoenosis of the caves from the Banatului Mountains. After I told him that I published something in a Polish journal, he advised me to send may paper there, as the Academy Publishing House always proposes text reductions without verifying if the text really contains surplus pages.

At 70 years, on 7 April 1967, Emil Pop was once more celebrated in the Romanian Academy aula. From the speech he held with this occasion, I quote this fragment: "What would I do if I'd start again, but with the experience and state of mind I have now? [...]. I'm afraid I would deny none of my directions [...]. If I would start again, I would like to use the same paths toward the seducing unknown to be at 70 years what I am now". Who would have guessed that the dynamic professor, who had just held at 25th May 1967 this final course of his didactic career with the subject "*Evolution of the biological sciences and especially the molecular biology*", had only 7 years to live? Barely retired at 1 October 1967 at age limit and appointed consultant professor without a salary, he already felt the effects of the bureaucracy : for two months he did not receive neither salary nor pension for the reason his pension was...to high (see S. Puiu, 1999, p.89). In 1969 began the process of reorganization of the research institutions by merging and transfer from the Academy to the ministers. Emil Pop's raport showing that a transfer of the research institutes of the Academy to the ministers would be to destroy them, was not headed. His proposal from 26 January 1970, regarding the founding

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of an Academic Institute of Science History, with his own journal, monograph and syntheses, was not approved also. In 1973, although aware of his physical decline, he continued to lead an active life, organizing a CRIFST symposium and participating at a Palinology Symposium. In 1974, reaching 77 years, he noted the ever present tiredness at the desk, his correspondence remained un-opened and his thoughts were clouded by the fate of the Academy, lacking its research institutes, its commissions and committees. At 1 July 1974, he wrote the foreword at the last volume of the S. R. of Romania Flora, underlining this is the first Flora finished in Europe; that it was started by Tr. Săvulescu, coordinated by E. I. Nyárády and finished by him. At 7 July, he made the last travel in the Apuseni Mountains, noted in his field note-book. A week later, at 14 July 1974, at 9 AM., Emil Pop was knocked down on his desk by a brain vascular accident. At 19 December 1974, he was followed in the world beyond by Florica Pop, the one who was in their harmonious life "the hope of hopes" (S. Puiu, 1999, p.96).

I am ending the short presentation of the life and work of Emil Pop, emphasizing that posterity remembered him as an important, authentic scientist among the gallery of great biologists given by Romania to the entire world.

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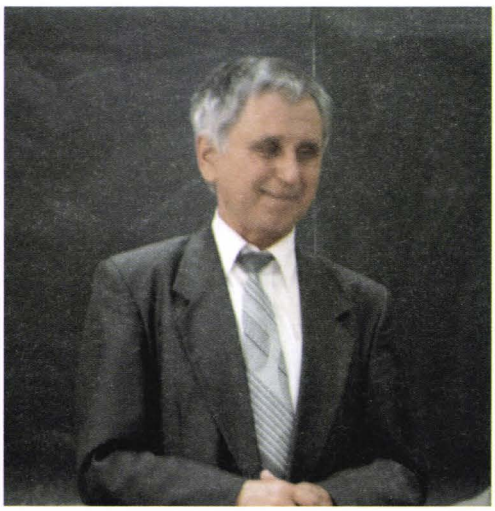
IN MEMORIAM
Professor Dr. ION I. BĂRA
(Soveja, 27 07 1941 - Iasi, 20 08 2007)

CORNEANU C. GABRIEL



In August 2007, Professor Ion I. BĂRA left this world. He was born at Soveja, at the beginning at the '40's, last century. He took his pre-University studies in the country. He then studied at the Biology Faculty, at the *A. I. Cuza* University in Iasi; he took his master's degree at the University in Bucharest (Academician Nicolae BOTNARIUC); he had the chance to specialize his technique in great university centers in Europe, America or Asia, where he had the opportunity to work in the laboratories of famous biologists and genetic specialists.

He had a great and important research activity among research units in the *A. I. Cuza* University in Iasi; in 1993 he was appointed lecturer, and, beginning with 1995, Professor, at the same prestigious University in Iasi. He published more than 360 scientific works (many of them in foreign countries), general information articles, many monographs, books and specialty volumes at known printing houses.

Together with his friend and colleague, Professor Dr. Gogu GHIORGHIŢĂ (nowadays, Rector of the University in Bacău), he organized more ***National Genetics Symposia***, at the Biologic Research Resort, ***Stejarul*** (*the Oak*) - Pângărați, of the University in Iasi. Thus, he contributed to the orientation of the genetics researches in Romania. He founded two Genetics magazines, printed in Iasi (of whose redactor he was), namely, ***Genetics and Evolutionism*** and ***Genetics and Molecular Biology***, taking part of the collective that edited the magazine ***Romanian Journal of Genetics*** (Bucharest), and of many other specialty publications. He coordinated the activity of many students, to the formation of the future doctors in Biology; he lead grants that contributed to solving some theoretical and experimental problems, and assured the formation of future specialists.

The acknowledgement of his activity and scientific authority in Biology and Genetics is confirmed by his leading of **Master's degree activity** in Biology and Genetics, of the **membership of the Science Academy of Moldavia Republic**, **the prize and medal *Opera Omnia***, offered by CNCSIS, Bucharest for his entire scientific activity, **Emanoil Teodorescu distinction**, of the Romanian Academy, **The Knight Praise-Worthy**, offered by the President of Romania (2004), and many more. He was also nominee in *Who's Who in the World* (Romania), *Marquis Who's Who in the World* (2001), nominee in *The Europe 500 Leaders for the New Century*, and selected for *The Man of the Year 2003.*

In the tumultuous contemporary world that we live, he was provided with the peace of creation among his family, his wife, **Klara Băra,** born **FAZAKAS**, who provided him with the comfort of the scientific creation as a **guarding angel**. This permanent attitude allowed them to remove or diminish the effect of many malefic powers that suppressed them in the last 20 years.

His disappearance left an empty place in our hearts: of his family, of his colleagues, the professors of the Biology faculty, who's Dean he was, and of the ones in the *A. I. Cuza* University in Iasi. Thinking of Professor Ion I. BĂRA, we have to think at the attention he showed to the ones near him, and those who knew him must be proud. Thus, we have to cherish his love for life and every moment in our life. And, not the last, we have to question ourselves: ***What is life?*** Many reflection ideas can be drawn from the survey edited in this magazine.

Professor Ion I. Băra, together his wife Klara Băra and the Huai-Pen Liu University staff (Automne 2006, China)

Prof. Ion I. Băra împreuna cu soţia sa Klara Băra şi cadrele didactice de la Universitatea Huai-Pen Liu (toamna 2006, China)

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