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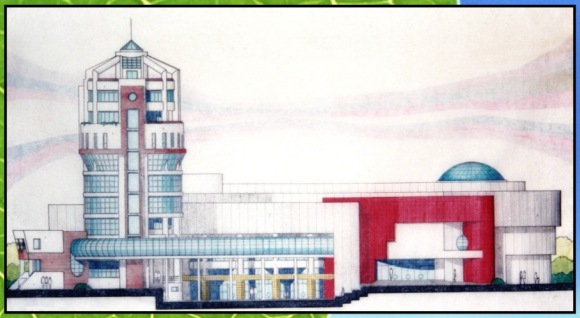

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CUPRINS

PART I – VEGETAL BIOLOGY

PART II – ANIMAL BIOLOGY

COMPLEXUL MUZEAL DE ŞTIINȚELE NATURII „ION BORCEA" BACĂU

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PART I – VEGETAL BIOLOGY

THE ANALYSIS OF *LARIX DECIDUA* MILL. SSP. *CARPATICA* (DOM.) KARYOTYPE

IOANA ANCA IEREMIE [1], GABRIELA CĂPRARU [2], ION I. BĂRA[3]

ABSTRACT

The present paper presents a description of *Larix decidua* chromosomes. The karyotype consist of 24 chromosomes. (Ciocârlan, 1988).

Keywords: seeds of *Larix decidua* Mil. ssp. *carpatica* (Dom.), karyotype, chromosomes.

Introduction

By taxonomical way, *Larix decidua* ssp. *carpatica* belongs to *Larix* genre and *Pinaceae* family (Chifu, Zamfirescu, Manzu, Şurubaru, 2001). The first informatios about the number of *Larix decidua* chromosomes was given by Strassburger E. (1892), Belajeff W. (1894), Nemec B. (1910) (Simak, 1962; Enescu, 1985), wich said that n=12. Sax K. and Sax H.J. (1933) presents an idiogram at *Larix decidua* (Enescu, 1985). Also, the references in literature about these species are in a small number. After Köppen (1889) theory, in time, siberian larch conserved itselfs the originals morphologicals characteristics better than *Larix decidua* (Simak, 1962).

Material and methods

Te biological material used in this experiment is represented by seeds of *Larix decidua* Mill. ssp. *carpatica* (Dom.) from the Forest Departament of Piatra Neamț (2005).

To obtain a good metaphase we followed several steps:

- the seeds was germinated in Petri dishes, on moistened filter paper and maintained one week to 4°C, this procedure promoting the chromosomes coil;
- after this, we maintained the Petri dishes at 24°C until germination (7-8 days);
- when the roots reached 5-10 mm in lenght, they were treated with colchicine 0.2 %, 24 hours, at 4°C, then were immersed in distillate water for washing;
- after that, the roots were fixed in 3:1 alcohol/acetic acid solution for 24 hours at 4°C;
- the roots were immersed in alcohol 70% until investigations;
- the roots was hydrolise with HCl (50 %) for 6 minutes;
- the coloration was effectued with Carr solution (modified Fuchsin).

Results and discussions

For karyotype we investigated the following characteristics:

- the long arm length;
- the short arm length;
- satellites length and numbers;
- the total length of chromosomes;
- the differences between the arms lengths;
- arms ratio;
- centromeric index;
- the length of the haploid set.

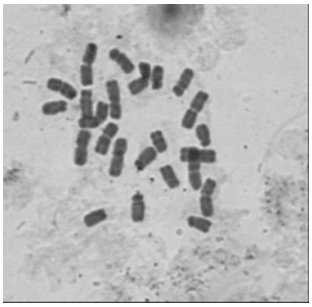

Fig. 1 - Metaphase of *Larix decidua* Mill. ssp.*carpatica* (Dom.)

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All features was expressed in μm, according to the micrometric scale (micrometric ruler). Micrometric ruler was photographed in the same conditions with the metaphases. The photos was made with a Nikon CoolPix digital camera (resolution 1600x1200 dpi). The photos magnification was made at 40x objective.

Tabel 1. - The morphological features of *Larix decidua* ssp. *carpatica* chromosomes (2n=24)

The pair of chrs.	The type of chrs.	Long arm (μm)	Short arm (μm)	Arms ratio (LA/SA) (μm)	Total lenght (μm)	Centromeric index
I	m	3.73	3.59	1.04	7.32	49.04
II	sm	4.01	3.03	1.33	7.04	43.00
III	sm	3.59	2.82	1.28	6.41	43.96
IV	sm	3.80	2.61	1.46	6.41	40.65
V	sm	3.45	2.61	1.33	6.06	43.02
VI	sm	3.38	2.46	1.37	5.85	42.16
VII	sm	3.45	1.76	1.96	5.21	33.77
VIII	st	3.59	1.20	3.01	4.79	24.98
IX	sm	3.03	1.41	2.15	4.44	15.63
X	sm	2.96	1.27	2.33	4.23	30.00
XI	sm	2.96	1.20	2.48	4.15	28.79
XII	sm	2.82	1.27	2.22	4.08	31.03

The length of the chromosomes and the other parametres studied were measured on the best metaphase.

After the measurements, the 24 chromosomes could be conjugated in 12 pairs with the length between 7.32 μm (1st pair) and 4.08 μm (12 th pair).

Total lengh af the haploid set is 65.09 μm.

The average length for the long arm of the chromosome have values between 4.01 μm (2nd pair) and 2.82 μm (12th pair). The variability limits for the long arm are between 2.82 and 3.80 μm.

The average length for the short arm of the chromosome have values between 3.59 μm (1st pair) and 1.27 μm (12th pair). The variability limits for the short arm are between 1.27 μm and 3.66 μm.

The centromeric index have average values betwen 49.04 and 31.03. The difference among the chromosome arms is between 1.55 μm and 0.14 μm (tabel 1). Chromosomes of 1st and 4th pairs posses secondary constrictions, which in both cases separate satellites at short arm.

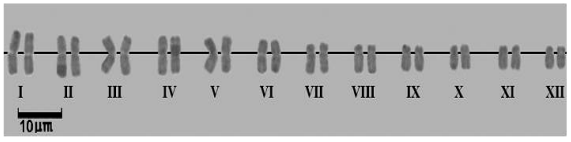

Fig. 2 - The karyotype of *Larix decidua* Mill. ssp.*carpatica (*Dom.*)*

Conclusions

The karyotype of the *Larix decidua* Mill. ssp. *carpatica* (Dom.) consists of 12 pairs of homologous chromosomes arranged after their decreasing sizes.

Behind the calculation of the centromeric index, we identified 3 morphological type:

- median (1st pair)
- submedian (2nd, 3rh, 4th, 5th, 6th, 7th, 9th, 10th, 11th, 12th pairs)
- subterminals (8th pair).

According to Stebbins (1974) the presence of the 3 morphological types of the chromosomes dignified the existance of an asymetric and less evolved karyotype.

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Rezumat

Lucrarea prezintă indicii morfologici de caracterizare ai cromosomilor la specia *Larix decidua* Mill. ssp *carpatica* (Dom). Specia are un număr de cromosomi 2n=24, grupaţi în 3 tipuri morfologice (mediani, submediani si subterminali), cu lungimi relativ mici. Cariotipul este unul asimetric si puţin evoluat.

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CITOLOGICAL REACTIONS OF THE XYLEM FACING PARAZITE FUNGUS

CONSTANTIN TOMA [1], IRINA STĂNESCU [2]

The authors compare, upon literature information, the evolution of xylem reactions beside two mycoparasite, one of them being pathogen (*Phialophora cinerescens* (Wr.) Beyma) and the other unpathogen (*Verticillium dahliae* Kleb.), after direct introduction of the spores at the basis of the carnation's stem.

After a long period of investigation made by a French team researchers (guided by professor Anne-Marie Catesson, from Sorbonne University of Paris), there are confirmed and explained: the absence of an important parietal hydrolysis and the role of the living cells which bound the xylem vessels from the stem, signalized after the infection in the root.

In both cases, gum secretion begins on the second day, in the contaminated xylem vessels, situated above the inoculation place of the spore suspension and then it progresses, determining their obstruction. However, it remains limited with *Verticillium*, while with *Phialophora* it stretches out to more internodes.

The cells associated to the xylem vessels acquire rapidly the characters of the secretory cells: ribosome abundance enlarge mitochondrial superficies, increase activity of the endoplasmic reticulum and of the dictyosomes. The secretion products accumulate in intracytoplasmic vesicles or in the periplasmic space, then they pass through the punctuations and then they are gradually evacuated in the vessels, obstructing them.

The vascular diseases are characterized either by an epinasty and a foliar discolouration and a gum secretion more or less coloured which occurs in the stem's xylem.

The capacity of producing gum substances at *Caryophyllaceae* species (mostly belonging to *Dianthus* genus) and *Ulmaceae* species (species of *Ulmus*) infected by their specific mycoparasites, *Phialophora cinerescens* and *Ceratocystis ulmi*, respectively, have been compared with that of the carnation, experimentally infected with *Verticillium dahliae*, vascular mycoparasite for *Dianthus* species, but very polyphagous (Catesson şi colab., 1976). In all cases, an intense reaction in the xylem has been observed. The elaboration of gum substances is not due to the lysis of the xylem vessels' wall, as there was suggested, it results from an intense secretion of the cells associated to the vessels; those cells, which normally do not have a secretion activity, show important metabolic changes as a response to the presence of the parasite: a strong increment of the mitochondrial surfaces, restarting Golgi activity (intense production of vesicles rich in polysaccharides, which accumulate in intracytoplasmic pockets or in the periplasmic space), the formation of some polyphenolic compounds in the cisternae of the endoplasmic reticulum (which might colour the diseased xylem); those products cross the punctuation wall and go in the vessel's lumen, which is finally obstructed (Catesson şi colab., 1976).

The secretive activity as a response to the aggression of the parasite is not specifically; analog reactions can be observed when the plant (the carnation) is invaded by unpathogen parasites (as *Verticillium dahliae*). The only difference is that, in this case, the aggressive manifestation, and so, the secretive activity is located, limited, without being generalized in the entire stem.

Vascular diseases, mostly those with fungal origin (trachaeomycoses) produce severe losing in most of herbaceous and woody cultures, in all climate types. Therefore, they are due to a small number of fungi, capable to develop in the xylem vessels.

Most of the parasite fungus diffuses through the soil, so they penetrate the roots; this is the case of *Fusarium* species from *Oxysporum* group, of *Verticillium dahliae* and *V. alboatrum* and of a few *Phialophora* species. *Ceratocystis ulmi* is the agent of elms' hollandaise disease.

The pathogenic power of those fungi (*Ascomycetes*) bears different specificity degrees. This is the case of *Phialophora cinerescens* specific

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to *Dianthus* species and to other *Caryophyllaceae* species, while *Ceratocystis ulmi* actions against a few *Ulmus* species; *Fusarium* species have specialised forms, each one of them being specific to a distinct host. On contrary, *Verticillium* species, especially *V. dahliae*, are very polyphagous and very cosmopolite species.

The obstruction of the xylem vessels is one of the important factors of the pathogen trachaeogenesis, that is why it required most attention from researchers, mycologists, cytologists and histologists, in order to discover its origin and to establish how much does the host and how much does the parasite to obtain the so called „parasite gum secretion". Those substances represent a complex made by polysaccharides and phenol compounds. Although various authors consider that the lytic activity of the parasite mycelium play an important role upon the wall of the xylem vessels, the information of the last three decades (Catesson and co., 1976) shows that the living cells of the xylem, could participate in gum elaboration; this is the case of the parenchyma cells associated to the vessels, the only cells which have an early reaction to the attack of the parasitic fungus.

Terminology:

- "Gum" should be used to identify pathologic or traumatic productions (Catesson şi colab., 1976): polymers of simple saccharides or of uronic acids; their origin might be explained by the destruction of the cellular walls;
- "Mucilage" should be used for the products secreted by special cells (upon the same authors).

Thinking about this explanation, the terms: "gums" and "vascular secretion gums" can be used if the vascular pathologic stoppers come from wall hydrolysis. But if they are due, even if partially, to a secretion activity of the parenchymatic cells[1] associated to the xylem vessels, then they must be called „mucilage complex of pathologic origin".

That is why, as cytologists and histologists, we decided to talk about this subject (vascular secretion gums: its origin, xylem reaction on mycoparasitic activity) focused in numerous papers by important phytoanatomists, whose research we will refer to in the following part.

Three decades ago, a group of French researchers (A. M. Catesson, M. Moreau, Y. Czaninski, M. Péresse) focused on cytological modifications suffered by the xylem of some cultivated species (herbaceous- the carnation and woody- the elm) in the presence of vascular parasites from *Ascomycota* filum; we are talking about species belonging to *Phialophora* genus (*Ph. cinerescens*, syn. *Verticillium cinerescens*), *Verticillium* genus (*V. dahliae*) and *Ceratocystis* genus (*C. ulmi*).

Phialophora cinerescens (Wr.) Beyma[2] is a vascular parasite specific to species belonging to *Caryophylloideae* subfamily (*Dianthus* species mostly) producing plant fading and xylem gum secretions.

Verticillium dahliae Kleb. is a vascular unpathogen parasite for carnation, but is known as a real polyphagous and cosmopolite species.

Ceratocystis ulmi (Buis.) C. Moreau[3] is known as the agent of elms' hollandaise disease, preferentially transported by the insects.

In the last four decades, new ultrastructural cytochemistry techniques let us better know the structure of the xylem vessels' wall. The hydrolysis of the intervascular wall, described for the first time by O'Brien and Thymann (1967), proved to be a general phenomenon in vascular elements' differentiation. Recent observations of Czaninski (1977, 1979) explained that the hydrolysis is total for acid polysaccharides and for those with vic-glycol groups; on contrary, the acid methiolate pectins persist and form a fibrillated lax web in the cellular wall.

Catesson and co. (1979) demonstrated that this hydrolysis could not take place when the stem xylem vessels are invaded by specific mycoparasites as *Phialophora cinerescens* is for the carnation or *Ceratocystis ulmi* is for the elm. This situation is present whatever the infection mode should be: a natural one or due to a hurt attack. This was verified by the mentioned authors, when they have directly introduced, in the carnation's stem, a polyphagous parasite, *Verticillium dahliae*, unpathogene for this plant, like other researchers had anterior done.

In this case, the walls of the intervascular punctuations persist and, sometimes, they become even thicker in the xylem which differentiates near the contaminated region.

Carnations are cultivated and contaminated with suspensions of *Phialophora cinerescens* or of *Verticillium dahliae*. The spore suspension penetrates through a cut done at the basis of the stem

[1] The cells associated to the vessels are different than those belonging to the xylem parenchyma, by presenting a less dense citoplasm, weak vascularization and, the most important aspect, by the fact that they elaborate very small quantities of reserve substances. The dictyosomes are rare and weak active. In carnation, the walls are still composed by cellulose; in the elm, they lignify during differentiation process, except the punctuations.

[2] In *Romanian Micological Flora* only *Ph. fastigiata* appears

[3] Courrent name: *Ophiostoma ulmi* (Buis.) Nannf.

and, then, it is carried away in the current of the sap; sterile water is applied on the cut belonging to the blank sample. In order to continue the investigation, the material was fixed after 6, 12 and 18 days. The acid polysaccharides were identified with ruthenic red, while the acid metilate polysaccharides were identified by contrasting the samples using PATAG techniques. All samples, cut with microtome, have been analyzed on a transmission electronic microscope. Analyzing the blank samples as well as the infected ones, the named researchers had come to the following conclusions:

- The presence of a vascular mycoparasite, pathogene or unpathogene, determines tow groups or cytological reactions in the xylem:
  - A progressive obstruction of the xylem vessels by gum substances; the secretion of the cells associated to the vessels had been anterior established by the same authors (Catesson şi colab., 1976; Moreau şi colab., 1978);
  - The maintenance and thickening of the walls in the intervascular punctuations.
- From utrastructural point of view, the reactions against *Phialophora cinerescens* or *Verticillium dahliae* are a little bit different; the second species, unpathogen for carnation, can not germinate in carnation's tissue; so, its defensive reactions are limited. On contrary, the specific host (the carnation) does not inhibit *Phialophora cinerescens*'s development.

Ultrastructural aspects

The infection with *Phialophora cinerescens* and xylem reactions at the end of the incubation

Before the external reactions could be observed (fading, especially) at the 18th day, most of the xylem's lumen is invaded by heterogenous gum substances, of polyphenolic type, especially.

The walls of the intervascular punctuations, which differentiated during incubation, are not hydrolyzed; they even got thicker with supplimentary quantities of polysaccharides; that is why intervascular transfers are perturbated.

In the cells associated to the vessels, the mitochondria are in great number, the dictyosomes are full of activity; the Golgi vesicles, rich in polysaccharides, fuse or eliminate their content in the periplasmic space (near the plasmalema).

Various substances, elaborated by the associated cells, accumulate temporary in the extracellular compartment and then pass the wall of the intervascular punctuations, in order to make more solid the gum substances which obstruct the vessels.

In the blank samples, the wall of the intervascular punctuations had suffered a partially hydrolysis and the associated cells bear rare dictyosomes, less active.

Xylem reactions facing ***Verticillium dahliae***

The conidia of this fungus, unpathogen for the carnation, can not germinate in the xylem vessels, although they are alive for a long time. In the vicinity of the vessels directly contaminated, some reactions, comparable as form and intensity with those described above, can be observed.

In the cells associated to the vessels, the mitochondria are well developed, the dictyosomes are active and the Golgi vesicles are rich in polysaccharides; those vesicles might fuse or might eliminate their content in the periplasmic space, producing the thickness of the punctuations' wall. Starting with the results obtained by all the authors mentioned above, a few aspects must be underlined:

- In a healthy xylem, when two vessels are functional, the wall between them can suffer hydrolysis; this process can not take place between vessels and their associated cells;

- When *Phialophora cinerescens* is present, the normal hydrolysis in the wall of two intervascular punctuations does not take place; on contrary, those vessels present even thicker walls. There have not been observed a hydrolysis of the parietal polysaccharides in the walls common to vessels and associated cells, which can be explained by the direct enzymatic action of the parasite species. Therefore, a transfer of polysaccharides is present, from the associated cells to the vessels, through the primary, unhydrolyzed wall.

- Vascular gum secretion appears as a result of the secretory activity induced by the presence of the parasitic species in the cells which bound the vessels. Its early reaction (after a few hours after introducing the spore suspension in the xylem of the carnation's stem) materialized by increasing the number of ribosoma, the apparition of Golgi vesicles bearing a dense content, increasing the number of endoplasmic reticulum profiles. At the same time, the great number of the mitochondria and their cisternae demonstrate an increment of the energy, necessary for the new synthesis trajectories. This refers to the elaboration of polyphenolic substances and polysaccharides (which accumulate in the periplasmic space, after passing the punctuations, invading and obstructing the vessels' lumen).

- Not all the saccharides secreted by the dictyosomes participate in elaborating the vascular secretion gums or in thickening the walls; some quantities accumulate in intracytoplasmic vesicles, similar to those with mucilage evidenced in other plant species.

- As they eliminate or absorb water, those polysaccharides could play a role in regulating the cellular osmotic pressure and even in establishing new circulation trajectories.

- Xylem reactions are not specific (they do not depend on the fungus species). They represent the common answer of the host at the penetration of a potential (pathogen or unpathogen) parasite in the stem's vessels and determine a change in their metabolism (we are referring to the living cells, the ones which are associated to the vessels), characterized by increasing a secretory activity, uncommon for those cells.

- The development of the pathogen agent determines a secretion in the cells; the number of functional vessels, as well as the possibility of water lateral transfer, is considerably reduced by the thickness of the walls, where the punctuations are present and by gum secretions extension.

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THE ECOLOGICAL DIVERSITY AND THE SOCIO-ECONOMIC IMPORTANCE OF SOME MACROMYCETES FROM PETROŞANI DEPRESSION

IOANA CIORTAN[1]

ABSTRACT

The paper presents a number of 122 species of macromycetes (2 species from the *Ascomycota* phylum, 120 from *Basidiomycota*) and offer indications of edibility, toxicity and practical use of the presented species.

Key words: macromycetes, ecology, edibility, toxic, association, pigment.

Introduction

General physical-geographical frame

The Petroşani Depression is situated in the west of Southern Carpathians between Retezatu, Şureanu, Parâng and Vâlcan Mountains.

The West Jiu river flows trough the depression, beginning from Jiu-Cerna passage (1330 m altitude) until it encounters the East Jiu, at Iscroni (556 m altitude), were Jiu river is formed, which, in the Lainici cutting, it forms the eastern limit of Vâlcan Mountains, to Parâng Mountains.

Crossing the Jiu cutting, at the exit, before Petroşani city, the road takes a turn to the left to Cheile Buţii (34 km), passing one by one the following cities: Vulcan, Lupeni, Uricani, Valea de Brazi, Valea de Peşti and Câmpu lui Neag villages.

In the depression on a length of 45 km and between 3 and 9 km width (between east and west), many routes were made, following the course of some rivers like Preotesei Valley, Căprişoarei Valley, Ungurului Valley (near Vulcan city), reaching the stone castle of Cheile Buţii, at an altitude of about 900 m, which is one of the entrances in Retezat Mountains.

Research were made in 2006-2007, July-October, on Preotesei Valley, Căprişoara Valley, Ungurului Valley (near Vulcan city) and in the beech tree forests from Cheile Buţii (900 m altitude).

Mycological researches in this area were never made until now.

I have made personal researches so far only on Oltenia territory, so the inserted data in the present material can give information on the chorology of some species with practical utilization (comestible, toxic, pigment formatting, etc.). From this research I have presented in 3 anterior papers [3, 4, 5,] a number of 28 macromycetes species from the near bouts of Vulcan city (Hunedoara County).

Material and method

The research was made in 2006-2007, in July, August and October.

All the data from those stations had been noted during the trip and the determination was made following the macro- and microscopic characteristics of the species on fresh material, using the keys from the bibliography [1, 2, 7, 13, 14 and 15] and other bibliographic sources [8, 9, 10, 11, 18]. Also, everything species were photographed in fresh condition, in natural habitats and, also, in laboratory.

From indications of edibility, toxicity and practical use of the presented species we using bibliographic sources from point [6, 12, 15, 16 and 17].

The species are presented in alphabetical order, first ascomycetes and second basidiomycetes, in separated lists for each station, followed by indications of the ecologic group, substrate, habitat and edibility or toxicity (if the species is repeated in more lists, its edibility or toxicity is indicated only in the first one).

The nomenclature is the one indicated from the [19] points of the bibliography.

The material may be found in the University of Craiova Herbarium.

Abbreviations used from ecological groups:

M – mycorrhizal species; Sh – saprotrophic species on humus; Sl – saprotrophic species on wood; Pl – parasite species on wood; SP - saproparasite species (parasite species on plants but saprotrophic after death of plants); SPl – saproparasite

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species on wood; P – parasite species; Sp – saprotrophic species in grassland; Sf – saprotrophic on leaf; Sc – coprotoph.

Results and discussions

I. On Preotesei Valley, at an altitude of 800-900 m, the vegetation is represented by beech tree forests. The vegetable formation characteristic to these forests is the association *Symphyto cordati-Fagetum* Vida 1959.

The species list (12.VIII.2006):

Daldinia concentrica (Bolton) Ces. & De Not. – Sl, on dead trunks of beech tree; *Hypoxylon fragiforme* (Pers.) J.K. Kickx f. – Sl, on dead trunks and branches of beech tree; *Amanita vaginata* var. *vaginata* (Bull.) Lam. – M, on soil, in wood, edible; *A. pantherina* Krombh. – M, on soil, in forest, toxic - induces pantherinian-atropinian syndrome, psychotic (it contains pantherine- muscimol-amanita factor B), sometimes even lethal; *Bjerkandera fumosa* (Pers.) P. Karst. – SPl, from trunk of beech tree; *Cantharelus cibarius* var. *cibarius* Fr. – M, on soil, in forest, edible; *Clitocybe gibba* (Pers.) P. Kummer – Sh, on soil, in forest, good edibility after long boiling; *Coprinellus micaceus* (Bull.) Vilgalys, Hople & Jacq. Johnson – Sl, on dead stumps of beech tree, in dense clusters, micotoxins productive species; *Cortinarius cinnabarinus* Fr. – M, on soil, in forest, toxic - micotoxin productive species (orellanine); *Cyahtus striatus* (Huds.) Willd. – Sl-Sh, on chips of beech tree; *Entoloma serrulatum* (Fr.) Hesler – Sp, on soil, in grassland; *Fomes fomentarius* (L.) J.J. Kickx. – SPl, on trunk of beech tree; *Fomitopsis pinicola* (Sow.) P. Karst. – SPl, on trunks of *Picea abies*; *Gymnopus peronatus* (Bolton) Antonin, Halling & Noordel – Sf, among leaf litter, in forest; *Hydnellum ferrugineum* (Fr.) P. Karst. – Sh, on soil, in forest glade; *Inonotus hispidus* (Bull.) P. Karst. – Pl, on trunk of beech tree; *Lenzites betulina* (L.) Fr. – Sl, on branches of beech tree; *Leucopaxilus giganteus* (Sowerby) Singer – Sp, on soil, in forest glade, moderate edibility; *Mycena sanguinolenta* (Alb. & Schwein.) P. Kumm. – Sh, on decaying wood, in beech forest; *Marasmius alliaceus* (Jacq.) Fr. – Sh-Sl, on (buried) beech branches, is usually dried for use as a flavoring; *M. oreades* (Bolt.) Fr. – P, on soil, in grassland, edible; *M. rotula* (Scop.) Fr. – Sl-Sf, on dead branches of beech tree; *Phellinus igniarius* (L.: Fr.) Quél. – Pl, on trunk of beech tree; *Piptoporus betulinus* (Bull.) P. Karst. – Pl, on trunks of *Betula pendula*; *Polyporus varius* Pers.: Fr. – SPl, on branches of *Betula pendula*; *Psathyrella candolleana* (Fr.) Maire – Sp, on or near stumps and buried wood, in forest; *Psilocybe semilanceata* (Fr.) P. Kumm. – Sp, on the ground, in manures grassland, toxic - induces the narcotic syndrome (mycotoxin productive species); *Pycnoporus cinnabarinus* (Jacq.) Fr. – SPl, on dead branches of beech tree; *Russula aeruginea* Fr. – M, on soil, in forest, edible; *R. alutacea* (Fr.) Fr. – M, on soil, in forest, edible; *R. cyanoxantha* (Schaeff.) Fr. – M, on soil, in forest, edible; *R. emetica* var. *fageticola* Melzer – M, on soil, in forest, toxic - induces the rezinoid syndrome (gastroenteric) (it contains muscarin); *R. foetens* (Pers.) Pers. - M, on soil, in forest, suspect - it induces the rezinoid syndrome (gastroenteric); *R. nigricans* (Bull.) Fr. – M, on soil, in forest; *R. virescens* (Schaeff.: Zant.) Fr. – M, on soil, in forest, edible; *Schizophyllum commune* Fr. – SPl, on trunks of beech tree; *Scleroderma citrinum Pers.* – M, on soil, in grassland, edible in young stage; *Stereum hirsutum* (Willd.) Pers. – SPl, on trunks of beech tree; *Trametes gibbosa* (Pers.) Fr. – SPl, on trunks and branches of beech tree; *T. versicolor* (L.) Lloyd – Sl, on trunks and branches of beech tree; *Xerula radicata* (Relhan) Dőrfelt – Sh, on the roots of beech, in forest, the cap edible.

II. On Caprişoara Valley, at an altitude of 1000-1100 m, the vegetation is made of *Fagus sylvatica* forests blending with many exemplars of *Betula pendula* Roth., which are spreading on a large surface, in compact groups), and at high altitudes with *Picea abies* (L.) Karsten.

The species list (13.VIII.2006):

Astraeus hygrometricus (Pers.) Morg. – M, on loamy soil, in forest; *Amanita phalloides* (Vaill. ex Fr.) Link – M, on soil, in forest, toxic - narcotizing species, induces the orelanian syndrome (it contains amatoxins – amanita factor B), sometime lethal; *Calocera viscosa* (Pers.) Fr. – Sl, on strongly decayed stumps, in forest; *Cantharellus cibarius* var. *cibarius* Fr. – M, on soil, in forest, edible; *Cantharellus tubaeformis* (Bull.) Fr. – M, on soil, in forest, edible; *Clitocybe gibba* (Pers.) P. Kummer – Sh, on soil, in forest; *Cortinarius cinnabarinus* Fr. – M, on soil, in forest, toxic; *Fomes fomentarius* (L.) J.J. Kickx. – SPl, on trunk of beech tree; *Fomitopsis pinicola* (Sow.) P. Karst. – PSl, on trunks of *Picea abies*; *Lactarius piperatus* (L.) Pers. – M, on soil, in forest, edible; *L. subdulcis* (Bull.) Gray – M, on soil, in forest, edible; *Leccinum scabrum* (Bull.) Gray – M, on soil, under *Betula pendula*, edible; *Lenzites betulina* (L.) Fr. – Sl, on dead branches of beech tree*; Marasmius alliaceus* (Jacq.) Fr. - Sh-Sl, on soil, in forest; *M. saccharinus* (Batsch) Fr. – Sf, on leaf of beech tree; *Phallus impudicus* L. - Pl-Sp, on loamy soil, in forest; *Ramaria botrytis* (Pers.) Ricken – Sh, on soil, edible; *R. flava* (Tourn. ex

Battarra) Quél. – Sh, in the ground, in forest; *Russula alutacea* (Fr.) Fr. – M, on soil, in wood; *R. foetens* (Pers.) Pers. – M, in wood, under fir trees; *Stereum hirsutum* (Wild.) Pers. – SPl, on stumps of beech tree; *Strobilomyces strobilaceus* (Scop.) Berk. – M, on soil, in forest glade, moderate edibility; *Trametes gibbosa* (Pers.) Fr. – SPl, on stumps of beech tree; *T. versicolor* (L.) Lloyd – Sl, on stumps of beech tree; *Xerula radicata* (Relhan) Dőrfelt – Sh, on the roots of beech tree.

The species list in the same station at 7.X.2007:

Amanita muscaria (L.) Lam. var. *muscaria* – M, on soil, in forest, toxic - it contains ibotenic acid (amanita factor C), muscimol (pantherine, amanita factor B) and muscazone. It induces the muscarinic syndrome; *Lepista fasciculata* Harmaja – Sh, on soil, in skirt wood, moderate edibility; *Mycena galericulata* (Scop.) Gray – SPl, on decaying wood and bark of beech tree, in skirt wood; *M. haematopus* (Pers.) P. Kumm. – Sl, on dead wood, in forest.

III. In 2007, at a single trip, on 24.VI.2007 were identified on Ungurului Valley, near the Nicolae Vulcan hermitage (where the vegetation is composed by beech tree forests (*Symphyto cordati-Fagetum* Vida 1959) and grassland (*Festuco rubrae - Agrostetum capillaris* Horv. 1951), the next species:

Amanita pantherina Krombh. – M, on soil, in forest; *A. rubescens* var. *rubescens* Pers. – M, on soil, in forest, good edibility after long boiling; *Boletus luridus* Schaeff. – M, on soil, in skirt wood, good edibility after long boiling; *Cantharellus cibarius* var. *cibarius* Fr. – M, on soil, in forest; *Fomes fomentarius* (L.) J.J. Kickx. – SPl, on trunks of beech tree; *Fomitopsis pinicola* (Sow.) P. Karst. – PSl, on trunk of *Picea abies*; *Hericium cirrhatum* (Pers.) Nikol. – SPl, on branches of *Fagus sylvatica*; *Inocybe geophylla* var. *lilacina* Gillet – M, on soil, in forest, toxic - induces the narcotic syndrome (mycotoxin productive species); *Lactarius piperatus* (L.) Pers. – M, on soil, in forest; *Lenzites betulina* (L.) Fr. – Sl, on branches of *Betula pendula*; *Limacella guttata* (Pers.) Konrad & Maubl. – Sh, on soil, in forest, edible; *Marasmius oreades* (Bolt.) Fr. – P, on soil, in grassland; M. *rotula* (Scop.) Fr. - Sl-Sf, in dead branches, in forest; *Micromphale foetidum* (Sowerby) Singer – Sl, on twigs of beech tree; *Peziza varia* (Headw.) Fr. - Sl, in wood; *Polyporus varius* Pers.: Fr. – SPl, on branches of *Betula pendula*; *Phellinus igniarius* (L.: Fr.) Quél. – Pl, on trunks of beech tree; *Pluteus petasatus* (Fr.) Gillet – Sl, on trunks of beech tree; *Psathyrella candolleana* (Fr.) Maire –Sp, in grassland; *Rhodocollybia buthyracea* (Bull.) Antonin & Noordel - Sh, on soil, in forest, edible; *Russula alutacea* (Fr.) Fr. - M, on soil, in forest; *R. cyanoxantha* (Schaeff.) Fr. – M, on soil, in forest; *R. emetica* var. *fageticola* Melzer – M, on soil, in forest; *R. foetens* (Pers.) Pers. - M, on soil, in forest; *R. ochroleuca* (Pers.) Fr. – M, on soil, in forest, moderate edibility; *R. nigricans* (Bull.) Fr. - M, on soil, in forest; *R. virescens* (Schaeff.: Zant.) Fr. – M, on soil, in forest; *Stereum hirsutum* (Wild.) Pers. – SPl, on dead trunks of beech tree; *Stropharia semiglobata* (Batsch: Fr.) Quél. – Sc, on soil, in grassland; *Trametes versicolor* (L.) Lloyd – Sl, on dead trunks of beech tree; *Xeromphalina campanella* (Batsch) Maire – Sl, in forest, among moss-cushions.

IV. The vegetation near Cheile Buții cabana is made of beech tree forests with isolated exemplars of fir trees.

The species list (7.X.2007):

Agaricus silvaticus Schaeff. – Sh, on soil, in forest, edible; *Amanita citrina* var. *citrina* (Schaeff.) Pers. – M, on soil, in forest, edible - in [23] species is indicated edible, but mediocre, in [20] as species which induces the rezinoid syndrome (gastroenteric); some mycologist think it is toxic because of the confusions with *Amanita phalloides*; *Armillaria mellea* (Vahl.) P. Kumm. – M, on soil, in forest, edible; *Boletus chrysenteron* Bull. – M, on soil, in forest; *B. regius* Krombh. – M, on soil, in forest, edible; *Bovista plumbea* Pers. – Sp, on soil, in grassland, in young stage moderate edibility; *Cantharellus cibarius* var. *cibarius* Fr. – M, on soil, in forest; *Clitocybe gibba* (Pers.) P. Kumm. – Sh, on soil, in forest; *C. nebularis* (Batsch) Quél. – Sh, on soil, in forest, forming fairy rings, edibility, but should not be eaten in great quantity; *Coprinus comatus* (O.F. Müll.) Gray – Sp, on rich soil, in skirt wood, after Kreisel [6] toxic species, mycotoxin productive species. In many specialty books it is indicated that it is edible only in young stage; *Cortinarius orellanoides* Rob. Henry – M, on soil, in forest, toxic - micotoxin productive species (orellanine), induces the orelanian syndrome; *C. trivialis* J.E. Lange – M, on soil, in grassland, toxic; *Cystoderma amianthinum* (Scop.) Fayod. – Sh, on soil, under *Picea abies*; *C. carcharias* (Pers.) Fayod – Sh, on soil, under *Picea abies*; *Daedaleopsis confragosa* (Bolton) J. Schrőtt – Sl, on branches of beech tree; *Ganoderma applanatum* (Pers.) Pat. – SPl, on trunk of beech tree; *Gymnopus confluens* (Pers.) Antonín, Halling & Noordel. – Sh, on soil, in forest; *Hygrocybe chlorophana* (Fr.) Wűnsche – Sp,

on soil, in grassland; *Hygrophorus eburneus* (Bull.: Fr.) Fr. var. *eburneus* – M, on soil, in forest; *Hypholoma fasciculare* (Huds.) P. Kumm. – Sl, on trunk of *Fagus sylvatica,* toxic - mycotoxin productive species, it induces the rezinoid syndrome (gastroenteric); *H. sublateritium* (Schaeff.) Quél. – Sl, on trunk of beech tree*,* toxic; *Inocybe maculata* Boud. - M, on soil, in forest, after some mycologist suspect or toxic because certain cases of intoxication which were indicated at it's consumption, but in some specialty books it is the same as all of the other toxic species of *Inocybe* ; *Laccaria amethystina* Cooke – Sh, on soil, in forest, good edibility; *L. laccata* (Scop.) Fr. – Sh, on soil, in forest, mediocre edibility; *Lactarius acerrimus* Britzelm. – M, on soil, in forest; *L. aurantiacus* (Pers.) Gray – M, on soil, in forest; *L. deliciosus* (L.) Gray – M, on soil, in forest, edible; *L. pergamenus* (Sowerby) Fr. – M, on soil, in forest; *L. rufus* (Scop.) Fr. – M, on soil, in forest; *L. scrobiculatus* (Scop.) Fr. – M, on soil, in forest, toxic - it induces the rezinoid syndrome (gastroenteric); *L. torminosus* (Schaeff.) Gray – M, on soil, in forest, toxic - it induces the rezinoid syndrome (gastroenteric); *L. turpis* (Weinm) Fr. – M, on soil, in forest; *Lepiota castanea* Quél. - Sp, on soil, in forest, suspect, to be considered toxic but not lethal; *L. clypeolaria* (Bull.) Quél. – Sh, on soil, in forest, suspect; *L. cristata* (Bolton) P. Kumm. – Sh, on soil, in forest in wood, suspect - it induces the rezinoid syndrome (gastroenteric) (it contains lipiotina; *Lepista nuda* (Bull.) Cooke – Sh, on soil, in forest, forming fairy rings, edible after long boiling; *Lycoperdon perlatum* Pers. – Sl, on soil, in forest; *Marasmius alliaceus* (Jacq.) Fr. – Sh-Sl, on beech branches, in forest; *M. androsaceus* (L.) Fr. – Sf, on *Picea abies* needles; *M. epiphyllus* Pers.) Fr. – Sf, on *Fagus sylvatica* leaves; *M. rotula* (Scop.) Fr. – Sl-Sf, on branches of beech tree; *M. scorodonius* (Fr.) Fr. – P, on herbaceous plants roots, in forest; *Micromphale foetidum* (Sow.) Singer – Sl, on branches of beech tree; *M. perforans* (Hoffm.) Gray – Sf, on needle litter (spruce); *Mycena capillaris* (Schumach.) P. Kummer – Sf, on rotting beech leaves; *M. epipterygia* (Scop.) Gray – Sl, on decaying wood; *M. galericulata* (Scop.) Gray – SPl, on decaying wood and bark of beech tree; *M. haematopus* (Pers.) P. Kumm. –Sl, on dead wood; *M. polygramma* (Bull.) Gray – Sl, on stamps of beech tree; *M. pura* (Pers.) P. Kummer – Sh, on leaf litter, in forest; *Oudemansiella mucida* (Schrad.) Hoehn. – SPl, on dead trunks of beech tree; *Panaeolus sphinctrinus* (Fr.) Quél. – Sc, on old cow, in forest glade; *Plicaturopsis crispa* (Pers.) D.A. Reid – Sl, on branches of beech tree; *Ramaria flava* (Tourn. ex Battarra) Quél. - Sh, in the ground, in forest; *Rhodocollybia buthyracea* (Bull.) Lennox – Sh, on soil, in forest, mediocre edibility; *Russula albonigra* (Krombh.) Fr. – M, on soil, in forest in wood; *R. aurea* Pers. – M, on soil, in forest; *R. cyanoxantha* (Schaeff.) Fr. - M, on soil, in forest; *R. delica* Fr. – M, on soil, in forest; *Russula emetica* var. *fageticola* Melzer – M, on soil, in forest; *R. fragilis* var. *fragilis* Fr. – M, on soil, in forest; *R. nigricans* (Bull.) Fr. – M, on soil, in forest; *R. ochroleuca* Pers.: Fr. – M, on soil, in forest; *R. virescens* (Schaeff.: Zant.) Fr. – M, on soil, in forest; *Schizophylum commune* Fr. – SPl, on branches of beech tree; *Scleroderma citrinum* Pers. – M, in wood; *Stereum hirsutum* (Wild.) Pers. – SPl, on truncks of beech tree; *Tricholoma myomyces* (Pers.) J. E. Lange – M, under *Picea abies*, edible; *T. vaccinum* (Pers.: Fr.) P. Kumm. - M, under *Picea abies*, mediocre edibility; *Tricholomopsis rutilans* (Schaeff.) Singer – Sl, on soil, in forest; *Vascellum pratense* (Pers.: Pers.) Kreis. – Sh, on soil, in forest

Macromycetes synusia analysis emphasized the dominance of the macorhhizal species (Diagram no.1.) followed by the saprotroph species, and the least representative species are the parasite species. This representation is in direct concordance with the type of vegetation, which in this area is formed of pure beech tree forest, made from healthy trees.

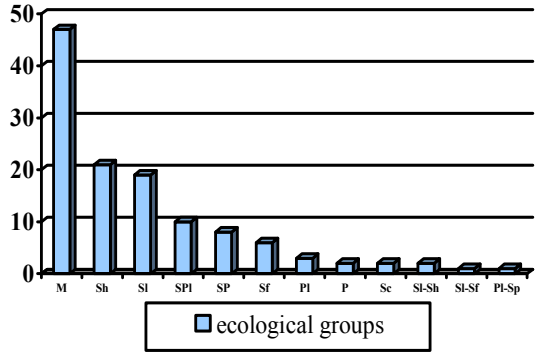

Fig. 1 - Ecological spectrum of the macromycetes species

The characteristic species from beech tree forests identified in the terricolous synusium are: *Armillaria mellea*, *Hygrophorus eburneus, Marasmius alliaceus, Mycena pura, Russula cyanoxantha, R. emetica* var. *fageticola,* and in epixylous synusium: *Hypholoma fasciculare Hypoxilon fragiforme, Lycoperdon pyriforme, Oudemansiella mucida, Plicaturopsis crispa, Polyporus varius.*

The socio-economic importance species (after Kreisel [6]):

- *Amanita muscaria* – aphrodisiac, narcotizing species (contains a substance that specifically affects the central nervous system), pigment productive species;
- *Coprinus comatus* – cultured species to be illegally used as drug; it contains coprine, a compound which has an effect similar to the drugs Refusal or Antabus, used to treat alcoholism;
- *Cortinarius orellanoides* – pigment and productive species;
- *Calocera viscosa* – pigment productive, purveyor of colorant;
- *Fomes fomentarius* - technical utility, in floral bindery and decorations;
- *Fomitopsis pinicola* - technical utility, in floral bindery and decorations;
- *Hydnum repandum* – condiment species (in selection process);
- *Hygrophorus eburneus* – condiment species (in selection process);
- *Hypholoma fasciculare* - species utilizable in popular medicine (it contains vital substances);
- *Hypholoma sublateritium* – species utilizable in popular medicine, it contains vital substances, cultured species, to be illegally used as drug;
- *Lenzites betulina* - technical utility, in floral bindery and decorations;
- *Lactarius piperatus* – species used in popular medicine, it contains vital substances;
- *Lepista nuda* – it contains nudinic acid with antibiotic propriety;
- *Lycoperdon perlatum* – technical utility (wick/tinder, perfume etc.), in popular medicine, it contains vital substances;
- *Xerula radicata* – cultivated species, to be illegally used as drug;
- *Phallus impudicus* – used in popular medicine as aphrodisiac;
- *Piptoporus betulinus* – used in popular medicine, technical utility;
- *Psilocybe semilanceata* - cultivated species, narcotizing species, to be illegally used as drug;
- *Pycnoporus cinnabarinus* – producer of pigment and colorant;
- *Strobilomyces strobilaceus* – producer of pigment and colorant;
- *Stereum hirsutum* – interesting industrial species (in study stage);
- *Trametes versicolor* – cultivated species, illegally used as drug, industrially introduced in the pharmaceutical industry, biotechnology, agent of biological control (control of arthropods and insects); used in floral bindery and decorations;
- *Tricholomopsis rutilans* – condiment species, interesting industrial (in study stage).

From the 38 comestible species the local people eat frequently the next: *Boletus regius, Cantharellus cibarius, Leccinum scabrum, Lactarius piperatus, Marasmius oreades, Russula alutacea, Russula cyanoxanta, Ramaria botrytis.*

Conclusions

Mycological research achieved in Petroşani Depression have made evident:

- 38 species from *Basidiomycota* are comestible species, 20 toxic species and 22 species with socio-economic importance.
- Of ecologic point of view the species are grouping as follows: M – 47 species, Sh – 21, Sl – 19, SPl – 10, SP – 8, Sf – 6, Pl – 3, P – 2, Sc – 2, Sl-Sh – 2, Sl-Sf – 1, Pl-Sp – 1.
- We don't have information that the species with socio-economical importance have been used by the people under the presented mode but they are a real economical potential.
- We consider that the researched area is an area with major mycological interest looking at the diversity of the macromycetes species and the interest of the population for consumption and commercialization.

Rezumat

Cercetările micologice, realizate în staţiunile prezentate, evidenţiază diversitatea speciilor de macromicete din pădurile cu făgete pure din această zonă. Lucrarea prezintă, de asemenea, speciile cu importanţă socio-economică (comestibile, toxice şi cele ce prezintă interes tehnic, medical sau de altă natură).

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COMPLEXUL MUZEAL DE ŞTIINȚELE NATURII „ION BORCEA" BACĂU

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THE *HETEROBASIDION ANNOSUM* (FR.) BREF. MUSCHROM DISEMINATION IN SUCEAVA DISTRICT

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ABSTRACT

The spread of the fungus *Heterobasidion annosum* (Fr.) Bref. by spores can be highlighted by disks method widely used abroad (Delatour, 1972). In Romania the method has been applied for the first time in 1996 (Grudnicki, 2002). The method can give very good results towards the quantitative assessment of potential infection, especially in forest stands affected by injuries caused by animals. The perimeter of Suceava county record in the 1970s over an area of 70,000 hectares with such injuries, stands the fungus *Heterobasidion annosum* had developed a special extension (Ichim, 1990, 1993).

Key words: *Heterobasidion annosum* (Fr.) Bref., disemination, Suceava district.

Introduction

Forest protection against the damaging action of certain biotic factors, that might endanger its capacity of fulfilling the functions of production and protection, imposes it self as a highly important activity of stringent actuality (Delatour, 1972)

In these conditions, we can affirm that the aim of this paper is to bring certain original contributions regarding the fungi attack on beech species, focusing mainly on the attack produced by *Heterobasidion annosum* (Fr.) Bref. because, beyond the large economic damages, this fungus also affects the stability of the forestry ecosystems.

The subjects chosen for this paper are justified by the large spreading of these fungi in the spruce forests of Suceava district, being considered that main factor that affects the quality of the spruce wood, dominant species in the investigated area (Sima, 1982; Ichim 1993; Cenuşă, 1996, Grudnicki, 2002).

Material and method

In order to determine the interactions on a larger area, there were established a network of research points on a route located between Ilisesti and Iacobeni (Puciosu stream). The network covers a length of 56 km and a height range of 470 m (Fig.1). On this route there is an important variability of vegetation, making the transition from the deciduous forests by mixtures of beech woods. Consequently, the network covered the demands of certain objectives that aimed mainly the influence of the vegetal carpet over the infecting potential and the influence of the air current intensity over the same process.

The method consists in drawing the small round disks by chopping the trunk of a health tree, especially spruce tree, whose diameter should be of about 20 cm, so as the small round disks should be handled easily; the thickness of the small round disks should not exceed 3-4 cm; after drawing, the small round disks are cleaned with a brush and put immediately under protection by packing; there can be used fresh small round disks or these can be frozen and used afterwards (Grudnicki, 2002).

The presentation of the small round disks in the research area is done directly on the ground or on various supports; it is registered the superior face of the small round disk, its number and the point location where the presentation took place; the presentation time is of 24 hours; at the end of the presentation time, each small round disk is taken off from the field and packed in blotting paper; the incubation is achieved in the laboratory after moistening the small round disks with distilled water, without unwrapping them. Afterwards, they are put in plastic bags for moisture preservation; the incubation period lasts 8-10 days at a temperature of 15-18 °C.

The observations are done by examining the superior face of each small round disk with a binocular magnifying lens; the "colonies" of the *Heterobasidion annosum* fungi occurred after the germination of the basidiospores can be easily noted

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due to their cone shape *Spiniger meineckellus* (Olson) Stalpers, that presents this fungus, although it belong to Basidiomycotina; for the safety of determination, there can be make drawings on the small round disk that can be examined at the microscope.

There are written down the number of "colonies" on the surface of each small round disk, and the outputs are expresses in spores/dm^2/24 hours.

The limits of the fields of the potential of infection have been established in terms of the variation domain of its value:

0 - 3 colonies/dm^2/24 hours – very low infecting potential;

3,1 – 6 colonies/dm^2/24 hours – low infecting potential; 6,1 – 9 colonies/dm^2/24 hours – average infecting potential;

9,1 – 12 colonies/dm^2/24 hours – high infecting potential; over 12 colonies/dm^2/24 hours – very high infecting potential.

Outputs and discussions

The primary outputs are organized in table 1

Table 1 - Monthly variability of the number of colonies/dm^2 / 24 hours according to the location of the site of investigation

	May	June	July	August	September	October	November
Ilişeşti	1,1	0,9	1,1	1,7	3,1	2,6	1,4
Frasin	1,7	1,4	2,0	2,9	6,0	6,6	4,9
Vama	5,1	4,0	4,9	6,6	10,6	10,0	7,4
Câmpulung	8,3	6,3	5,7	10,3	13,7	12,6	9,1
Pojorâta	10,9	8,6	10,3	11,7	16,0	15,1	13,7
Valea Putnei	13,4	10,9	12,0	12,9	16,9	16,3	12,9
Mestecăniş	11,1	10,0	9,7	12,0	13,4	8,9	6,6
Mestecăniş (chalet)	5,7	4,9	5,4	3,1	4,3	3,4	2,6
Iacobeni	10,6	8,0	8,9	10,0	12,0	7,7	7,1

There are noticed important differences between various zones where the research took place. A simple analysis of variation shows that these differences are very significant from the statistic point of view ($F_{real} = 24,56^{***}$; $F_{crit.} = 2,115$).

These differences are given directly mainly by the percent of beech in the forest spaces located around the observation points.

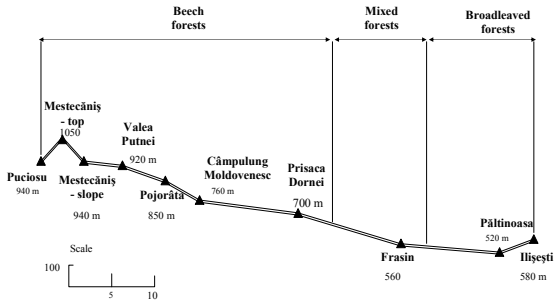

Fig. 1 - Vertical profile of the research network of the infecting potential at sub regional level (original)

In figure 2 it is described the chart of seasonal variation of the infecting potential proportional to the forestry formation:

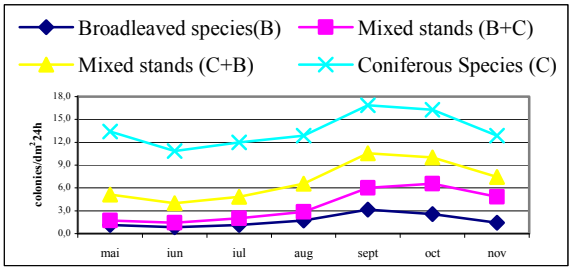

Fig. 2 - Monthly dynamics of the infection potential proportional to the vegetation zone

It is found out that in the beech zone the average of depositions is of 1,7 colonies/dm^2 with a variation coefficient of 49,06%; in the mixed forests where deciduous trees prevail the average of depositions is of 3,63 colonies/dm^2 with a variation coefficient of 58,98%; in the mixed forests where the beech trees prevail the average of depositions is of 6,93 colonies/dm^2 with a variation coefficient of 36,8% and in the zone of beech forests the average of depositions is of 13,59 colonies/dm^2 with a variation coefficient of 16,18%.

Another element considered in our analysis was the wind regime, because from the research made in Codrul Secular Slătioara we haven't obtained its precise influence over the infecting potential. Thus, for the three points situated on Obcina Mestecăniş it was made a separate analysis, from which came out very significant differentiation. In picture 3 it is shown the variation of the monthly amounts for the infecting potential in three different situations: Iacobeni – slope with wind, Mestecăniş (chalet) – windswept peak, Mestecăniş – slope under wind.

Although between the slope with wind (average: 9,18 colonies/dm^2; variation coefficient

19,4%) and the slope under wind (average: 10,2 colonies/dm^2; variation coefficient 21,7%) there were not noticed significant differences (F_{real} = 0,98; $F_{crit.}$= 4,74), between them and the peak there are very significant differences (F_{real} = 23,097***; $F_{crit.}$ = 3,55). (average: 4,2 colonies/dm^2; variation coefficient 28,4%).

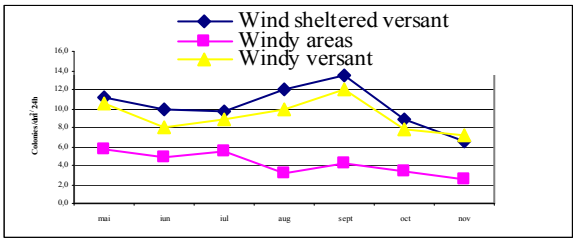

Fig. 3 - Monthly dynamics of the infection potential proportional to the propensity to wind sweeping

Conclusions

In the above-mentioned frame there can be explained why we haven't made correlation with altitude because this influences the researched phenomenon in an indirect way, through the distribution of vegetation and the correlation, although it is obvious, would have been an auto-correlation if we didn't take into consideration the wind sweeping.

The results obtained by expressivity and by flexibility proportional to the main factors of influence are pleading for the use of the small round disks method in monitoring the infecting potential of *Heterobasidion annosum* fungus and on large areas;

Determination of the intensity of infection with the spores of *Heterobasidion annosum* fungus, of its space and time variability and of the influence of the ecologic factors over these phenomena achieved by the method of small round disks emphasized the infecting potential at a yearly regime;

The application of the small round disks method in various field conditions at the level of plot, forest and sub regional shows that:

This method is very reliable and provides very good outputs, is easy to be applied in research aims as well as in practical aims;

The infecting potential has a specific annual regime with minimum values in the winter months and with maximum values in the month of September. Its rhythm of growing is quite slow until July and accelerates until September;

At macro space level – on the itinerary, there are noticed important differences regarding the infecting potential between various zones. These differences are mainly given by the proportion of participation of the beech trees at the brushes around the observation points;;

It is noticed a progressive growth of the average of spores depositions starting from the zone of the deciduous trees up to the brushes zone of pure spruce trees;

Another element shown by the macro space analysis is the influence of the wind regime in spores deposition. .

Rezumat

Răspândirea ciupercii *Heterobasidion annosum* (Fr.) Bref. prin spori poate fi pusă în evidență prin metoda rondelelor utilizată pe scară largă în străinătate (Delatour, 1972). În țara noastră a fost aplicată pentru prima dată în 1996 (Grudnicki, 2002). Metoda poate oferi foarte bune rezultate în direcția evaluării cantitative a potențialului de infecție mai ales în arboretele afectate de rănile produse de animale. În perimetrul județului Suceava se înregistra în anii 1970 o suprafață de peste 70000 hectare cu astfel de răni, arborete în care ciuperca *Heterobasidion annosum* căpătase o extindere deosebită (Ichim, 1990, 1993).

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MYCOCOENOLOGICAL *INVESTIGATIONS* IN DRĂGOIASA AND CRISTIŞOR PEAT BOGS (EASTERN CARPATHIANS)

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ABSTRACT

The peat bogs of Drăgoiasa and Cristişor are situated on a meadow of river Neagra Broştenilor (Eastern Carpathians). The mycocoenological investigations described were carried out on the plant associations accommodated on soils with excessive humidity: *Vaccinio–Pinetum sylvestris* Kleist 1929 (in Drăgoiasa peat bog), *Sphagno–Piceetum* Kuach 1954 (in Drăgoiasa and Cristişor peat bogs) and *Telekio speciosae–Alnetum incanae* Coldea 1990 (in Cristişor peat bog). These form homogeneous phytocoenoses in the investigated peat bogs. Within the three plant associations, 99 species of macromycetes were identified on terricolous, bryophilous and ligneous substrates. The analysis of ecological categories highlights the presence of acidophile (mycorrhizal and sphagnicolous) species associated with ligneous flora and peat moss.

Key words: macromycetes, peat bog, Drăgoiasa, Cristişor.

Introduction

Peat bogs form a special category of habitats in Europe, for which reason they are considered priority areas of floristic and faunal protection. The peat bogs of Drăgoiasa and Cristişor are situated on a meadow of river Neagra Broştenilor, which springs from Mount Măgura (Ujvari I., 1959) of Călimani Massif (Eastern Carpathians). Drăgoiasa peat bog is found in the immediate vicinity of the homonymous village, on the territory of commune Păltiniş, Suceava county, on the left shore of river Neagra Broştenilor (47°09'13,3" N; 25°26'40,6" E), at an altitude of 1020–1030 meters.

The Cristişor peat bog is located, from an administrative point of view, on the south–eastern border of Suceava county, at a distance of approximately 11 km E–SE to Drăgoiasa and of 8 km S–SW from the confluence of rivers Negrişoara and Neagra Broştenilor (47°08'49,5" N; 25°36'52,2" E), at an altitude of 815 meters. The peat bog has a surface of 16 hectares and forms a unilateral meadow at the entrance of Omul brook, a left–side affluent, up to the embouchure of Cristişor brook, a right–side affluent (Pop, 1960).

Studies on the flora and vegetation of the two peat bogs have been carried out by Ştefureac and collaborators (1963) for Drăgoiasa and by Lungu (1971) for Cristişor.

Previous references to the mycobiota of the two peat bogs under the present study are scarce; the literature mentions the presence of only two species, *Arrhenia sphagnicola* and *Cortinarius huronensis*, as published by Silaghi and Ştefureac in 1969.

Material and Methods

Mycological observations were carried out, over the period between August 2004 and September 2007, on the ligneous plant associations in the oligotrophic peat bogs of Drăgoiasa and Cristişor. For the characterization of mycocoenoses, there were selected homogeneous surfaces, not having been subject to anthropic pressure, with an area of 500 sq. m in quadrangles of 50x10 m or of 20x25 m, function of phytocoenotic configuration (Chifu, 1970).

For highlighting the degree of similarity between the investigated mycocoenoses, Jaccard's index of coenotic similarity was calculated (Varvara and col., 2001).

In the mycocoenological tables, for each individual species the ecological category and the biological form were specified. For identifying the macromycetes species, the specialized literature presenting identification clues and species diagnosis was resorted to (Borgarino, Hurtado, 2001; Courtecuisse, Duhem, 1994; Galli, 1996; Roux, 2006, Sălăgeanu, 1985).

The species nomenclature follows Kirk and collaborators. The analyzed specimens were submitted to the Herbarium collection of the Faculty of Biology within "Alexandru Ioan Cuza" University of Iaşi [I].

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Results and discussions

Mycocoenological investigations were performed on the plant associations accommodated on soils with excessive humidity: *Vaccinio–Pinetum sylvestris* Kleist 1929 (in Drăgoiasa peat bog), *Sphagno–Piceetum* Kuach 1954 (in Drăgoiasa and Cristişor peat bogs) and *Telekio speciosae–Alnetum incanae* Coldea 1990 (in Cristişor peat bog). These form homogeneous phytocoenoses in the investigated peat bogs.

The diversity of macromycetes is determined by the structure of each individual phytocoenosis. Thus, an important part is played by the ligneous vegetation, the composition of the moss layer and the type of soil developed by fungi.

Within the three plant associations, 99 species of macromycetes were identified on terricolous, bryophilous and ligneous substrates (**Table 1)**. Most of the species were inventoried in the spruce fir–based phytocenoses (63), while in the association *Vaccinio–Pinetum sylvestris* 35 species were identified. The lowest diversity was registered in association *Telekio speciosae–Alnetum incanae*, with 19 species of macromycetes.

The spectrum of ecological categories reflects the numerical superiority of saprophytic species (**Figure 1**). It is worth noting the high number of lignicolous, saprophytic and saproparasitic species on the wood of deciduous and coniferous species. The diversity thereof is mainly determined by the ligneous essence involved. Lignicolous macromycetes in the peat bogs under study are represented by 36 species identified on coniferous wood: *Pinus sylvestris*, *Picea abies*, as well as on deciduous wood: *Betula pendula, Betula pubescens* and *Alnus incana*.

The dominance of coniferous species in high–altitude peat bogs causes a high diversity of lignicolous macromycetes that develop on such substrate. The high humidity of the habitats and the fact that fallen trees are not eliminated constitute favorable factors for the installation and development of lignicolous macromycetes. On coniferous wood 21 species were identified, while on deciduous wood 14 species were inventoried.

The highest diversity of lignicolous macromycetes was registered in the association *Sphagno–Piceetum*, with 19 inventoried species. Among these was an abundance of registered species: *Climacocystis borealis*, *Gloephyllum sepiarium*, *Hypholoma capnoides* and *Xeromphalina campanella*.

In the association *Telekio speciosae–Alnetum incanae* 13 species of lignicolous macromycetes were inventoried, out of which some are specific for deciduous species, being identified on alder tree: *Armillaria mellea*, *Exidia glandulosa*, *Kuehneromyces mutabilis*, *Mycena inclinata*, *Phellinus igniarius*, *Plicaturopsis crispa* and *Stereum gausapatum*.

The spectrum of ectomycorrhizal macromycetes in the investigated peat bogs shows a numerical superiority of species associated with spruce fir, followed by those mycorrhizing with pine, birch and alder trees. These are adapted to development on acid soil with excessive humidity.

In the association *Sphagno–Piceetum* the highest number of ectomycorrhizal species associated with spruce fir and birch was registered. Among these, abundance was observed in the case of these species: *Amanita fulva, Lactarius glyciosmus, Rozites caperatus, Russula decolorans* and *Russula paludosa*.

In the association *Telekio speciosae–Alnetum incanae* four ectomycorrhizal species were identified, of which *Gyrodon lividus, Naucoria escharioides* and *Paxillus filamentosus* are strictly associated with alder.

The moss layer, well developed in the associations of *Sphagno–Piceetum* and *Vaccinio–Pinetum sylvestris*, represents a favorable substrate for the development of sphagnicolous species. Among these, a high occurrence was registered for species *Arrhenia sphagnicola*, *Galerina paludosa* and *Hypholoma elongatum*. Of the macromycetes parasitic on *Sphagnum* moss, the species *Tephrocybe palustris* was identified.

From the category of litter decomposing macromycetes, three saprophytic species were identified on spruce fir tree leaves: *Marasmius androsaceus*, *Micromphale perforans* and *Mycena rosella*. A high frequency was observed for species *Marasmius androsaceus* and *Mycena rosella*.

The presence of excrements from wild animals inducts a mycobiota specific to this type of substrate represented by the coprophilous species: *Bolbitius vitellinus, Coprinopsis nivea, Panaeolus semiovatus, Panaeolus sphinctrinus* and *Stropharia semiglobata*.

In order to determine the degree of similarity between the investigated mycocoenoses, Jaccard's index of coenotic similarity was calculated and the data obtained were rendered graphically in the form of a dendrogramme (**Figure 2**).

A similarity degree of 18,07% was observed between the mycocoenoses of plant associations *Sphagno–Piceetum* (1) and *Vaccinio–Pinetum sylvestris* (2).

The similarity is due to common species being present in both associations, such as:

- mycorrhizal macromycetes of birch, present in both phytocoenoses: *Cortinarius cinnamomeus*, *Hebeloma helodes*, *Hebeloma mesophaeum*, *Lactarius glyciosmus*, *Lactarius uvidus*, *Lactarius turpis* and *Russula claroflava*. A strong influence of the birch tree on the mycobiota composition of the two compared associations can be noticed;

- mycorrhizal macromycetes of pine and spruce fir: *Amanita fulva*, *Boletus badius*, *Cortinarius huronensis*, *Paxillus involutus*, *Russula decolorans*, *Russula emetica*, *Russula paludosa* and *Thelephora terrestris*;

- bryophilous macromycetes, developing on *Sphagnum* species: *Hypholoma elongatum*, *Galerina paludosa* and *Galerina sphagnorum*;

- lignicolous macromycetes, developing on the wood of coniferous (pine and spruce fir) and deciduous (birch) trees.

A low similarity, 2,83%, can be observed between the association *Telekio speciosae–Alnetum incanae* and the other investigated associations. This is explained by the different floristic composition of the former.

Conclusions

Mycological investigations on the ligneous plant associations in the peat bogs of Drăgoiasa and Cristişor led to the identification of 99 species;

Most of the species (64) were signaled in the association *Sphagno–Piceetum*, which is well represented in the Cristişor site with 54 species, while 19 species were inventoried at Drăgoiasa;

On the surfaces covered by *Vaccinio–Pinetum sylvestris*, 35 species of macromycetes were identified at Drăgoiasa, of which only *Suillus variegatus* is exclusively associated with the pine tree;

In the association of *Telekio speciosae–Alnetum incanae* 19 species were inventoried, the influence of alder tree on the mycobiota being illustrated by species: *Gyrodon lividus*, *Naucoria escharioides* and *Paxillus filamentosus*;

In the associations based on pine and spruce fir, the presence of birch is well distinguished by the occurrence of the following species: *Cortinarius cinnamomeus*, *Cortinarius hemitrichus*, *Hebeloma helodes*, *Hebeloma mesophaeum*, *Lactarius glyciosmus*, *Lactarius turpis*, *Lactarius uvidus* and *Russula claroflava*;

The macromycetes specific to peat bogs are represented by mycorrhizal and sphagnicolous species such as: *Cortinarius huronensis*, *Galerina paludosa*, *Galerina sphagnorum*, *Lactarius helvus*, *Russula decolorans*, *Russula paludosa* and *Tephrocybe palustris*.

Rezumat

Mlaştinile de la Drăgoiasa şi de la Cristişor sunt situate în lunca râului Neagra Broştenilor (Carpaţii Orientali). Investigaţiile micocenologice au fost realizate în cadrul asociaţiilor vegetale instalate pe soluri cu exces de umiditate: *Vaccinio–Pinetum sylvestris* Kleist 1929 (din mlaştina Drăgoiasa), *Sphagno–Piceetum* Kuach 1954 (din mlaştinile Drăgoiasa şi Cristişor) şi *Telekio speciosae–Alnetum incanae* Coldea 1990 (din mlaştina Cristişor). Acestea formează fitocenoze omogene în mlaştinile investigate. În cadrul acestor trei asociaţii vegetale au fost identificate 99 specii de macromicete din sinuziile tericolă, muscinală şi lignicolă. Analiza categoriilor ecologice evidenţiază prezenţa speciilor acidofile (micorizante şi sfagnicole), asociate florei lemnoase şi muşchiului de turbă.

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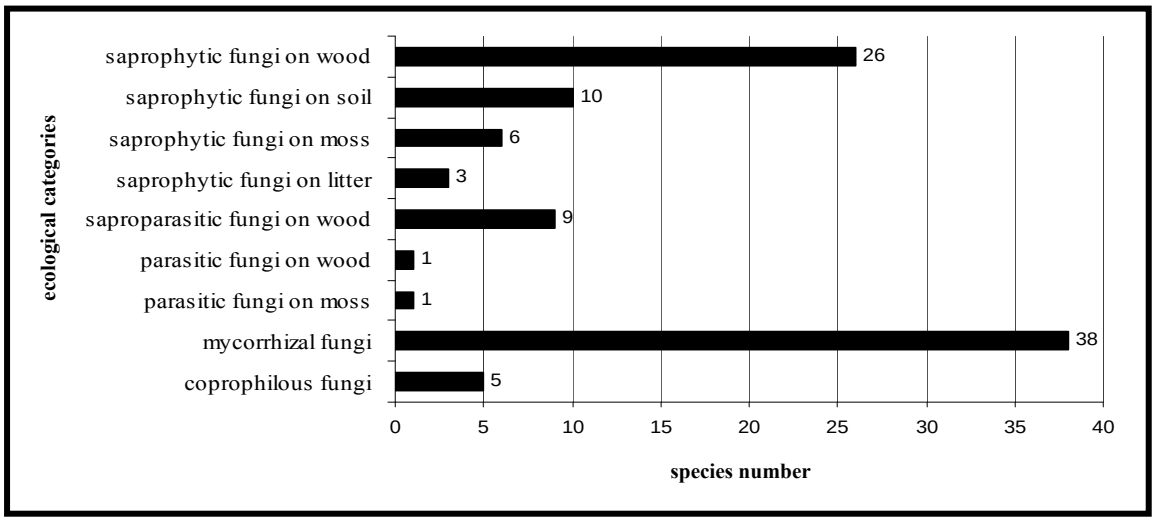

Fig. 1 - The Spectrum of Ecological Categories

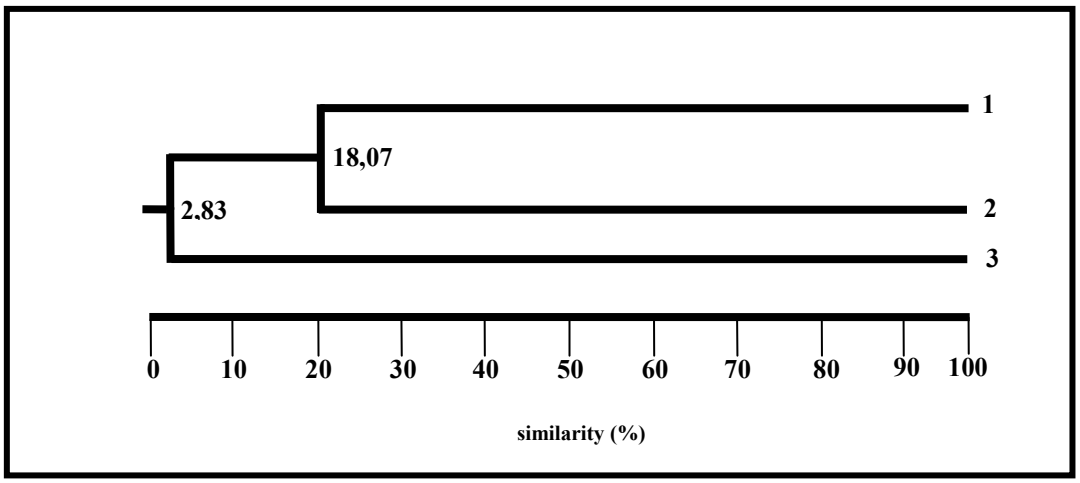

Fig. 2 - The Dendrogramme of Similarity Degree

Table 1 - The Macromycetes Species List from Drăgoiasa and Cristişor Peat Bogs

No.	Ecological Categories	Biological Form	Species	Ass. 1		Ass. 2	Ass. 3
				D	C	D	C
1.	M	Gm	*Amanita battarrae* (Boud.) Bon		+		
2.	M	Gm	*Amanita fulva* (Schaeff.) Fr.		+	+	
3.	M	Gm	*Amanita vaginata* (Bull.) Lam.	+			
4.	Sl	EPx	*Arcyria incarnata* (Pers.) Pers.		+		
5.	SPl	Ex-EPx	*Armillaria mellea* (Vahl) P. Kumm.				+
6.	SPl	Ex-EPx	*Armillaria ostoyae* (Romagn.) Herink		+		
7.	Sbr	EPbr	*Arrhenia sphagnicola* (Berk.) Redhead, Lutzoni, Moncalvo & Vilgalys			+	
8.	Sc	Th	*Bolbitius vitellinus* (Pers.) Fr.			+	
9.	M	Gm	*Boletus edulis* Bull.		+		
10.	Sh	Gs	*Bovista plumbea* Pers.				+
11.	Sl	EPx	*Calocera cornea* (Batsch) Fr.			+	
12.	Sl	EPx	*Calocera palmata* (Schumach.) Fr.	+			
13.	Sl	EPx	*Ceratiomyxa fruticulosa* (O.F. Müll.) T. Macbr.			+	
14.	Sh	Gs	*Clavulina coralloides* (L.) J. Schröt.			+	
15.	SPl	Ex-EPx	*Climacocystis borealis* (Fr.) Kotl. & Pouzar		+		
16.	Sh	Th	*Conocybe tenera* (Schaeff.) Fayod			+	
17.	Sc	Th	*Coprinopsis nivea* (Pers.) Redhead, Vilgalys & Moncalvo			+	
18.	M	Gm	*Cortinarius cinnamomeus* (L.) Fr.			+	
19.	M	Gm	*Cortinarius collinitus* (Pers.) Fr.			+	
20.	M	Gm	*Cortinarius flexipes* (Pers.) Fr.		+		
21.	M	Gm	*Cortinarius hemitrichus* (Pers.) Fr.		+		
22.	M	Gm	*Cortinarius huronensis* Ammirati & A.H. Sm.		+	+	
23.	M	Gm	*Cortinarius malicorius* Fr.		+	+	
24.	M	Gm	*Cortinarius paleaceus* (Weinm.) Fr.	+	+		
25.	M	Gm	*Cortinarius sanguineus* (Wulfen) Fr.		+		
26.	M	Gm	*Cortinarius scaurus* (Fr.) Fr.		+		
27.	M	Gm	*Cortinarius stillatitius* Fr.		+	+	
28.	Sl	EPx	*Crucibulum laeve* (Huds.) Kambly				+
29.	Sh	Gs	*Cystoderma amianthinum* (Scop.) Fayod		+		
30.	Sl	EPx	*Dacrymyces stillatus* Nees		+		
31.	Sl	EPx	*Exidia glandulosa* (Bull.) Fr.				+
32.	SPl	Ex-EPx	*Fomitopsis pinicola* (Sw.) P. Karst.		+		+
33.	Sh	Gs	*Galerina hypnorum* (Schrank) Kühner			+	
34.	Sbr	EPbr	*Galerina paludosa* (Fr.) Kühner	+	+	+	
35.	Sbr	EPbr	*Galerina sphagnorum* (Pers.) Kühner		+	+	
36.	Sbr	EPbr	*Galerina vittiformis* (Fr.) Earle	+			
37.	Sl	EPx	*Gloeophyllum abietinum* (Bull.) P. Karst.	+			
38.	Sl	EPx	*Gloeophyllum odoratum* (Wulfen) Imazeki		+		
39.	Sl	EPx	*Gloeophyllum sepiarium* (Wulfen) P. Karst.	+	+	+	
40.	M	Gm	*Gyrodon lividus* (Bull.) Fr.				+
41.	M	Gm	*Hebeloma helodes* J. Favre		+		
42.	M	Gm	*Hebeloma mesophaeum* (Pers.) Quél.			+	
43.	M	Gm	*Hygrophorus persicolor* Ricek		+		
44.	Sl	EPx	*Hypholoma capnoides* (Fr.) P. Kumm.		+		
45.	Sbr	EPbr	*Hypholoma elongatum* (Pers.) Ricken		+	+	
46.	M	Gm	*Inocybe geophylla* (Pers.) P. Kumm.				+
47.	Sl	EPx	*Ischnoderma benzoinum* (Wahlenb.) P. Karst.	+			
48.	SPl	Ex-EPx	*Kuehneromyces mutabilis* (Schaeff.) Singer & A.H. Sm.				+
49.	Sh	Gs	*Laccaria laccata* (Scop.) Cooke	+	+		
50.	M	Gm	*Lactarius deterrimus* Gröger		+	+	
51.	M	Gm	*Lactarius glyciosmus* (Fr.) Fr.		+		
52.	M	Gm	*Lactarius helvus* (Fr.) Fr.	+	+	+	
53.	M	Gm	*Lactarius rufus* (Scop.) Fr.	+	+		
54.	M	Gm	*Lactarius theiogalus* (Bull.) Gray		+		
55.	M	Gm	*Lactarius turpis* Fr.	+	+		
56.	M	Gm	*Lactarius uvidus* (Fr.) Fr.	+			
57.	M	Gm	*Lactarius vietus* (Fr.) Fr.		+		
58.	SPl	Ex-EPx	*Lycoperdon pyriforme* Schaeff.	+			+

No.	Ecological Categories	Biological Form	Species	Ass. 1		Ass. 2	Ass. 3
				D	C	D	C
59.	Sf	Gs	*Marasmius androsaceus* (L.) Fr.		+		
60.	Sf	Gs	*Micromphale perforans* (Hoffm.) Gray		+	+	
61.	Sl	EPx	*Mycena epipterygia* (Scop.) Gray		+		
62.	Sh	Gs	*Mycena galopus* (Pers.) P. Kumm.		+	+	+
63.	Sl	EPx	*Mycena haematopus* (Pers.) P. Kumm.		+		
64.	Sl	EPx	*Mycena inclinata* (Fr.) Quél.				+
65.	Sh	Gs	*Mycena rorida* (Scop.) Quél.			+	
66.	Sf	Gs	*Mycena rosella* (Fr.) P. Kumm.		+		
67.	M	Gm	*Naucoria escharioides* (Fr.) P. Kumm.				+
68.	Sbr	EPbr	*Omphalina ericetorum* (Bull.) M. Lange		+		
69.	Sc	Th	*Panaeolus semiovatus* (Sowerby) S. Lundell & Nannf.			+	
70.	Sc	Th	*Panaeolus sphinctrinus* (Fr.) Quél.			+	
71.	Sl	EPx	*Panellus mitis* (Pers.) Singer		+		
72.	Sl	EPx	*Panellus stipticus* (Bull.) P. Karst.				+
73.	M	Gm	*Paxillus filamentosus* Fr.				+
74.	M	Gm	*Paxillus involutus* (Batsch) Fr.	+	+		
75.	Pl	Ex	*Phellinus igniarius* (L.) Quél.				+
76.	Sl	EPx	*Phlebia radiata* Fr.				+
77.	Sl	EPx	*Pholiota lenta* (Pers.) Singer		+		
78.	Sh	Gs	*Pholiota scamba* (Fr.) M.M. Moser			+	
79.	Sl	EPx	*Pholiota spumosa* (Fr.) Singer			+	
80.	Sl	EPx	*Plicaturopsis crispa* (Pers.) D.A. Reid				+
81.	Sl	EPx	*Pluteus hispidulus* (Fr.) Gillet			+	
82.	Sl	EPx	*Pluteus umbrosus* (Pers.) P. Kumm.		+		
83.	Sl	EPx	*Pseudohydnum gelatinosum* (Scop.) P. Karst.		+		
84.	M	Gm	*Rozites caperatus* (Pers.) P. Karst.		+		
85.	M	Gm	*Russula claroflava* Grove		+		
86.	M	Gm	*Russula decolorans* (Fr.) Fr.	+	+	+	
87.	M	Gm	*Russula emetica* (Schaeff.) Pers.	+	+	+	
88.	M	Gm	*Russula mustelina* Fr.	+			
89.	M	Gm	*Russula paludosa* Britzelm.		+		
90.	SPl	Ex-EPx	*Schizophyllum commune* Fr.				+
91.	Sl	EPx	*Scutellinia scutellata* (L.) Lambotte		+		
92.	SPl	Ex-EPx	*Stereum gausapatum* (Fr.) Fr.				+
93.	SPl	Ex-EPx	*Stereum hirsutum* (Willd.) Pers.		+		
94.	Sh	Gs	*Stropharia melanosperma* (Bull.) Bres.	+			
95.	Sc	Gs	*Stropharia semiglobata* (Batsch) Quél.			+	
96.	M	Gm	*Suillus variegatus* (Sw.) Kuntze			+	
97.	Pbr	Ebr	*Tephrocybe palustris* (Peck) Donk			+	
98.	M	Gm	*Thelephora terrestris* Ehrh.		+	+	
99.	Sl	EPx	*Xeromphalina campanella* (Batsch) Maire		+		

coprophilous fungi (Sc): 5
mycorrhizal fungi (M): 38
parasitic fungi on moss (Pbr): 1
parasitic fungi on wood (Pl): 1
saproparasitic fungi on wood (SPl): 9
saprophytic fungi on litter (Sf): 3
saprophytic fungi on moss (Sbr): 6
saprophytic fungi on soil (Sh): 10
saprophytic fungi on wood (Sl): 26

mycetoendobriophyta (Ebr): 1
mycetoendoxilophyta - mycetoepixilophyta (Ex– Epx): 9

mycetoendoxilophyta (Ex): 1

mycetoepibriophyta (Epbr): 6

mycetoepixilophyta (Epx): 26

mycetogeophyta mycorrhiza (Gm): 38

mycetogeophyta saprophytica (Gs): 13
mycetotherophyta (Th): 5

Ass. 1: – *Sphagno– Piceetum* association
Ass. 2: – *Vaccinio– Pinetum sylvestris* association
Ass. 3: – *Telekio speciosae–Alnetum incanae* association

D: – Drăgoiasa peat bog
C: – Cristişor peat bog

Place and date of observations: Cristişor – 23.09.2006, 1.07.2007; Drăgoiasa – 7.08.2004, 1.07.2005, 1.10.2005, 1.07.2007, 29.07.2007, 2.10.2007.

COMPLEXUL MUZEAL DE ŞTIINȚELE NATURII „ION BORCEA" BACĂU

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THE KOELERIO LOBATAE BURDUJA ET HOREANU 1976 ASSOCIATION ON TULCEA HILLS

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ABSTRACT

The authors present the *Koelerio lobatae – Thymetum zygioides* Burduja et Horeanu 1976 association identified on Tulcea Hills. The association is described in terms of chorology, stationary conditions, floral and phytosociological composition.

Key words: ecology, floral and phytosociological composition.

Introduction

The research performed between 2005 and 2008 revealed the fact that the vegetation on Tulcea Hills has not interested researchers much [1, 10]. Our studies led to the identification of the *Koelerio lobatae – Thymetum zygioides* Burduja et Horeanu 1976 association which has not been mentioned before in this area.

We mention that this association has been published under the name *Agropyro brandzae - Thymetum zygioides* Dihoru et Doniță 1970 from Babadag Plane [6] in which the *Agropyron brandzae* species has a IV stability. In the phytocenoses on Tulcea Hills, the *Agropyron brandzae* species has not been identified so far, and therefore we believe that the designation used in this paper is more adequate, being adopted by Cl. Horeanu [8] as well. Taking into account the priority of the names given by Dihoru and Doniță in 1970, the name accepted by us can be seen as a synonym, and, given the nomenclature and the phytosociological classification [4, 11], the association falls within the following cenosystem:

Cl. Festuco-Brometea Br.- Bl. et R.Tx. ex Klika et Hadac 1944

Ord. Festucetalia valesiacae Br.-Bl. et R.Tx. ex Br. - Bl. 1949

Al.Pimpinello – Thymion zygioides (Dihoru 1970) Dihoru et Doniță 1970

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Material and methods

Research was consisted in ground surveys performed according to the principles of Central European School [2]. The taxonomic terminology, the biological forms and the phyto-geographical elements are those used by Ciocârlan [5]. Regarding the cenosystem, the framings in T. Chifu[4] have been used.The analysis of the ecological indexes was based on the system adopted by Ellemberg H.[7].

Results and discussions

Chorology. The phytocenoses of the association have been identified on Stânca Mare (The Big Rock), Agighiol, Pietriș (Gravel), Găvana Mică and Murighiol Hills. The highest degree of coverage is on Stânca Mare and Găvana Mică Hills.

Stationary conditions. The phytocenoses in *Koeleria lobata* and *Thymus zygioides* develop on very dry lands with surface calcareous rocks, at an average height of 120 m, oriented mostly towards the North and with an average slope of 20°.

Floral and phytosociological composition. In point of floral and phytosociological composition, the association is rich in species (115 species), but the mean on the survey is rather low (26 species) due to restrictive stationary conditions, scarce vegetation (65% on average) and the testing surface of around 65 sqm (table 1). This is also reflected by the constancy of the species, as follows: only four species (*Artemisia austriaca, Festuca valesiaca, Koeleria lobata, Thymus zygioides)* have a high constancy while 17 species (*Eryngium campestre, Euphorbia glareosa ssp. dobrogensis, Agropyron cristatum ssp. pectinatum, Teucrium polium ssp. capitatum, Dianthus nardiformis, Festuca callieri, Sanguisorba minor, Euphorbia segueriana,*

Minuartia adenotricha, etc.) are under-constant (III) and more than 80% have a low constancy (I,II).

The phytocenotic structure is relatively complex and the cenotic structure participates to some species characteristic to the *Koelerio-Corynepharetea, Quercetea pubescentis, Artemisetea, Stellarietea mediae, etc.,* classes, although the clear dominance (over 70%) of the species characteristic to the *Festuco Brometea* class is obvious.

The association also has a significant conservative value through the presence of 27 rare or vulnerable species (around 24%), mostly present in the composition of the *Jurineo- Euphorbinenion* sub-alliance and *Stipion lessingianae* şi *Pimpinello – Thymion zygioides* [9] alliances (*Tanacetum millefolium, Stipa ucrainica, Hyacinthella leuchophaea, Convolvulus lineatus, Allium saxatile, Festuca callieri, Campanula romanica – endemism dobrogean,* etc.). The species in *Koeleria lobata* and *Thymus zygioides* are also rare.

The spectrum of the bioforms (fig.1) points to the dominance of the hemychryptophytes in a percentage of 56.52%, followed by therophytes 19.13%, chamaephytes 6.95%, geophytes 5.21% and phanerophytes 2.6%.

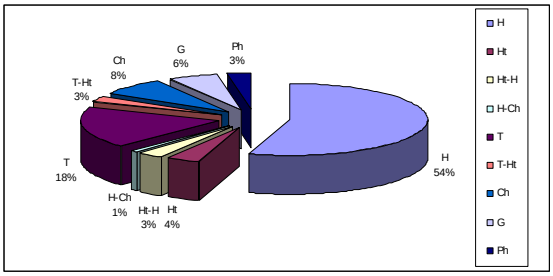

Fig. 1 - The spectrum of the bioforms
H-hemicryptophytes, G-geophytes, Ch-chamephyte, Ph-phanerophytes, T-therophytes, Ht-hemitherophytes

The spectrum of the floral elements (fig.2) is dominated by Eurasian (33.04%) and Pontic elements (29.51%), followed by the European ones with 11.3%, Balkan 3.47%, Mediterranean 3.47%, Sub-Mediterranean 1.73%, Cosmopolite 1.73%, Circumpolar and Atlantic-Mediterranean 0.86% each.

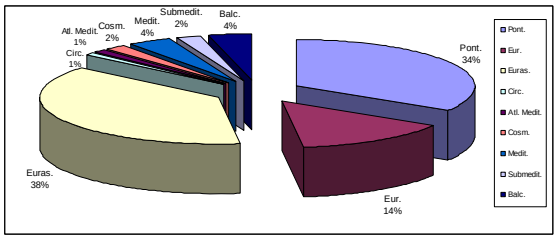

Fig. 2 - The spectrum of the floral elements
Euras. - Euro-Asian, Eur. - European, Circ. - circumpolar, Atl.Medit. – Atlantic Mediterranean, Medit – Mediterranean, Smd - Sub-Mediterranean, Balc-Balkan, Cosm-ubiquist, Pont-pontic

The spectrum of the ecological parameters (fig.3) reveals the following situation: taking into consideration light preferences, the heliofile species which do not bear shading too well, are the most numerous, followed by the species from the intermediate level (L= 6) of semi-shading. With respect to heat preferences, the most numerous are the plants widespread in temperate and warm areas. Taking into consideration soil humidity, the majority is held by mezofile species and by those developing on moderately wet soils.

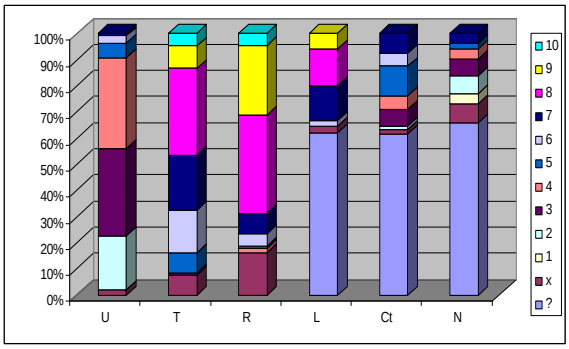

Fig. 3 - The spectrum of the ecological parameters

Conclusions

The association *Koelerio lobatae – Thymetum zygioides* is very similar with the association described by other authors from Dobrogea.

However, there has not been identified so far, within the floral composition, a series of species well spread in this association from Dobrogea, (*Pimpinella tragium ssp. litophila, Potentilla taurica, Paeonia tenuifolia, Artemisia lerchiana, Alyssum minitum, Colchicum fominii, Crocus pallasii, Astragalus ponticus,*etc.), but other species, widespread in North Dobrogea, could be added (*Digitalis lanata, Serratula radiata, Onobrychis gracile,* etc.).

We also specify that around 70% of the listed species from Babadag and Casimcea Planes are to be found in the floral composition of the association on Tulcea Hills.

Rezumat

Regiunea Dealurilor Tulcei a fost puțin studiată atât din punct de vedere floristic cât şi fitocenologic. Prin cercetările efectuate de noi, în această zonă au fost identificate peste 700 de specii de plante şi 50 de asociații vegetale. Una dintre acestea este asociația *Koelerio lobatae – Thymetum zygioides* Burduja et Horeanu 1976.

Asociația este relativ bogată în specii (115) din care peste 70% sunt specii caracteristice clasei *Festuco-Brometea.*

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Table 1 - As. Koelerio lobatae - Thymetum zygioides Burduja et Horeanu 1976

Rélevee no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Height (m.s.m.)	140	135	165	160	160	80	70	70	60	70	85	80	70	70	200	160	195	200	160	15	
Orientation	N	N	N	NV	NV	S	NE	NE	N	N	V	V	NE	NE	E	E	NE	NE	NV	SV	
Slope (degrees)	15	30	25	20	20	5	5	5	5	5	20	15	20	20	40	45	45	15	30	20	K
Covering of grassy stratum (%)	60	50	70	40	50	80	80	80	60	70	60	60	60	80	50	50	90	50	90	50	
Surface (m²)	50	50	50	50	50	100	100	80	50	100	50	50	50	50	50	50	100	80	100	50	
No. of species	28	24	27	26	27	24	30	27	30	25	25	24	23	25	22	28	27	28	24	25	
Caract. de as.																					
Koeleria lobata	3	3	3	2	3	2	3	3	2	3	1	3	3	1	+	+	2	+	1	+	V
Pimpinello-Thymion zygioides																					
Allium saxatile	-	-	-	-	-	+	-	-	-	-	+	+	+	-	-	+	-	-	-	-	II
Campanula romanica	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	+	-	-	I
Dianthus nardiformis	+	+	1	1	1	-	+	-	+	+	-	-	+	+	-	+	-	+	-	-	III
Euphorbia myrsinites ssp. litardierei	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	+	-	+	-	I
Festuca callieri	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	+	-	-	II
Minuartia adenotricha	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	III
Sedum caespitosum	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	I
Sedum urvillei ssp. hillebrandtii	-	+	+	+	+	-	+	-	+	+	-	-	-	+	+	+	-	+	+	-	III
Thymus zygioides	1	1	1	1	1	3	2	2	1	1	3	1	1	1	3	2	4	3	4	3	V
Jurineo arachnoideae-Euphorbinenion																					
Achillea coarctata	-	+	+	+	-	-	+	-	-	-	-	+	-	-	+	-	-	-	-	+	II
Achillea nobilis ssp. neilreichii	+	-	-	+	-	-	+	+	-	+	-	+	-	-	-	-	+	+	+	-	II
Alyssum hirsutum	+	-	-	+	+	-	-	-	+	-	+	+	-	-	+	+	+	+	+	+	III
Digitalis lanata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	I

Eryngium campestre	-	-	-	-	-	+	-	+	+	+	+	-	+	+	-	-	+		+	+	III
Euphorbia glareosa ssp. dobrogensis	+	+	+	+	+	-	-	+	+		+	-	1	-	-	-	+	-	-	+	III
Galium octonarium	-	+	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	I
Haplophyllum suaveolens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	I
Hyacinthella leucophaea	-	-	-	-	-	+	+	+	-	-	-	-	+	-	-	-	-	-	-	-	I
Jurinea arachnoidea	-	-	+	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	I
Stipa ucrainica	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I
Tanacetum millefolium	-	-	-	-	-	-	1	+	-	-	-	+	-	-	-	-	-	-	+	-	I
Taraxacum serotinum	-	+	+	+	-	-	-	+	+	+	+	+	-	-	+	-	-	+	+	-	III

Festucion valesiacae

Agropyron cristatum ssp. pectinatum	-	+	+	+	+	-	+	+	+	-	+	-	-	-	-	2	_+	+	-	-	III
Ajuga laxmanii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	I
Allium flavum	-	-	-	-	-	+	-	-	-	-	+	+	-	-	-	-	-	-	-	-	IV
Artemisia austriaca	+	+	+	+	-	+	+	+	-	+	+	+	+	-	+	-	-	-	+	+	II
Asperula cynanchica	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	II
Astragalus onobrychis	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	I
Chondrilla juncea	-	-	-	+	-	-	+	-	-	+	-	-	-	-	+	-	-	-	-	-	I
Euphorbia segueriana	-	-	-	-	-	-	-	+	+	+	+	-	+	-	-	-	+	+	+	+	III
Hypericum elegans	-	-	-	-	-	+	+	+	+	+	-	-	-	-	-	-	+	-	-	-	II
Koeleria macrantha	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	I
Linaria genistifolia	-	-	-	-	+	-	-	+	-	-	-	-	-	+	-	-	+	-	-	-	I
Linum tenuifolium	-	-	-	-	-	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	II
Medicago falcata	-	+	+	+	+	-	-	-	-	-	-	-	-	+	+	-	-	-	+	-	II
Potentilla recta	+	-	+	+	+	+	-	+	-	+	+	-	+	-	-	+	-	-	+	+	III
Sanguisorba minor	+	+	-	-	-	+	-	-	-	-	+	+	+	-	-	+	+	-	+	+	III
Serratula radiata	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I
Seseli peucedanifolium	-	-	-	-	-	+	-	-	1	-	+	+	-	+	-	-	-	-	-	-	II
Silene spergulifolia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I
Stachys recta	+	-	+	-	+	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	II

Teucrium chamaedrys	+	-	1	-	-	+	-	-	-	-	+	+	+	-	+	+	+	+	-	-	III
Teucrium polium ssp. capitatum	+	+	-	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	III
Thlapsi perfoliatum	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	I

Stipion lessingianae

Convolvulus lineatus	-	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	+	-	II
Seseli gracile	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	II
Stipa lessingiana	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I

Festucetalia valesiacae

Adonis vernalis	-	-	-	-	-	+	-	+	-	-	-	-	+	-	-	-	-	-	-	-	I
Allium oleraceum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	I
Anthyllis vulneraria	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I
Campanula sibirica	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I
Cerastium semidecandrum	-	-	-	-		-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	II
Festuca valesiaca	-	-	+	-	-	-	+	+	-	-	-	+	+	3	-	+	+	+	-	+	IV
Galium verum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	I
Hieracium bauhinii	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	+	+	I
Linum austriacum	-	-	-	+	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+	II
Melica ciliata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	I
Minuartia setacea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	I
Orlaya grandiflora	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	I
Ornithogalum orttophyllum ssp. kochii	-	-	-	-	-	-	+	-	-	-	+	-	+	-	-	-	-	-	-	-	I
Ornithogalum sibthorpii	-	-	+	-	-	-	+	-	+	-	+	-	-	-	-	-	-	-	-	-	II
Phleum phleoides	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	I
Siderites montana	+	+	+	-	-	+	-	-	-	+	-	+	+	+	+	+	+	-	+	-	III
Trifolium campestre	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	II
Verbascum banaticum	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I
Verbascum chaixii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	I
Vinca herbacea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	I

Stipo pulcherrimae-Festucetalia pallentis

Anthemis tinctoria ssp. tinctoria	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I
Paronychia cephalotes	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	II

Festucetalia vaginatae

Astragalus cornutus	-	-	-	-	-	+	-	-	-	+	-	-	+	-	-	-	-	-	-	-	I
Bromus squarrosus	-	-	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	I
Bromus tectorum	-	+	+	-	-	-	+	+	+	+	+	-	-	+	+	+	-	-	-	+	III
Echinops ruthenica	+	-	-	-	-	+	+	-	-	-	-	+	-	+	-	-	-	-	-	-	II
Onosma visianii	+	+	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	II

Festuco Brometea

Acinos arvensis	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	I
Asperula tenella	-	-	-	-	-	-	+	-	+	-	+	-	-	+	-	-	-	-	-	+	II
Centaurea diffusa	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	I
Crepis foetida ssp. rhoaedifolia	-	+	-	-	-	+	+	-	-	-	-	+	-	-	-	-	-	-	-	-	I
Cuscuta epithymum	-	-	-	-	-	-	-	-	-	+	-		-	-	-	-	-	-	-	-	I
Herniaria inana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	I
Kohlrauschia prolifera	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	I
Onobrychis gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	I
Plantago lanceolata	-	+	-	-	+	-	+	+	-	-	+	-	+	-	-	-	+	-	-	-	II
Poa angustifolia	-	+	-	+	-	-	-	-	-	-	-	-	-	-	1	-	-	+	1	-	II
Poa bulbosa	+	+	-	-	+	+	+	-	+	-	-	-	+	+	-	+	-	+	-	-	III

Koelerio- Corynepharetea

Arenaria serpyllifolia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	I
Bombycilaena erecta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	I
Sedum acre	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I

Quercetea pubescentis

Carex michelii	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I
Celtis glabrata	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I
Cotinus coggygria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	I

Crataegus monogyna juv.	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	I
Cruciata laevipes	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	I
Paeonia peregrina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I
Thalictrum minus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	I
Viola suavis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	I

Molinio - Arrhenatheretea s.l.

Achillea millefolium	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	I
Cichorium intybus	-	-	-	-	+	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	I
Erodium cicutarium	-	-	-	+	+	-	-	+	-	-	-	+	-	+	-	-	-	-	-	-	II
Lepidium ruderale	-	-	-	-	-	-	-	+	+	-	-	-	-	-	+	-	-	-	-	-	I

Artemisetea et Stellarietea mediae s.l.

Althaea hirsuta	-	-	-	-	+	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	I
Androsace maxima	-	-	-	-	-	-	+	-	+	+	-	-	-	+	+	-	-	-	-	-	II
Carduus thoermeri	+	-	-	+	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	I
Chenopodium album	-	-	-	-	-	-	-	+	-	-	+	-	-	+	-	-	-	-	-	-	I
Consolida regalis	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	+	+	-	-	I
Cuscuta europaea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	I
Glaucium corniculatum	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I
Marrubium peregrinum	-	+	-	-	-	-	+	+	-	-	-	+	+	-	-	-	-	+	+	-	II
Reseda lutea	+	-	-	+	+	-	-	-	+	+	-	-	-	-	-	+	-	-	-	-	II
Senecio vulgaris	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	+	-	-	-	+	I
Sisymbrium orientale	+	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	I
Stachys annuua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	I
Thesium doliineri	-	-	-	-	-	-	+	-	+	+	-	+	-	-	-	-	-	-	-	-	I

Locul şi data releveelor

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CONTRIBUTIONS TO THE STUDY OF VACCINIO – PICEETEA VEGETATION CLASS IN NEAGRA BROŞTENILOR HYDROGRAPHYC BASIN

CONSTANTIN MARDARI[1], TOADER CHIFU[2]

ABSTRACT

The hydrographic basin of Neagra Broştenilor river presents approximately 350 km^2 area and occupies, in its larger part, the central zone of Bistrița Mountains, a reduced portion of the eastern slope of Călimani Mountains and the Drăgoiasa – Glodu depression (Eastern Carpathians). From this territory are described 5 plant communities from *Vaccinio – Piceetea* Br.-Bl. 1939 vegetation class and analysed in this paper from the bioforms, floristic elements and ecological requests perspectives.

Key words: vegetation, Vaccinio – Piceetea, Neagra Brostenilor

Introduction

Vaccinio-Piceetea class groups together the forests and scrubs edified by coniferous species, installed especially in the boreal and sub-alpine vegetation levels. Most of these forests have been cut for wood reclaim and for meadows obtainment and, in this way, in the most part of them, these phytocoenoses are semi-natural, and are obtained by the massive planting activities. Only the terrains situated at high altitudes or that are very inclined are preserving today quasi-natural forests.

Material and methods

The phytosociological study has been made using the classic methods specific to Central Europe Phytosociological School, by realizing phytocoenological relevées in field (using Braun – Blanquet scale having the abundance – dominance indices from + to 5) (4) and then their ordering and grouping in vegetal associations on the basis of characteristic, dominant and differential species (1), (3), (9). The biological forms and floristic elements for each species are those that have been given by V. Ciocarlan (2) and the values for ecological indices (L–light, T–temperature, U–humidity, R–soil pH) have been established by H. Ellenberg (5).

Results and discussions

According to literature (1), (3), (10), (11), these two plant communities are subordinated to the next superior coenotaxa:

VACCINIO – PICEETEA Br.-Bl. in Br.-Bl. et al. 1939 PICEETALIA EXCELSAE Pawlowski in Pawlowski et al. 1928

Piceion excelsae Pawlowski in Pawlowski et al. 1928

Hieracio transsilvanici – Piceetum Pawlowski et Br.-Bl. 1939

Sphagno – Piceetum (Tx. 1937) Hartman 1942

Dicrano – Pinion (Libbert 1932) Matuszkiewicz 1962

Leucobryo – Pinetum sylvestris Matuszkiewicz 1962 - *betuletosum pendulae* (Burduja et Ştefan 1982) Coldea 1991

Pinion mugi Pawlowski 1928

Calamagrostio villosae – Pinetum mugi Sanda et Popescu 2002

ATHYRIO – PICEETALIA Hadač 1962

Abieti – Piceion (Br.-Bl. in Br.-Bl. et al. 1939) Soó 1964

Hieracio transsilvanici – Abietetum (Borhidi 1971) Coldea 1991

1. ***Hieracio transsilvanici – Piceetum*** Pawlowski et Br.-Bl. 1939

Chorology: *Hieracio transsilvanici – Piceetum* Pawlowski et Br.-Bl. 1939 association is wide spread in the hydrographic basin of Neagra Broştenilor river, including phytocoenoses edified by *Picea abies,* presenting *Hieracium transsilvanicum* as characteristic species in the herbaceous stratum. It is installed on variable inclined slopes (from 15 to 45º-50º), with

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various aspects, on acid and poor in nutritive substance soils. Although the spruce fir forests are mentioned literature (from our study area) since the XIX-th century, this association has been described by phytosociological tables much later, by Lucia Lungu (6), and T. Seghedin (12).

Floristic composition and phytocoenological structure: Tree stratum, characterized by a covering degree that varies between 70 and 90%, is dominated by the edifying species – *Picea abies*, near by sporadically appear *Sorbus aucuparia, Abies alba, Fagus sylvatica, Betula pendula, Tilia cordata*, *Acer pseudoplatanus* etc. Shrubs stratum includes, generally, a reduced number of species, it's covering degree varies between 3 and 20%, in it's composition more frequently: *Vaccinium myrtillus*, *Vaccinium vitis-idaea*, *Daphne mezereum*, *Corylus avellana*, *Spiraea chamaedryfolia*, *Rosa pendulina*, *Rubus idaeus* etc could be met. Herbaceous stratum is very diverse, presents variable covering degrees, betweeen 10 and 70% and includes numerous species: *Melampyrum sylvaticum, Gymnocarpium dryopteris, Salvia glutinosa, Senecio ovatus* etc. (Table 1). In the fitocoenological composition, high constance indices present species characteristic to Piceion şi Piceetalia (*Luzula luzuloides, Calamagrostis arundinacea* etc.) and also to Vaccinio – Piceetea (*Oxalis acetosella, Campanula abietina, Moneses uniflora* etc.). Besides these species, in the forests edified by Picea abies have been identified also species from the deciduous or mixed forests from Querco – Fagetea (*Daphne mezereum, Dryopteris filix-mas* etc.), species characteristic to Epilobietea angustifolii (*Galeopsis speciosa, Solidago virgaurea* etc.) or Mulgedio – Aconietea (*Rosa pendulina, Polygonatum verticillatum* etc.) vegetation classes.

Ecological indices spectrum: presents the preponderance of shadow (L_3 – 8% and L_4 – 31%) and semi-shadow species (L_5 – 19%), preferring cold montane (T_3 – 8% and T_4 – 12%) or temperate sub-montane (T_5 – 26%) regions, having the main spreading area in all Central Europe (Ct_4 – 32%). Most of the component species prefer moderate humid soils (U_5 – 38% and U_6 – 25%), acid (R_{1-4} – 20%), moderate acid (R_5 – 13% and R_6 – 8%) or neutral (R_7 – 19%) soils, characterized by a nitrogen content varying between very poor and moderate (N_{1-6} – 51%). Important proportions are registered for the eurythermic (T_x – 45%), euryhygrous (U_x – 17%), indifferent to soil pH (R_x – 29%) and to nitrogen content of soil (N_x – 23%) species.

Bioforms spectrum: H–51%, Ph–20%, G – 16%, Ch–5%, T– 5%, Ht–3%.

Floristic elements spectrum: Euras.–36%, Circ.– 21%, Eur. centr.–14%, Eur.–11%, Cosm.–7%, End.– 4%, Carp.-balc.-3%, Alp.-eur.–2%, Alp.-carp.-balc.-1%, Carp.-balc.-cauc.-anat.-1%.

Table 1 - As. *Hieracio transsilvanici – Piceetum* Pawlowski et Br.-Bl. 1939

No. of relevé	1	2	3	4	5	6	7	8	9	10	11	
Plot area (m^2)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
Altitude (m)	740	900	950	900	1025	1100	1076	813	1000	1200	900	
Aspect	NV	SE	NE	SE	NV	NV	S	E	NE	NV	N	
Slope (º)	25	15	45	30	30	25	45	50	20	15	35	
Tree stratum covering (%)	80	75	85	80	85	90	80	95	90	85	90	***K***
Shrubs and regeneration stratum covering (%)	5	15	5	20	5	5	10	5	5	10	5	
Herbs stratum covering (%)	60	70	35	50	60	25	40	45	65	35	40	
Car. ass.												
Picea abies	5	4	5	4	5	5	4	5	5	4	4	V
Picea abies (juv.)	+	1	+	+	+	+	1	+	+	+	-	V
Hieracium transsilvanicum	+	1	+	+	+	+	+	+	+	+	-	V
Piceion et Piceetalia excelsae												
Melampyrum sylvaticum	+	-	+	+	-	+	-	+	+	+	1	IV
Luzula luzuloides	+	+	+	-	+	+	-	+	-	+	1	IV
Clematis alpina	+	-	-	+	-	+	-	+	-	-	-	II
Gymnocarpium dryopteris	+	+	-	+	+	+	+	+	+	-	-	IV
Streptopus amplexifolius	+	-	-	-	-	-	+	-	+	-	+	II
Calamagrostis arundinacea	-	1	+	1	+	-	-	-	+	+	+	IV
Luzula sylvatica	-	-	-	+	+	+	+	+	+	-	-	III
Calamagrostis villosa	-	-	-	-	+	-	+	+	-	-	-	II
Juniperus communis	-	-	-	-	-	-	+	-	-	-	+	I
Deschampsia flexuosa	-	-	-	-	-	-	-	-	+	-	+	I

Vaccinio – Piceetea												
Oxalis acetosella	3	2	1	+	3	+	+	1	1	+	+	V
Lycopodium selago	+	-	+	+	-	-	+	-	-	-	+	III
Campanula abietina	+	-	-	+	+	+	+	+	+	+	+	V
Sorbus aucuparia	+	+	+	+	-	+	+	+	+	+	+	V
Sorbus aucuparia (juv.)	+	+	-	+	+	+	-	+	+	+	+	V
Moneses uniflora	+	+	-	+	-	+	+	+	+	-	+	IV
Vaccinium vitis-idaea	-	-	-	-	-	+	+	-	+	-	-	II
Vaccinium myrtillus	-	-	+	-	-	+	+	-	+	1	+	III
Abies alba (juv.)	-	+	+	+	+	-	-	-	-	-	-	II
Goodyera repens	-	+	-	-	-	-	+	-	-	-	-	I
Homogyne alpina	-	+	-	-	+	+	+	-	+	+	+	IV
Orthilia secunda	-	-	-	-	-	+	-	+	-	-	+	II
Melampyrum saxosum	-	-	-	-	-	-	+	-	-	-	+	I
Symphyto cordati – Fagion et Fagetalia sylvaticae												
Fagus sylvatica	+	-	+	1	-	-	+	-	+	+	1	III
Fagus sylvatica (juv.)	+	+	-	+	+	-	-	-	+	+	+	IV
Pulmonaria rubra	+	-	+	+	-	-	-	-	-	-	-	II
Paris quadrifolia	+	-	-	-	+	+	-	-	+	-	-	II
Symphytum cordatum	+	-	-	-	-	-	-	-	-	-	-	I
Salvia glutinosa	1	+	+	1	+	+	-	+	+	+	+	V
Mercurialis perennis	+	+	-	+	-	-	+	-	-	-	-	II
Daphne mezereum	+	+	+	+	+	+	-	+	+	+	-	V
Scrophularia nodosa	+	-	+	-	-	+	+	+	-	-	+	III
Euphorbia amygdaloides	+	-	+	-	-	+	+	+	+	+	+	IV
Epilobium montanum	+	-	-	-	+	-	+	-	-	+	-	II
Lilium martagon	+	+	+	-	-	+	-	-	-	-	-	II
Querco – Fagetea												
Corylus avellana	+	1	+	1	-	-	+	-	-	-	+	III
Dryopteris filix-mas	+	-	+	+	+	+	+	+	+	+	+	V
Athyrium filix-femina	+	-	-	-	+	+	-	+	+	-	+	III
Mycelis muralis	+	+	-	+	+	+	+	+	+	+	+	V
Lonicera xylosteum	+	+	+	+	+	-	+	+	-	-	+	IV
Poa nemoralis	+	+	-	-	-	-	-	+	-	-	-	II
Actaea spicata	+	-	-	+	-	+	-	-	-	-	-	II
Geranium robertianum	+	-	-	+	+	-	+	-	+	+	+	IV
Galium schultesii	+	+	-	-	-	-	-	+	-	-	-	I
Glechoma hirsuta	+	+	-	+	-	-	-	-	-	-	-	II
Stellaria nemorum	+	+	-	-	-	-	-	-	-	-	-	I
Veronica urticifolia	+	-	+	+	+	+	+	-	+	+	+	V
Maianthemum bifolium	-	+	+	+	-	+	+	-	+	+	+	IV
Neottia nidus-avis	-	-	+	+	-	-	-	-	-	-	-	I
Spiraea chamaedryfolia	-	+	-	+	+	+	-	+	+	+	-	IV
Polystichum setiferum	-	-	-	-	+	-	-	-	-	-	+	I
Mulgedio – Aconietea												
Polygonatum verticillatum	+	-	-	+	-	+	-	+	-	-	-	II
Rosa pendulina	+	+	+	-	-	-	-	-	-	-	-	II
Hypericum maculatum	-	-	-	-	-	-	+	-	+	-	-	I
Epilobietea angustifolii												
Senecio ovatus	+	+	-	+	+	+	-	+	+	-	-	IV
Fragaria vesca	+	1	+	+	+	+	1	+	+	+	-	V
Galeopsis speciosa	+	+	-	+	-	-	-	+	+	+	-	III
Variae syntaxa												
Aconitum anthora	+	-	-	+	-	-	-	-	-	-	-	I
Rubus idaeus	+	+	-	-	+	+	-	-	+	-	+	III
Betula pendula	+	-	-	+	-	-	+	-	-	1	+	III
Silene dioica	+	-	-	-	-	-	-	+	+	+	-	II
Impatiens noli-tangere	+	-	-	-	-	-	-	+	-	-	-	I
Telekia speciosa	+	-	-	+	-	-	-	-	-	-	-	I

Stachys sylvatica	+	-	-	+	-	+	-	-	+	-	-	II
Circaea alpina	+	+	+	+	+	-	+	-	+	+	-	IV
Digitalis grandiflora	+	+	-	+	+	+	-	-	-	+	+	IV
Tilia cordata (juv.)	+	-	-	-	-	+	-	-	-	-	-	I
Campanula trachelium	+	-	-	+	-	+	-	-	-	-	-	II
Milium effusum	+	-	-	-	-	-	-	-	-	-	+	I
Acer pseudoplatanus	-	+	+	-	+	-	+	+	+	+	1	IV
Acer pseudoplatanus (juv.)	-	-	-	-	+	+	-	+	+	+	+	III
Veronica officinalis	-	+	-	-	+	+	+	-	+	+	+	IV
Cruciata glabra	-	+	-	+	-	-	+	-	-	+	-	II
Prunella vulgaris	-	+	-	-	+	+	+	-	-	-	+	III
Ribes uva-crispa	-	+	-	-	+	-	-	-	-	-	-	I
Valeriana montana	-	+	-	-	-	-	+	-	-	-	-	I
Equisetum sylvaticum	-	+	-	-	-	+	-	-	-	-	-	I
Myosotis sylvatica	-	-	+	-	-	-	+	-	-	-	-	I
Polypodium vulgare	-	-	-	+	-	-	-	+	-	-	-	I
Vicia sylvatica	-	-	-	+	+	-	-	-	-	-	-	I
Urtica dioica	-	-	-	-	+	+	+	+	-	-	-	II
Salix caprea	-	-	-	-	-	+	-	-	+	+	-	II
Cirsium erisithales	-	-	-	-	-	+	+	+	-	+	+	III
Alnus incana	-	-	-	-	-	-	+	+	-	-	-	I
Gentiana asclepiadea	-	-	-	-	-	-	-	-	-	+	+	I

Species in one relevé: Abies alba (rel. 3); Pyrola rotundifolia (rel. 7); Pinus sylvestris (rel. 7); Polystichum aculeatum (rel. 1); Dryopteris carthusiana (rel. 2); Lathyrus laevigatus (rel. 4); Anemone nemorosa (rel. 1); Brachypodium sylvaticum (rel. 1); Carex sylvatica (rel. 3); Dentaria glandulosa (rel. 3); Acer platanoides (juv.) (rel. 4); Moehringia trinervia (rel. 9); Solidago virgaurea (rel. 4); Cardamine impatiens (rel. 1); Arctium tomentosum (rel 1); Tussilago farfara (rel 1); Tilia cordata (rel 4); Ulmus glabra (rel. 1); Populus tremula (juv.) (rel. 2); Polystichum lonchitis (rel. 2); Campanula persicifolia (rel. 2); Pulmonaria officinalis (rel. 4); Geum urbanum (rel. 4); Lamium maculatum (rel. 5); Cystopteris fragilis (rel. 5); Doronicum columnae (rel. 6); Sambucus racemosa (rel. 9); Hieracium murorum (rel. 9); Cicerbita alpina (rel. 10); Origanum vulgare (rel. 11); Pteridium aquilinum (rel. 11).

Place and date of relevées: Neagra Broşteni: 29.07.2006 (rel. 1); confluence Neagra Broştenilor and Negrişoara: 29.07.2006 (rel. 2); Budacu: 20.06.2005 (rel. 3); Ortoiţa: 3.09.2007 (rel. 4); Dârmoxa: 4.09.2007 (rel. 5); Păltiniş: 5.09.2007 (rel. 6); Drăgoiasa: 3.07.2007 (rel. 7); Cristişor: 2.07.2007 (rel. 8); Ortoaia: 1.08.2008 (rel. 9); Căliman Cerbuc: 25.07.2007 (rel. 10); Grinţieşul Mic: 3.08.2008 (rel. 11);

2. ***Sphagno – Piceetum*** (Tx. 1937) Hartman 1942

Chorology: The *Sphagno – Piceetum* (Tx. 1937) Hartman 1942 association has been identified on limited areas in the hydrographic basin of Neagra Broştenilor river, including the phytocoenoses edified by *Picea abies* that are vegetating on acid, poor in nutritive substances and humid soils, in the marginal areas of the eutrophic peat bogs from Drăgoiasa and Cristişor. It is installed on plane or presenting reduced inclinations terrains (2 and 3º). **Floristic composition and phytocoenological structure**: Tree stratum, characterized by a covering degree that vary between 60 and 80%, is dominated by the edifying species – *Picea abies*, near by sporadically appear *Betula pendula, Betula alba ssp. glutinosa* etc. Shrubs stratum includes, generally, a reduced number of species, it's covering degree varies between 5 and 40%, in it's composition more frequently could be met: *Vaccinium myrtillus*, *Vaccinium vitis-idaea*, *Daphne mezereum*, *Spiraea chamaedryfolia*, etc. Herbaceous stratum is diverse, presents variable covering degrees, between 15 and 20% and includes numerous species: *Eriophorum vaginatum, Dactylorhiza maculata*, *Equisetum sylvaticum* etc. (Table 2). In the fitocoenological composition, high constance indices present species characteristic to Piceion şi Piceetalia (*Calamagrostis arundinacea, Luzula luzuloides* etc.) and to Vaccinio – Piceetea (*Oxalis acetosella, Vaccinium myrtillus* etc.). Besides these species, in the forests edified by *Picea abies* have been identified also species from the deciduous or mixed forests from Querco – Fagetea (*Dryopteris filix-mas, Daphne mezereum* etc), species characteristic to Scheuchzerio – Caricetea nigrae (*Ligularia sibirica, Carex nigra* etc.) or Oxycocco – Sphagnetea (*Oxycoccus palustris, Andromeda polifolia* etc.) vegetation classes.

Ecological indices spectrum: presents the preponderance of light (L_7 – 33%), semi-shadow (L_5

– 8% and L_6 – 20%) and shadow species (L_3 – 8% and L_4 – 17%), tolerating wide variations of temperature factor (eurythermic, T_x – 62%) or preferring cold montane regions (T_3 – 6% and T_4 – 17%), presenting the main spreading area in all Central Europe (Ct_3 – 21% and Ct_4 – 17%). Most of the component species prefers moderate humid soils (U_5 – 20% and U_6 – 17%) and have the capacity to tolerate wide variations of soil pH (R_x – 41%) and nitrogen content (N_x – 31%). Besides these species, in the floristic composition of these phytocoenoses, is individualized an nucleus of species preferring acid (R_{1-4} – 34%) or moderate acid (R_5 – 11% şi R_6 – 4%) soils, presenting a nitrogen content varying between very poor to moderate (N_{1-5} – 49%).

Bioforms spectrum: H–49%, Ph–23%, G – 13%, Ch–11%, T-Ht– 4%.

Floristic elements spectrum: Euras.–43%, Circ.– 26%, Eur. centr.– 11%, Eur.–9%, Cosm.-9%, End. carp.-2%.

Table 2 - As. *Sphagno – Piceetum* (Tx. 1937) Hartman 1942

No. of relevé	1	2	3	4	5	6	*K*
Plot area (m^2)	1000	1000	1000	1000	1000	1000	
Altitude (m)	1064	1064	815	815	815	815	
Aspect	-	-	-	-	V	SV	
Slope (º)	-	-	-	-	2-3	3	
Tree stratum covering (%)	75	70	65	80	60	75	
Shrubs stratum covering (%)	10	5	25	15	40	30	
Herbs stratum covering (%)	15	10	20	10	10	20	
Car. ass.							
Picea abies	4	4	4	5	3	4	V
Picea abies juv.	+	+	+	+	+	+	V
Piceion et Piceetalia excelsae							
Calamagrostis arundinacea	+	+	-	-	-	+	III
Luzula sylvatica	+	+	+	-	-	-	III
Luzula luzuloides	-	-	-	+	+	-	II
Vaccinio – Piceetea							
Sorbus aucuparia	+	-	+	+	+	+	V
Sorbus aucuparia (juv.)	-	+	+	+	+	-	IV
Oxalis acetosella	+	+	+	-	-	+	IV
Vaccinium vitis – idaea	+	+	+	1	2	+	V
Vaccinium myrtillus	1	+	+	+	1	2	V
Moneses uniflora	-	-	+	+	-	-	II
Oxycocco – Sphagnetea							
Oxycoccus palustris	+	+	2	+	1	+	V
Eriophorum vaginatum	+	1	+	-	+	-	IV
Andromeda polifolia	+	-	-	-	+	-	II
Scheuchzerio – Caricetea nigrae							
Ligularia sibirica	+	-	-	+	-	-	II
Carex nigra	+	-	-	-	+	-	II
Querco – Fagetea							
Spiraea chamaedryfolia	+	+	-	+	-	-	III
Dryopteris filix-mas	-	-	-	+	+	-	II
Daphne mezereum	-	-	+	+	-	-	II
Maianthemum bifolium	-	-	+	+	+	+	IV
Variae syntaxa							
Betula pendula	+	+	+	-	+	+	V
Equisetum sylvaticum	+	+	-	-	-	+	III
Salix caprea	+	-	+	+	+	-	IV
Caltha palustris	+	-	+	-	-	-	II
Filipendula ulmaria	+	-	-	-	-	+	II
Valeriana dioica	+	+	-	-	-	-	II
Myosotis scorpioides	+	+	-	+	+	-	IV
Alnus incana	+	+	-	-	-	-	II
Potentilla erecta	+	+	+	-	+	+	V
Betula alba ssp. glutinosa	-	-	+	+	1	+	IV
Prunella vulgaris	-	-	+	+	-	-	II

Geranium robertianum	-	-	+	+	+	-	III
Veratrum album	-	-	+	+	-	-	II
Polygonatum verticillatum	-	-	-	+	-	+	II
Dactylorhiza maculata	-	-	-	+	+		II
Fragaria vesca	-	-	-	+	+	-	II
Deschampsia caespitosa	-	-	-	-	+	+	II

Species in one relevé: Pyrola rotundifolia (rel. 3); Homogyne alpina (rel. 4); Lycopodium clavatum (rel. 6); Carex echinata (rel. 3); Fagus sylvatica (juv.) (rel. 3); Spiraea salicifolia (rel. 1); Polygonum bistorta (rel. 1); Lychnis flos-cuculi (rel. 1); Galium uliginosum (rel. 1); Agrostis canina (rel. 3); Cruciata glabra (rel. 3); Acer pseudoplatanus (juv.) (rel. 3); Lysimachia nummularia (rel. 6); Evonymus nanus (rel. 4); Solanum dulcamara (rel. 4); Epilobium palustre (rel. 6); Sambucus racemosa (rel. 6); Stellaria media (rel. 6).

Place and date of relevées: Dragoiasa: 1.07.2007 (rel. 1, 2); Cristisor: 2.07.2007 (rel. 3, 4, 5, 6).

3. ***Leucobryo – Pinetum sylvestris*** Matuszkiewicz 1962 - ***betuletosum pendulae*** (Burduja et Ştefan 1982) Coldea 1991

Chorology: Phytocoenoses of the *Leucobryo – Pinetum sylvestris* Matuszkiewicz 1962 - *betuletosum pendulae* (Burduja et Ştefan 1982) Coldea 1991 sub-association are sporadically spread in the hydrographic basin of Neagra Broştenilor river. These phytocoenoses are edified by *Pinus sylvestris*, present *Betula pendula* as differential species and are installed on very inclined slopes (between 35 and 60º) characterized by various aspects, crystalline schists substratum and superficial and poor in nutritive substances soils.

Floristic composition and phytocoenological structure: Tree stratum, characterized by a covering degree that vary between 55 and 65%, is dominated by the edifying species – *Pinus sylvestris*, near by sporadically appear *Sorbus aucuparia, Picea abies, Fagus sylvatica* etc. Shrubs stratum is well represented, realize covering degrees that vary between 15 and 45%, in it's composition more frequently *Vaccinium myrtillus*, *Lonicera xylosteum* etc. can be met. Herbaceous stratum is the most diverse, presents reduced covering degrees (varying between 10 and 15%) and includes numerous species: *Oxalis acetosella*, *Sedum maximum, Gentiana asclepiadea* etc. (Table 3). In the phytocoenological composition, high constance indices presents species characteristic to Dicrano – Pinion (*Chamaecytisus hirsutus, Veronica officinalis* etc.), Piceetalia (*Luzula luzuloides, Calamagrostis arundinacea* etc.) and Vaccinio – Piceetea (*Campanula abietina* etc.). Besides these species, in the forests edified by Pinus sylvestris have been also identified species from the Asplenietea trichomanis (*Polypodium vulgare, Silene nutans* ssp. *dubia* etc.) and Querco – Fagetea (*Fagus sylvatica, Poa nemoralis* etc.) vegetation classes.

Ecological indices spectrum: presents the fact that the most of the component species are light (L_7 – 33%) and semi-shadow (L_5 – 25%) plants, having the capacity to tolerate wide variations of temperature factor (T_x – 62%), presenting the main spreading area in Central Europe (Ct_4 – 31%). The floristic composition of these phytocoenoses is dominated by species preferring moderate humid (U_5 – 42% and U_6 – 11%) soils, have the capacity to tolerate wide variations of soil pH (R_x – 39%) and soil nitrogen content (N_x- 33%). Besides these categories, significant proportions have been registered for species preferring soils characterized by a poor nitrogen content (N_3 – 22%) and moderate acid (R_5 – 11%) or neutral (R_7 – 22%) reaction.

Bioforms spectrum: H–49%, Ph–31%, Ch–14%, G–6%.

Floristic elements spectrum: Euras.–32%, Eur. centr.–31%, Circ.–25%, End.–6%, Eur.–3%, Carp.-balc.–3%.

Table 3 - As. *Leucobryo – Pinetum sylvestris* Matuszkiewicz 1962 – *betuletosum pendulae* (Burduja et Ştefan 1982) Coldea 1991

No. of relevé	1	2	3	4	5	
Plot area (m^2)	1000	1000	1000	1000	1000	
Altitude (m)	850	900	800	950	1020	
Aspect	NV	N	N	NE	SE	***K***
Slope (º)	40	35	45	55	40	
Tree stratum covering (%)	60	65	55	55	65	
Shrubs stratum covering (%)	45	30	40	20	15	
Herbs stratum covering (%)	15	10	15	10	15	

Car. ass.						
Pinus sylvestris	3	4	3	3	4	V
Dif. subass.						
Betula pendula	1	+	+	1	1	V
Betula pendula juv.	+	+	-	-	+	III
Dicrano – Pinion						
Chamaecytisus hirsutus	1	+	+	-	+	IV
Veronica officinalis	+	-	+	+	-	III
Piceetalia excelsae						
Luzula luzuloides	+	+	-	+	-	III
Calamagrostis arundinacea	+	+	+	-	+	IV
Vaccinio – Piceetea						
Vaccinium myrtillus	3	2	3	1	1	V
Vaccinium vitis-idaea	+	+	+	+	1	V
Sorbus aucuparia	+	+	-	+	+	IV
Picea abies	+	-	+	+	-	III
Oxalis acetosella	+	+	+	+	1	V
Abies alba	-	+	+	-	-	II
Orthilia secunda	-	+	-	+	-	II
Campanula abietina	-	+	+	-	+	III
Asplenietea trichomanis						
Sedum maximum	+	+	-	+	+	IV
Polypodium vulgare	+	-	+	+	-	III
Silene nutans ssp. dubia	+	-	+	-	-	II
Valeriana tripteris	-	+	+	-	+	III
Querco – Fagetea						
Spiraea chamaedryfolia	+	+	-	-	+	III
Fagus sylvatica	+	+	+	-	-	III
Maianthemum bifolium	+	+	-	-	+	III
Poa nemoralis	-	+	+	+	+	IV
Veronica urticifolia	-	-	+	+	+	III
Euphorbia amygdaloides	-	-	+	+	-	II
Variae syntaxa						
Dianthus tenuifolius	+	-	+	+	-	III
Solidago virgaurea	+	-	+	-	-	II
Salvia glutinosa	+	+	+	-	+	IV
Gentiana asclepiadea	-	+	+	-	+	III
Fragaria vesca	-	+	-	-	+	II
Rubus idaeus	-	-	+	-	+	II
Sambucus racemosa	-	-	+	-	+	II

Species in one relevé: Pyrola media (rel. 2); Lonicera xylosteum (rel. 5); Origanum vulgare (rel. 4); Senecio ovatus (rel. 5); Cirsium erisithales (rel. 5);

Place and date of relevées: Negrei Broştenilor valley – confluence with Ortoaia rivulet: 3.07.2007 (rel. 1,2); Căpraria rivulet: 4.07.2007 (rel. 3,4); Negrişoara rivulet: 4.07.2007 (rel. 5).

4. ***Calamagrostio villosae – Pinetum mugi*** Sanda et Popescu 2002 **Chorology**: The *Calamagrostio villosae – Pinetum mugi* Sanda et Popescu 2002 association has been identified on limited areas in the our study area, including the phytocoenoses edified by *Pinus mugo* having *Calamagrostis villosa* as characteristic species in the herbaceous stratum. It is installed on the eastern slopes of Căliman Izvor and Căliman Cerbuc peaks, on plane terrains or presenting various aspects, on acid and poor in nutritive substances soils.

Floristic composition and phytocoenological structure: The shrubs stratum, characterized by a increased covering degree (80 – 95%), is dominated by the edifying species – *Pinus mugo*, near by sporadically appear *Juniperus sibirica* or individuals of *Picea abies* or *Sorbus aucuparia* reduced to a shrub size. The sub-arbustive stratum realize covering degrees up to 25%, in it's composition more frequently *Vaccinium myrtillus*, *Rhododendron myrtifolium*, *Vaccinium vitis-idaea* could be met. The herbaceous stratum is most diversified, presents variable covering degrees (between 30 and 55%) and includes, besides the characteristic species, numerous other species: *Luzula luzuloides*, *Homogyne alpina*, *Deschampsia flexuosa* etc. (Table 4). In the phytocoenological composition,

increased abundance – dominance indices present the species characteristic to Pinion mugi, Junipero - Pinetalia (*Juniperus sibirica, Rhododendron myrtifolium*), Piceetalia excelsae (*Luzula luzuloides, Deschampsia flexuosa*) and Vaccinio-Piceetea (*Homogyne alpina, Lycopodium selago* etc.). Besides these species, the phytocoenoses edified by Pinus mugo includes also species characteristic to Loiseleurio-Vaccinietea (*Vaccinium gaultherioides, Vaccinium vitis-idaea*), or to Juncetea trifidi (*Juncus trifidus, Potentilla aurea* etc.) vegetation classes.

Ecological indices spectrum: presents the preponderance of light loving plant species (L_7 – 19% and L_8 – 41%), preferring cold alpine (T_2 – 19%) or sub-alpine and montane regions (T_3 – 28% and T_4 – 13%), presenting the main spreading area in Central Europe (Ct_3 – 43% and Ct_4 – 23%). Most of the component species grows on moderate humid (U_4 – 25%, U_5 – 22% and U_6 – 13%), acid (R_3 – 25% and R_4 – 13%), very acid (R_1 – 3% and R_2 – 16%) and very poor in nitrogen (N_1 – 9% and N_2 – 25%) soils. For the next ecological factors: temperature (T_x – 37%), humidity (U_x – 28%) and soil pH (R_x – 24%) significant proportions of eurythermic, euryhygrous and euryionic species can be observed.

Bioforms spectrum: H – 56%, Ph – 19%, Ch – 19%, G – 3%, T – 3%.

Floristic elements spectrum: Circ.– 32%, Euras. – 19%, Eur. centr.– 16%, Alp.-carp.-balc.– 9%, Alp.-eur. – 6%, Cosm.– 6%, Arct.-alp. – 3%, End. carp.– 3%.

Table 4 - As. *Calamagrostio villosae – Pinetum mugi* Sanda et Popescu 2002

No. of relevé	1	2	3	4	5	*K*
Plot area (m^2)	100	100	100	100	100	
Altitude (m)	1750	1800	1850	1800	1900	
Aspect	NV	V	-	NE	E	
Slope (º)	15	5	-	20	15	
Shrubs stratum covering (%)	95	90	80	90	85	
Herbs stratum covering (%)	30	50	55	30	45	
Car. ass.						
Pinus mugo	4	5	4	5	5	V
Calamagrostis villosa	2	3	3	2	3	V
Junipero - Pinetalia mugi et Pinion mugi						
Juniperus communis	+	+	1	-	-	III
Rhododendron myrtifolium	-	+	-	+	+	III
Juniperus nana	-	-	+	+	+	III
Piceetalia excelsae						
Deschampsia flexuosa	1	+	+	+	+	V
Luzula luzuloides	+	+	+	+	+	V
Vaccinio – Piceetea						
Vaccinium myrtillus	2	1	+	+	+	V
Homogyne alpina	+	+	+	+	+	V
Sorbus aucuparia juv.	+	+	-	-	+	III
Picea abies	+	-	-	-	+	II
Campanula abietina	-	+	-	+	-	II
Loiseleurio – Vaccinietea						
Vaccinium vitis-idaea	+	-	-	+	+	III
Vaccinium gaultherioides	+	-	-	+	-	II
Juncetea trifidi						
Hieracium alpinum	+	-	-	-	+	II
Juncus trifidus	-	+	+	-	-	II
Campanula alpina	-	+	-	-	+	II
Festuca supina	-	-	-	+	+	II
Antennaria dioica	-	-	-	+	+	II
Potentilla aurea	-	-	-	+	+	II
Variae syntaxa						
Hypericum richeri ssp. grisebachii	+	-	+	-	-	II
Phleum alpinum	+	+	-	-	-	II
Anthoxanthum odoratum	-	-	+	+	-	II

Species in one relevé: Melampyrum saxosum (rel. 1); Lycopodium selago (rel. 4); Oxalis acetosella (rel. 5); Hypochoeris uniflora (rel. 3); Veratrum album (rel. 1); Deschampsia caespitosa (rel. 1); Cystopteris montana (rel. 1); Thymus alpestris (rel. 3); Nardus stricta (rel. 5).

Place and date of relevées: Căliman Izvor (rel. 1-3): 20.08.2008; Căliman Cerbuc (rel. 4-5): 20.08.2008.

5. ***Hieracio transsilvanici – Abietetum*** (Borhidi 1971) Coldea 1991

Chorology: The *Hieracio transsilvanici – Abietetum* (Borhidi 1971) Coldea 1991 association includes the phytocoenoses edified by *Abies alba* and *Picea abies*, presenting *Hieracium transsilvanicum* as characteristic species in the herbaceous stratum. It is installed on the western slopes of Budacu massif, presenting an inclination degree varying between 5 and 15º, at 800 - 900m altitude. This association is described for the first time for our study area.

Floristic composition and phytocoenological structure: Tree stratum, characterized by a covering degree that vary between 70 and 80%, is dominated by the edifying species – *Abies alba* and *Picea abies* (in co-dominance report), near by sporadically appear *Sorbus aucuparia, Acer pseudoplatanus, Fagus sylvatica* etc. Shrubs stratum is represented by a reduced number of species, realize variable covering degrees (between 5 and 20%), in it's composition more frequently could be identified: *Daphne mezereum*, *Corylus avellana*, *Spiraea chamaedryfolia* etc. The herbaceous stratum is diverse, presents variable covering degrees (between 10 and 30%) and includes, besides the characteristic species, numerous other species: *Sanicula europaea*, *Athyrium filix-femina*, *Actaea spicata*, *Poa nemoralis*, *Carex sylvatica* etc. (Table 5). In the phytocoenological composition, increased abundance-dominance indices presents the species characteristic to Abieti – Piceion (*Corylus avellana, Sanicula europaea*) and Athyrio – Piceetalia (*Daphne mezereum, Lilium martagon* etc.), to Piceion and Piceetalia (*Oxalis acetosella, Moneses uniflora* etc.) and also to Vaccinio – Piceetea (*Campanula abietina, Lycopodium selago* etc.). Besides these species, in the phytocoenoses edified by *Abies alba* and *Picea abies* have been identified also species from Querco – Fagetea (*Dryopteris filix-mas, Isopyrum thalictroides* etc.), Epilobietea angustifolii (*Galeopsis speciosa, Gnaphalium sylvaticum* etc.) and Galio – Urticetea (*Salvia glutinosa, Urtica dioica* etc.) vegetation classes.

Ecological indices spectrum: presents the preponderance of shadow (L_3 – 9% and L_4 – 30%) and semi-shadow (L_5 – 17% and L_6 – 14%) species, having the capability to tolerate wide variations of temperature (T_x – 50%) or prefer temperate sub-montane regions (T_5 – 21%), presenting the main spreading area in Central Europe (Ct_3 – 36% and Ct_4 – 26%). Most of these phytocoenoses component species grows on moderate humid soils (U_5 – 49% and U_6 – 23%), neutral (R_7 – 19%) or moderate acid (R_5 – 14% and R_6 – 4%), characterized by a nitrogen content varying from moderate (N_5 – 13% and N_6 – 14%) to high (R_7 – 14% and R_8 – 13%).

Bioforms spectrum: H–53%, Ph–17%, G–14%, Ch–9%, T–4%, Ht–3%.

Floristic elements spectrum: Euras.–38%, Circ.–21%, Eur. centr.–20%, Eur.–10%, Cosm.–6%, Carp.-balc.–4%, Alp.-eur.–1%.

Table 5 - As. *Hieracio transsilvanici – Abietetum* (Borhidi 1971) Coldea 1991

No. of relevé	1	2	3	4	5	*K*
Plot area (m^2)	1000	1000	1000	1000	1000	
Altitude (m)	900	850	870	900	850	
Aspect	SV	NV	E	SE	V	
Slope (º)	15	10	5	15	5	
Tree stratum covering (%)	75	80	75	80	70	
Shrubs stratum covering (%)	5	6-7	10	5	15	
Herbs stratum covering (%)	35	20	30	25	20	
Car. ass.						
Abies alba	3	2	2	3	2	V
Abies alba juv.	+	+	+	+	+	V
Picea abies	2	4	3	3	3	V
Picea abies juv.	+	-	+	+	+	IV
Hieracium transsilvanicum	+	+	+	-	+	IV
Abieti – Piceion						
Corylus avellana	+	+	-	+	1	IV

Athyrio – Piceetalia						
Daphne mezereum	+	+	+	+	+	V
Rosa pendulina	-	+	-	+	+	III
Athyrium filix-femina	-	+	-	-	+	II
Lilium martagon	-	-	+	+	-	II
Piceion et Piceetalia excelsae						
Oxalis acetosella	1	+	+	+	+	V
Luzula sylvatica	+	+	-	-	-	II
Calamagrostis arundinacea	+	-	-	+	-	II
Melampyrum sylvaticum	-	+	+	+	+	IV
Luzula luzuloides	-	-	+	1	+	III
Moneses uniflora	-	-	+	+	+	III
Vaccinio – Piceetea						
Campanula abietina	+	+	+	+	-	IV
Sorbus aucuparia	+	+	-	+	-	III
Sorbus aucuparia juv.	+	+	+	-	+	IV
Homogyne alpina	+	-	-	+	+	III
Vaccinium myrtillus	+	+	1	-	-	III
Lycopodium selago	+	-	+	-	-	II
Equisetum sylvaticum	-	-	-	+	+	II
Fagetalia et Querco – Fagetea						
Acer pseudoplatanus	+	+	-	+	1	IV
Spiraea chamaedryfolia	+	+	-	+	+	IV
Dryopteris filix-mas	1	+	+	+	+	V
Mycelis muralis	+	+	-	+	+	IV
Maianthemum bifolium	+	-	-	-	+	II
Poa nemoralis	+	+	-	-	-	II
Fagus sylvatica	1	+	1	-	-	III
Paris quadrifolia	-	+	-	+	-	II
Euphorbia amygdaloides	-	-	-	+	+	II
Galio – Urticetea						
Salvia glutinosa	+	+	1	+	+	V
Urtica dioica	+	-	+	-	+	III
Veronica urticifolia	-	+	+	+	-	III
Epilobietea angustifolii						
Fragaria vesca	+	+	+	+	+	V
Galeopsis speciosa	+	+	+	-	-	III
Senecio ovatus	+	-	+	-	-	II
Chamerion angustifolium	-	-	-	+	+	II
Variae syntaxa						
Geranium robertianum	+	+	+	-	-	III
Myosotis sylvatica	+	+	-	+	-	III
Digitalis grandiflora	+	+	+	+	-	IV
Rubus idaeus	+	-	-	+	+	III
Veronica officinalis	+	-	-	+	-	II
Polygonatum verticillatum	+	-	-	-	+	II
Gentiana asclepiadea	-	+	+	-	-	II
Sambucus racemosa	-	-	-	+	+	II
Cirsium erisithales	-	-	+	-	+	II
Betula pendula	-	-	-	+	+	II
Hypericum maculatum	-	-	-	+	+	II

Species in one relevé: Sanicula europaea (rel. 1); Mercurialis perennis (rel. 1); Polystichum lonchitis (rel. 1); Calamagrostis villosa (rel. 4); Vaccinium vitis-idaea (rel. 5); Milium effusum (rel. 1); Actaea spicata (rel. 1); Acer platanoides juv. (rel. 1); Pulmonaria rubra (rel. 1); Epilobium montanum (rel. 3); Isopyrum thalictroides (rel. 4); Carex sylvatica (rel. 4); Chaerophyllum hirsutum (rel. 2); Alliaria petiolata (rel. 3); Gnaphalium sylvaticum (rel. 2); Eupatorium cannabinum (rel. 3); Circaea alpina (rel. 1); Tussilago farfara (rel. 1); Polypodium vulgare (rel. 3); Campanula trachelium (rel. 5); Silene dioica (rel. 4); Scrophularia nodosa (rel. 4); Epipogium aphyllum (rel. 5).

Place and date of relevées: Budacu: 14.07.2008 (rel. nr. 1-5).

Rezumat

Bazinul hidrografic al Negrei Broştenilor prezintă o suprafaţă de aproximativ 350 km^2 şi ocupă, în cea mai mare parte a sa zona centrală a Munţilor Bistriţei, o porţiune redusă a versantului estic al Munţilor Călimani şi depresiunea Drăgoiasa-Glodu (Carpaţii Orientali). Din acest teritoriu sunt descrise 5 asociaţii vegetale din clasa *Vaccinio – Piceetea* Br.-Bl. 1939 care sunt analizate în această lucrare din perspectivele bioformelor, geoelementelor şi caracterizate din punct de vedere ecologic.

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CONTRIBUTION TO THE FLORA OF THE BOZOVICI DEPRESSION (ALMĂJ VALLEY) (CARAŞ-SEVERIN COUNTY)

ILIE D. GOGA[1]

ABSTRACT

The author presents in this note the result of his botanical researches in the depression Bozovici, from Caraş-Severin County. Among rare taxa in depression the author cites: *Rubus colemanii* Bloxm. subsp. *doftanensis* (Nyàr.) Cicârlan; *Kickxia elatine* (L.) Dumort f. *banatica* (Heuff.) Jáv.; *Sesleria filifolia* Hoppe; *Stipa pennata* L. subsp. *pennata* (*S. joannis* Čelak.) and *Crepis biennis* L. var. *lacera* Wimm. et Grab. f. *banatica*.

Keyword: new taxa, flora, Bozovici depression, Almăj Valley

Introduction

The author presents in this note some rare taxa for the Depression Bozovici (Almăj Valley), and he quots the following taxa: *Rubus colemannii* Bloxem. subsp. *doftanensis* (Nyár.) Ciocârlan; *Kickxia elatine* (L.) Dumort f. *banatica* (Heuff.) Jáv.; *Sesleria filifolia* Hoppe; *Stipa pennata* L. subsp. *pennata* (*S. joannis* Čelak.) and *Crepis biennis* L. var. *lacera* Wimm. et Grab. f. *banatica*.

Results and discussions

The taxa new for depression Bozovici are listed as following.

Family Papaveraceae

Papaver rhoeas L. ssp. *eurhoeas* A. Nyár loc. Bozovici spread along un cultivated fields; var. *eurhoeas* Nyár.; var. *genuinum* Hill Băclan in meadows.

P. dubium L. loc. Bozovici, spread near Nera River in warblers, in meadows on Ogaşu Grecului, var. *subbipinnatifidum* (O. Ktze) f. *tenuisecturn* A. Nyár along fields, in cultures, var. *coliinum* (Bogenn) through uncultivated land and fields.

Family Fumariaceae

Corydalis cava (L.) Schweigg et Koerte (C. bulbosa auct.) loc. Bozovici, Miniş Gorges, at Bigar in beech forest.

C. solida (L.) Clairv. loc. Bozovici, Miniş Gorges, at Bigar in beech forest, at Muscala in scrubs near the river Nera, f. *bicaulis* Zap. in Miniş Gorges alog with *C. pumila* (Host.), *f. subintegra* (Casp.) Miniş Gorges in forest.

Obs. f. *bicaulis* Zap. was quoted for Tg Mures, Bălan, on Mount Ŏcsem-Ciuc and Cirogârla-Mihăileşti.

Fumaria schleicheri Soy. - Willem. loc. Bozovici in crops, fallows, scrubs, but rare.

F. officinalis L. loc. Bozovici along the river Miniş, in culture and scrub near the hospital.

Family Fagaceae

Quercus frainetto Ten. loc. Gârbovăț in forest at Obârşitură.

Family Caryophyllaceae

Sagina procumbens L. loc. Prigor on Prigorului Hill, in pastures.

Herniaria glabra L. loc. Gârbovăț in Valea Mare along meadows near the village on gravel and sand. First appearing of the species was in 1979 in the same place, disappearing for a while and in the summer of 2007 was found in two specimenes.

Family Amaranthaceae

Amaranthus crispus (Lesp. et Thev.) N. Terracc, f. *microphyllus* Deg. et Thelle loc. Bozovici on the gravel in Nera River warblers.

Family Rosaceae

Rubus colemannii Bloxam. subsp. *doftanensis* (Nyár.) loc. Bozovici on Ogaşu Slătinic in forest.

R. fuscus The. loc. Bozovici on Ogaşu Babitu alongside the water stream.

Potentilla micrantha Ram. loc. Gârbovăț in forest, on cliffs, at Cârşia lui Vasile.

P. erecta (L.) Rausch. var. *sciaphila* Th. Wolf. loc. Gârbovăț at Obârşitură in forest, on rocky coasts, loc. Borlovenii Noi pe Dealul Țerovei in meadows.

P. pedata Willd. loc. Bozovici in the village, along fences.

[1]Reşița, Bd. Republicii, bl. 7, sc. II, et. 8, ap. 29, jud. Caraş-Severin

P. chrysantha Trev loc. Gârbovăţ, in forests along Şopotu Lung Valley.

Grataegus monogyna Jacq. loc. Gârbovăţ, in the warbler at Moara Bătrână.

Family Fabaceae (Leguminosae)

Vicia sepium L. loc. Bozovici on Pojaru Hill, in forest, at Garbovăţ on Valea Mare - in forest. Flowers are dirty purple.

Family Balsaminaceae

Impatiens noli-tangere L. loc. Gârbovăţ in Valea Mare, on alluvia sand in trenches.

Family Linaceae

Linum flavum L. loc. Gârbovăţ in Valea Mare through meadows, but rare.

Family Apiaceae (Umbelliferae**)**

Bupleurum praealtum L. loc. Şopotu Nou in the forest on rocky coasts, at Dracului Lake.

Family Brassicaceae (Cruciferae**)**

Erysimum odoraturn Ehrh. (E. pannonicum Crantz.) f. *umbrosum* Jáv. loc. Bozovici below Cununa Gosnei on limestone cliffs; Şopotu Nou, in Nera Gorges at the peak; Dracului Lake in forest on limestone cliffs.

Arabis turrita L. loc. Bozovici at Bigar in Miniş Gorges.

Alyssum alyssoides (L.) L. f. *incanum* (Heuff.) loc. Bozovici on Cârst Hill through meadow.

Draba nemorosa L. loc. Bozoviei on Cununa Gosnei on rocky limestone.

Lepidium virginicum L. loc. Şopotu Vechi at Glimeica die along the road, loc. Bozovici very abundant along the village roads.

Family Primulaceae

Lysimachia nummularia L. f. *bravipedunculata* (Opiz.) Nyár. loc. Gârbovăţ; on gravel of Valea Mare stream.

Family Oleaceae

Fraxinus ornus L. loc. Lăpuşnicul Mare on Lăpuşnicului Valley at forest edge.

Family Solanaceae

Scopolia carniolica Jacq. loc. Bozovici on Miniş Valley along the road to Anina, over rocks.

Family Borraginaceae

Anchusa officinalis L. var. *vulgaris* Kit. f. *pinguin* (Dum.) Guşul, loc. Bozovici along the river Nera in warblers.

Family Lamiaceae (Labiatae)

Ballota nigra L. f. *leucantha* Beck. loc. Gârbovăţ in village, in the school yard.

Acinos alpinus (L.) Moench. (*Calamintha alpine* (*C. alpina* subsp. *hungarica* (Simonkai) Havek. loc. Bozovici at Bigar in Miniş Gorges; on rocks in Văleaşca Valley.

Mentha pulegium L. f. *erecta* (Mill.) loc. Bozovici towards Prilipeţi village in swampy places near the river Nera.

Family Scrophulariaceae

Kickxia elatine (L.) Dumort. f. *banatica* (Heuff.) Jáv. loc.Gârbovăţ; at Selişte in crops.

Digitalis grandiflora Mill, loc. Gârbovăţ, on Valea Mare through meadows.

Euphrasia officinalis L. loc. Bozovici in Miniş Gorges, in Văleasca Valley on limestone scree.

Melamphyrum cristatum L. loc. Bozovici in forest at Bigar, in Miniş Valley along the road.

M. arvense L. loc. Gârbovăţ on Viilor Hill, in meadows.

M. bihariense A. Kerner. loc. Bozovici in forest at Bigar, along Minişului Valley along the roads.

Family Gampanulaceae

Campanula grandiflora L. loc. Gârbovăţ on Valea Mare in meadows.

Family Dipsacaceae

Knautia arvensis Coulter. loc. Bozovici on Voicovacea Hill through meadows; Gârbovăţ on Anghel Hill in meadows.

Family Asteraceae (Compositae)

Aster linosyris L. loc. Garbovaţ on Valea Mare in meadows.

Filago vulgaris Lam. (*F. germanica* L. non Hudson) loc. Gârbovăţ at Gorunu Trăznit in dry grassland.

F. minima (Sm.) Pers. (*F. montana* L.) loc. Gârbovăţ at Gorunu Trăznit in meadows.

Gnaphalium sylvaticum L. loc. Gârbovăţ; on Valea Mare along the roads, in forest.

Inula hirta L. loc. Gârbovăţ on Ogaşu Rău, in meadow.

Crepis biennis L. var. *lacera* Wimm. et Grab f. *banatica*, Loc. Gârbovăţ in the village, in house yard, rare.

Family Liliaceae

Gagea lutea (L.) Ker.-Gawl. Loc. Şopotu Vechi on Şopotului Valley, in forest.

Family Qrchidaceae

Gymnadenia conopsea (L.) Br. loc. Gârbovăţ at Răchită in meadows, rare in association with *Orchis coriophora* L.

Family Poaceae (Gramineae)

Sesleria filifolia Hoppe. loc. Bozovici, in Gorge Miniş, Coronini waterfall on limestone cliffs.

Stipa pennata L. subsp. *pennata* (*S. joannis* Celak.) loc. Bozovici in meadows, at Babiţu Mic.

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PART II – ANIMAL BIOLOGY

A NEW RECORD OF THE HERMIT BEETLE IN ROMANIA

DORIN A. POP[1]

ABSTRACT

I refer in this note to a new record of a specimen of Hermit beetle (*Osmoderma eremita,* Scopoli, 1763). The beetle was found during a field practice, on Lotrişor Valley, in Cozia National Park, Valcea County, Romania.

Key words: *Osmoderma eremita*, saproxylic, Cozia

The Hermit beetle (*Osmoderma eremita*, Scopoli, 1763; Coleoptera: Cetoniidae) is the only representative species of genus *Osmoderma* in Europe (although there are several discussions whether some subspecies could not be actually distinct species of *Osmoderma*; in this note I follow the approach of Ranius et al. 2005, treating *Osmoderma*'s subspecies provisionally as a single species). It is included in Annex II of the EU Habitat Directive, as priority species (Anonymous 1992) and listed by the Bern Convention, being regarded as highly endangered over its entirely distributional range (Luce 1996 and Schaffrath 2003, cited by Oleksa 2007).

The larvae develop in tree hollows of standing trees and very few observations of larvae have been observed in dead logs on the ground. As long as there is a suitable tree hollow with wood mould, it appears that it may use the following species: Oaks (Quercus spp. are the trees mainly used by it), followed by lime (Tilia spp.), willow (Salix spp.), beech (Fagus sylvatica) and fruit trees (Prunus spp., Pyrus spp., Malus domestica) (Th. Ranius et al. 2005), poplar (Populus spp.) (Panin 1957).

Ecological studies of it support the view that each tree possibly sustains a local population and that the populations in stands together form a metapopulation (Ranius and Hedin 2000, Ranius 2001, Ranius 2002a).

A study in south–eastern Sweden showed that in sites with tree hollows, those with *O. eremita* present have a higher species richness of other threatened beetle species associated with tree hollows (Ranius 2002b). Therefore *O. eremita* is useful as an indicator and umbrella species for the preservation of the entire invertebrate community associated with hollow trees in Europe (Ranius et al. 2005).

In Romania, the species is said to be spread from the ante-steppe up to the beech zone (Panin 1957). There are 27 localities with O. eremita recordings. At ten of these, records have not been made since 1911 (Fleck 1904–1906; Petri 1912, cited by Ranius et al. 2005), which can be explained by the low search effort (Ranius et al. 2005). O. eremita occurs in oak or mixed forests along the Danube alluvial plain (Ranius et al. 2005), in various decidous tree (apple, plum, poplar) (Panin 1957) and in beech (Fagus sp.) or hornbeam (Carpinus spp.) mixed forests at the foot of the Carpathians (Ranius et al. 2005).

The specimen – a female Hermit beetle - was found on 31.07.2008, on the forestry road along the Lotrişor Valley, not very far from the entrance on it, inside Cozia National Park and Natura 2000 sit (SCI and SPA), Vâlcea County. Approximate coordinates (I didn't use a GPS, so the localization was made post-factum on GoogleEarth) were N 45°18'12", E 24°16'58" and approximate altitude 350 m. Weather was changing, partially overcast sky, insignifiant precipitation. The habitat for the recording site is „Subcarpathian oak (*Q. dalechampii*, *Q. polycarpa*, *Q. petraea*) and hornbean (*C. betulus*) forests with *Carex pilosa*, in complex with termophylous forests" (Donita et al. 1992), typical for Hermit beetle.

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Table 1 - Recordings of Hermit Beetle for Romania found in literature

County	Locality	Year	Citation
Argeş	Curtea de Argeş	-	Panin 1957
Braşov	Braşov	before 1912	Panin 1957, Ranius et al. 2005
	Cincu	before 1912	Panin 1957, Ranius et al. 2005
	Mt.Postăvaru	-	Panin 1957
Cluj	Cheile Turzii	1969	Ranius et al. 2005
	Baciu, Cluj–Napoca	1994	Ranius et al. 2005
Dolj	Caracal	1969	Ranius et al. 2005
	Bucovăț	1968	Ranius et al. 2005
	Lintesti	1967	Ranius et al. 2005
	Leamna	1969	Ranius et al. 2005
	Racoviță	1985	Ranius et al. 2005
	Craiova	1968	Ranius et al. 2005
	Banu Mărăcine	1968	Ranius et al. 2005
	Negoiu	1966	Ranius et al. 2005
	Salcia	1970	Ranius et al. 2005
Giurgiu	Comana	-	Panin 1957
Gorj	Cărbunești	1967	Ranius et al. 2005
	Cheile Sohodol	1999	Ranius et al. 2005
	Tismana	1965	Ranius et al. 2005
Hunedoara	Hațeg	before 1912	Panin 1957, Ranius et al. 2005
	Deva	before 1912	Panin 1957, Ranius et al. 2005
	Brad	before 1912	Panin 1957, Ranius et al. 2005
Ilfov	Căldărușani	-	Panin S. 1957
Mehedinți	Olăneşti	1954	Ranius et al. 2005
		1992	Ranius et al. 2005
Mureş	Sighișoara	before 1912	Panin 1957, Ranius et al. 2005
	Reghin	before 1912	Panin 1957, Ranius et al. 2005
Prahova	Nucet	-	Panin S. 1957
Sibiu	Sibiu	before 1912	Panin 1957, Ranius et al. 2005
	Făgăraș	before 1912	Panin 1957, Ranius et al. 2005
	Mediaș	before 1912	Panin 1957, Ranius et al. 2005

The recording suggests that the site may support a metapopulation of Hermit beetle, knowing that the species is phylopatric, with low dispersal rate (about 12-18%) and short range of dispersal (Hedin et al. 2007, Ranius & Hedin 2000), that one hollow tree may harbour one population and that nearby populations vary through years asinchronously (Ranius 2001).

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COMPLEXUL MUZEAL DE ŞTIINȚELE NATURII „ION BORCEA" BACĂU

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RESEARCHES CONCERNING THE DIVERSITY OF SCARABEOID DUNG BEETLES (COLEOPTERA, SCARABAEOIDEA) FROM THE MEADOW OF SIRET RIVER AREA (HOLT VILLAGE, LETEA VECHE COMMUNE)

MIHAELA ARINTON[1]

ABSTRACT

The researches concerning the diversity of scarabeoid dung beetles from the meadow of Siret River area were made in 2004-2006. The material was collected weekly, from May to September. Thus, for every year of study there have been analyzed 16 samples (16 weeks of study - year). 11,588 coprophagous specimens were collected in the three years of study (48 weeks of study in 2004-2006). Systematically, these insects belong to 28 de specii.

For the coprophagous scarabeiods collected from the meadow of Siret River area, the value of the Simpson diversity index was 10.02 and the Shannon-Wiener index was 3.67363. The theoretical number of species that corresponds to the value of this last index is 18, but for the studied area there have been identified 28 species. This fact explains the value of the equitability – 64.28%. Also, from the twenty-eight species collected from the cattle pastures of Holt Village (Letea Veche Commune) *Onthophagus taurus* Schr. was the dominant species – it was represented by the largest number of specimens (2,083 insects, respectively 17.97%). This species was followed by *Euoniticellus fulvus* Goeze with 1,638 specimens (14.13%). *Aphodius fimetarius* L., *Caccobius schreberi* L. and *Colobopterus erraticus* L. were also very well represented – over 1,000 specimens (over 8%).

Key words: coprophagous, scarabeoid dung beetles, diversity

Introduction

The dung beetles are represented by many species which are included in two scarabeoid families: Scarabaeidae (Aphodiinae, Scarabaeinae and Coprinae) and Geotrupidae (Geotrupinae). Both stages – adults and their larvae – feed with faces. For finding the food, the adults use olfactory and tactile stimuli. Their antennae detect the odours of the faces. After they found a dung pad, the adults burrow into or under the dung. All the coprophagous beetles are very good diggers. The insects dig tunnels in the soil where they deposit faces for them or for their springs.

As it is already know, the scarabeoid dung beetles have a very important role in nature. They aid in the decomposition of dung. These coleopterans incorporate the dung into the soil and in that way they play an important role in increasing the soil fertility and they also assure the nutrient cycling. Rapidly, their abundant populations succeed in removing the dung from the pasture, increasing the development of the vegetation (4).

Material and methods

The researches concerning the diversity of scarabeoid dung beetles from the meadow of Siret River area were made during 2004-2006. The insects were collected from the cattle pastures of Holt Village (Letea Veche Commune). In every year of study, the material was collected weekly, from May to September – 16 samples / year. The samples were represented by similar quantities of dung (approximately ten dung pads and the soil below). The author investigated only faces populated by beetles. The material was identified using the specialty literature (1, 3, 5).

In order to evaluate the diversity situation of the coprophagous species from the meadow of Siret River area, the author calculate some diversity indexes: the Simpson diversity index, the Shannon-Wiener index, the theoretical diversity and the equitability (6).

The taxonomy and nomenclature used in this paper is in accordance with Fauna Europaea.

Results and discussions

The material analyzed in this paper is represented by 11,588 specimens of scarabeoid dung beetles collected during 2004-2006, from the meadow of Siret River area. Systematically, these coleopterans belong to 28 species included into eighteen genera, respectively, into two families: Geotrupidae (one subfamily – Geotrupinae) and Scarabaeidae (with two subfamilies – Aphodiinae and Scarabaeinae).

In table no. 1 there are presented the coprophagous species collected during 2004-2006 from the cattle pastures of Holt Village (Letea Veche Commune). In this table, the species were mentioned in the descending order of the values of their abundance index.

Analyzing the results it is easy to remark that *Onthophagus taurus* Schr. was the dominant species – it was represented by the largest number of specimens (2,083 insects, respectively 17.97%). This species was followed by *Euoniticellus fulvus* Goeze with 1,638 specimens (14.13%).

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Table 1 - Scarabeoid dung beetles species collected from the meadow of Siret River area (Holt Village, Letea Veche Commune), during 2004-2006 (1-16 – the weeks of study)

No.	Species		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
1.	*Onthophagus taurus* Schr.	2004	36	43	86	89	45	12	3	25	27	19	58	38	67	9	16	17	590
		2005	40	46	124	87	99	12	21	29	24	18	54	226	41	28	46	31	926
		2006	29	37	57	79	41	10	18	11	22	21	49	98	37	14	26	18	567
		T	**105**	**126**	**267**	**255**	**185**	**34**	**42**	**65**	**73**	**58**	**161**	**362**	**145**	**51**	**88**	**66**	**2083**
2.	*Euoniticellus fulvus* Goeze	2004	10	31	14	5	3	40	14	384	128	49	28	14	19	8	22	18	787
		2005	13	29	10	8	23	1	14	28	27	49	133	47	33	21	24	15	472
		2006	11	24	10	4	11	15	10	12	95	25	81	21	18	10	19	13	379
		T	**34**	**84**	**34**	**17**	**37**	**56**	**38**	**424**	**250**	**120**	**242**	**82**	**70**	**39**	**65**	**46**	**1638**
3.	*Aphodius fimetarius* L.	2004	10	2	4	2	6	66	59	75	31	3	4	-	-	-	15	23	300
		2005	11	1	1	1	6	45	121	293	71	32	5	2	-	-	2	18	609
		2006	13	1	5	-	8	47	98	134	81	28	8	-	4	-	7	21	455
		T	**34**	**4**	**10**	**3**	**20**	**158**	**278**	**502**	**183**	**63**	**17**	**2**	**4**	**-**	**24**	**62**	**1364**
4.	*Caccobius schreberi* L.	2004	15	21	52	29	11	10	18	61	47	10	19	12	14	3	14	12	348
		2005	11	23	72	63	27	1	11	18	15	64	110	84	47	19	7	6	578
		2006	9	15	17	17	9	8	17	23	14	29	53	33	21	8	9	12	294
		T	**35**	**59**	**141**	**109**	**47**	**19**	**46**	**102**	**76**	**103**	**182**	**129**	**82**	**30**	**30**	**30**	**1220**
5.	*Colobopterus erraticus* L.	2004	8	11	12	5	10	11	12	20	2	28	4	2	34	12	3	17	191
		2005	6	9	13	8	22	8	43	41	5	38	42	226	56	18	4	12	551
		2006	10	13	9	7	8	10	22	1	1	20	26	81	27	11	6	18	270
		T	**24**	**33**	**34**	**20**	**40**	**29**	**77**	**62**	**8**	**86**	**72**	**309**	**117**	**41**	**13**	**47**	**1012**
6.	*Onthophagus illyricus* Scop.	2004	10	11	24	25	29	5	2	6	8	15	36	9	12	4	6	12	214
		2005	7	9	16	11	27	1	22	14	18	17	33	59	26	17	20	23	320
		2006	9	13	36	23	28	2	13	7	14	8	27	54	23	6	12	16	291
		T	**26**	**33**	**76**	**59**	**84**	**8**	**37**	**27**	**40**	**40**	**96**	**122**	**61**	**27**	**38**	**51**	**825**
7.	*Onthophagus ruficapillus* Brullé	2004	21	37	18	20	2	1	-	-	6	37	5	-	1	-	-	-	148
		2005	29	43	28	18	3	17	21	19	3	15	64	95	7	-	5	-	367
		2006	12	28	7	24	-	8	-	-	5	16	19	16	6	-	3	-	144
		T	**62**	**108**	**53**	**62**	**5**	**26**	**21**	**19**	**14**	**68**	**88**	**111**	**14**	**-**	**8**	**-**	**659**
8.	*Acanthobodilus immundus* Creutz.	2004	-	5	9	7	19	33	54	79	57	19	12	9	7	6	5	5	326
		2005	-	8	29	24	8	-	-	-	12	9	13	11	15	8	-	4	141
		2006	-	6	-	1	5	14	20	-	23	-	21	13	10	12	3	6	134
		T	**-**	**19**	**38**	**32**	**32**	**47**	**74**	**79**	**92**	**28**	**46**	**33**	**32**	**26**	**8**	**15**	**601**
9.	*Onthophagus furcatus* Fabr.	2004	11	34	25	19	-	3	-	2	-	15	4	-	5	-	-	1	119
		2005	8	48	40	31	-	-	2	3	-	-	5	3	34	-	7	1	182
		2006	4	31	-	-	-	1	-	-	-	5	7	5	18	-	4	-	75
		T	**23**	**113**	**65**	**50**	**-**	**4**	**2**	**5**	**-**	**20**	**16**	**8**	**57**	**-**	**11**	**2**	**376**

No.	Species		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
10.	*Eupleurus subterraneus* L.	2004	4	1	1	-	4	3	12	57	42	-	4	-	3	-	-	-	131
		2005	5	1	1	-	-	15	9	14	23	39	4	6	2	-	-	-	119
		2006	2	-	-	-	4	8	18	9	7	1	8	-	8	-	-	-	65
		T	**11**	**2**	**2**	**-**	**8**	**26**	**39**	**80**	**72**	**40**	**16**	**6**	**13**	**-**	**-**	**-**	**315**
11.	*Onthophagus ovatus* L.	2004	17	23	13	11	-	-	-	-	4	-	-	-	1	-	-	-	69
		2005	15	24	17	10	1	6	3	4	2	4	18	55	4	-	1	-	164
		2006	10	19	11	9	-	1	-	-	2	5	5	8	1	-	-	-	71
		T	**42**	**66**	**41**	**30**	**1**	**7**	**3**	**4**	**8**	**9**	**23**	**63**	**6**	**-**	**1**	**-**	**304**
12.	*Onthophagus nuchicornis* L.	2004	-	27	3	2	-	-	-	6	1	3	5	1	2	2	-	1	53
		2005	-	29	25	22	1	2	4	4	2	7	28	12	6	2	4	2	150
		2006	-	18	-	1	1	1	-	-	1	2	14	5	4	1	1	1	50
		T	**-**	**74**	**28**	**25**	**2**	**3**	**4**	**10**	**4**	**12**	**47**	**18**	**12**	**5**	**5**	**4**	**253**
13.	*Bodilus lugens* Creutzer	2004	-	-	2	1	-	2	15	4	22	3	12	-		17	8	18	104
		2005	-	1	1	1	-	-	3	4	7	4	4	1	19	21	-	14	80
		2006	-	-	1	-	-	1	8	-	13	-	7	-	3	15	5	12	65
		T	**-**	**1**	**4**	**2**	**-**	**3**	**26**	**8**	**42**	**7**	**23**	**1**	**22**	**53**	**13**	**44**	**249**
14.	*Copris lunaris* L.	2004	-	-	3	4	-	2	-	-	-	-	1	1	4	28	9	22	74
		2005	-	-	1	1	2	1	2	-	-	-	1	-	2	13	8	11	42
		2006	-	-	7	6	-	1	-	-	-	-	-	2	6	17	6	18	63
		T	**-**	**-**	**11**	**11**	**2**	**4**	**2**	**-**	**-**	**-**	**2**	**3**	**12**	**58**	**23**	**51**	**179**
15.	*Otophorus haemorrhoidalis* L.	2004	-	-	3	3	41	9	8	29	5	1	1	-	5	1	-	-	106
		2005	2	-	7	4	-	-	5	3	3	10	5	1	-	2	1	-	43
		2006	-	-	-	1	2	1	5	-	-	2	3	-	-	3	-	-	17
		T	**2**	**-**	**10**	**8**	**43**	**10**	**18**	**32**	**8**	**13**	**9**	**1**	**5**	**6**	**1**	**-**	**166**
16.	*Onthophagus vacca* L.	2004	-	3	2	1	1	1	-	2	-	5	4	1	-	-	-	1	21
		2005	1	2	1	-	6	-	2	5	-	10	10	17	6	-	1	1	62
		2006	-	1	1	1	2	-	1	-	-	-	6	11	4	-	2	-	29
		T	**1**	**6**	**4**	**2**	**9**	**1**	**3**	**7**	**-**	**15**	**20**	**29**	**10**	**-**	**3**	**2**	**112**
17.	*Aphodius foetens* Fabr.	2004	-	-	-	-	-	2	-	-	2	1	7	4	8	13	-	1	38
		2005	-	-	-	-	-	-	-	-	2	1	1	-	4	5	1	1	15
		2006	-	-	-	-	-	-	-	-	1	-	2	7	11	7	-	-	28
		T	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**5**	**2**	**10**	**11**	**23**	**25**	**1**	**2**	**81**
18.	*Coprimorphus scrutator* Herbst	2004	-	-	-	1	-	-	-	-	-	-	-	-	-	14	3	1	19
		2005	-	-	1	2	-	-	-	-	-	-	-	1	7	10	-	1	22
		2006	-	-	-	2	-	-	-	2	-	1	-	-	5	8	2	2	22
		T	**-**	**-**	**1**	**5**	**-**	**-**	**-**	**2**	**-**	**1**	**-**	**1**	**12**	**32**	**5**	**4**	**63**
19.	*Geotrupes puncticollis* Malin.	2004	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	1	3
		2005	-	-	-	-	-	-	-	-	-	-	-	2	11	-	1	1	15
		2006	-	-	-	-	-	-	-	-	-	-	2	-	3	-	2	1	8

No.	Species		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
		T	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**3**	**2**	**14**	**-**	**3**	**3**	**26**
20.	*Teuchestes fossor* L.	2004	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2
		2005	1	1	-	-	-	-	5	-	1	3	-	-	-	-	-	-	11
		2006	1	-	2	-	-	-	-	5	1	2	-	-	-	-	-	-	11
		T	**2**	**2**	**2**	**-**	**-**	**-**	**5**	**5**	**3**	**5**	**-**	**-**	**-**	**-**	**-**	**-**	**24**
21.	*Oxyomus sylvestris* Scop.	2004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		2005	-	-	-	-	-	5	3	2	-	-	1	-	-	-	-	-	11
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		T	**-**	**-**	**-**	**-**	**-**	**5**	**3**	**2**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**11**
22.	*Calamosternus granarius* L.	2004		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		2005	1	-	5	3	-	-	-	-	-	-	-	-	-	-	-	-	9
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		T	**1**	**-**	**5**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**9**
23.	*Anoplotrupes stercorosus* Scriba	2004	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	1	4
		2005	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	2
		2006	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	2
		T	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**4**	**2**	**-**	**-**	**-**	**2**	**8**
24.	*Onthophagus vitulus* Fabr.	2004	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
		2005	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
		2006	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
		T	**-**	**-**	**-**	**2**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**4**
25.	*Onthophagus fracticornis* Preyss.	2004	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
		2005	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		T	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**2**
26.	*Agrilinus rufus* Moller	2004	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		T	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
27.	*Trichonotulus scrofa* Fabr.	2004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		2006	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
		T	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
28.	*Bodilus ictericus* Laich.	2004	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		T	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
TOTAL			**403**	**730**	**827**	**695**	**515**	**444**	**719**	**1435**	**880**	**690**	**1079**	**1295**	**712**	**393**	**340**	**431**	**11588**

These results are also well represented in figure no. 1. According to the same graphic, the species: *Aphodius fimetarius* L., *Caccobius schreberi* L. and *Colobopterus erraticus* L. were also very well represented – over 1,000 specimens (over 8%). Seven species have had less than ten specimens (maximum 0.007%).

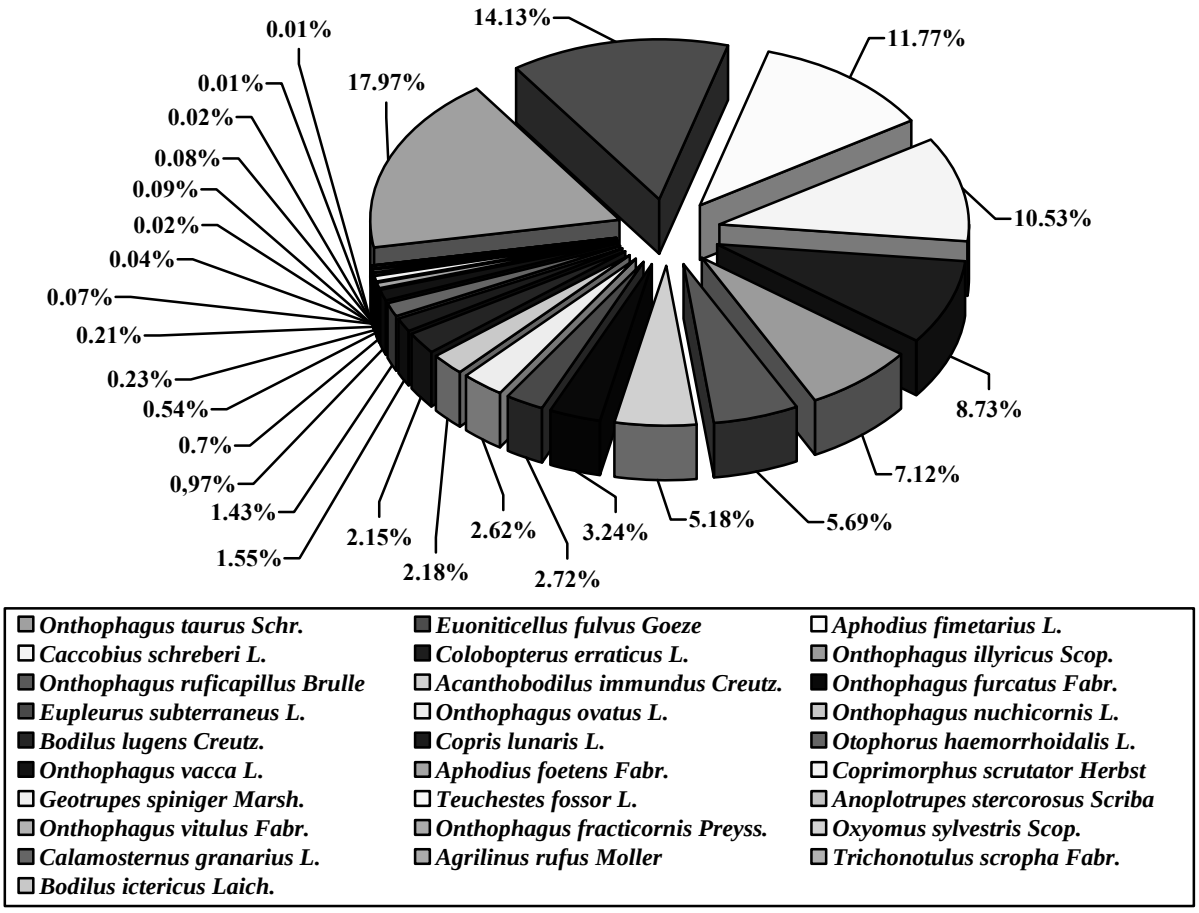

Fig. 1 – The percentages distribution of scarabeoid dung beetles species collected from the meadow of Siret River area, during 2004-2006

From the twenty-eight species collected from the cattle pastures of Holt Village (Letea Veche Commune), eight species (*Onthophagus taurus* Schr., *Euoniticellus fulvus* Goeze, *Aphodius fimetarius* L., *Caccobius schreberi* L., *Colobopterus erraticus* L., *Onthophagus illyricus* Scop., *Onthophagus ruficapillus* Brullé, *Acanthobodilus immundus* Creutz.) were represented by over 600 of individuals. The author studied the numerical dynamic of these eight species during 2004-2006 – Fig. 2.

For evaluating the diversity situation of the coprophagous species from the meadow of Siret River area it was necessary to calculate some diversity indexes: *the Simpson diversity index, the Shannon-Wiener index*, *the theoretical diversity* and *the equitability*. These indexes were calculated with the aid of data presented in table no. 2

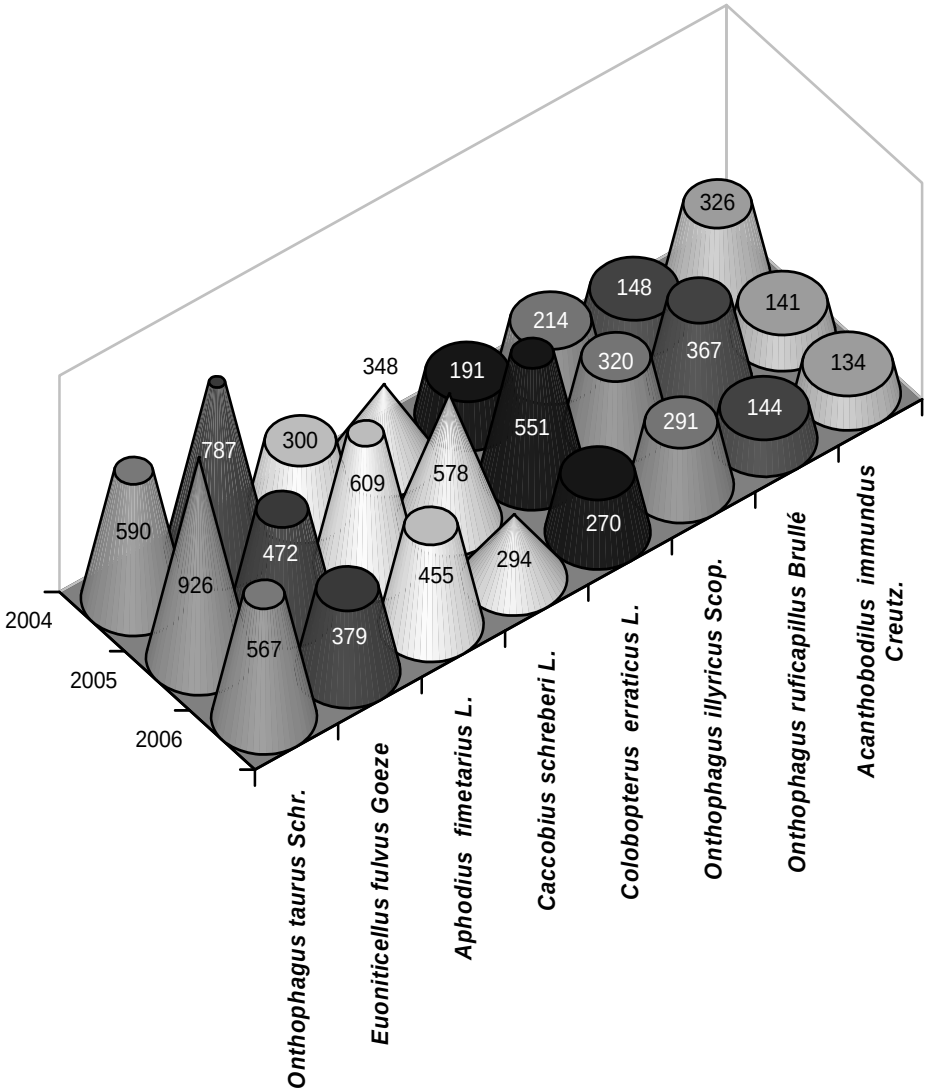

Fig. 2 – The numerical dynamic of copropfagous species: *Onthophagus taurus* Schr., *Euoniticellus fulvus* Goeze, *Aphodius fimetarius* L., *Caccobius schreberi* L., *Colobopterus erraticus* L., *Onthophagus illyricus* Scop., O*nthophagus ruficapillus* Brullé, *Acanthobodilus immundus* Creutz., during 2004-2006, from the meadow of Siret River area

For evaluating the diversity situation of the coprophagous species from the meadow of Siret River area it was necessary to calculate some diversity indexes: *the Simpson diversity index, the Shannon-Wiener index*, *the theoretical diversity* and *the equitability*. These indexes were calculated with the aid of data presented in table no. 2.

For the scarabeoid dung beetles species collected from the cattle pastures of Holt Village (Letea Veche Commune), during 2004-2006, the value of the Simpson diversity index was 10.02; the , the Shannon-Wiener index was 3.67363. The theoretical number of species was eighteen, but for the studied area were identified twenty-eight species. That is way the value of equitability was 64.28%. These results can be explain by the fact that from the twenty-eight species collected, *Onthophagus taurus* Schr. was the most well represented species (2,083 specimens). It was followed by *Euoniticellus fulvus* Goeze (1,638 de individuals). *Aphodius fimetarius* L., *Caccobius schreberi* L. and *Colobopterus erraticus* L. were represented by over 1,000 specimens).

Table 2 – Necessary data for calculating the diversity indexes for the coprophagous species collected from the meadow of Siret River area, during 2004-2006

No.	Species	n	n-1	n(n-1)	$\log_{10}n$	$n\log_{10}n$
1.	*Onthophagus taurus* Schr.	2,083	2,082	4,336,806	3.31869	6,912.83127
2.	*Euoniticellus fulvus* Goeze	1,638	1,637	2,681,406	3.21431	5,265.03978
3.	*Aphodius fimetarius* L.	1,364	1,363	1,859,132	3.13481	4,275.88084
4.	*Caccobius schreberi* L.	1,220	1,219	1,487,180	3.08636	3,765.35920
5.	*Colobopterus erraticus* L.	1,012	1,011	1,023,132	3.00518	3,041.24216
6.	*Onthophagus illyricus* Scop.	825	824	679,800	2.91645	2,406.07125
7.	*Onthophagus ruficapillus* Brullé	659	658	433,622	2.81888	1,857.64192
8.	*Acanthobodilus immundus* Creutz.	601	600	360,600	2.77887	1,670.10087
9.	*Onthophagus furcatus* Fabr.	376	375	141,000	2,57519	968,27144
10.	*Eupleurus subterraneus* L.	315	314	98,910	2.49831	786.96765
11.	*Onthophagus ovatus* L.	304	303	92,112	2.48287	754.79248
12.	*Onthophagus nuchicornis* L.	253	252	63,756	2.40312	607.98936
13.	*Bodilus lugens* Creutzer	249	248	61,752	2.39620	596,65380
14.	*Copris lunaris* L.	179	178	31,862	2.25285	403.26015
15.	*Otophorus haemorrhoidalis* L.	166	165	27,390	2.22011	368,53826
16.	*Onthophagus vacca* L.	112	111	12,432	2.04922	229.51264
17.	*Aphodius foetens* Fabr.	81	80	6,480	1.90848	154.58688
18.	*Coprimorphus scrutator* Herbst	63	62	3,906	1.79934	113.35842
19.	*Geotrupes puncticollis* Malin.	26	25	650	1.41497	36.78922
20.	*Teuchestes fossor* L.	24	23	552	1.38021	33.12504
21.	*Oxyomus sylvestris* Scop.	11	10	110	1.04139	11.45529
22.	*Calamosternus granarius* L.	9	8	72	0.95424	8,58816
23.	*Anoplotrupes stercorosus* Scriba	8	7	56	0.90309	7.22472
24.	*Onthophagus vitulus* Fabr.	4	3	12	0.60206	2.40824
25.	*Onthophagus fracticornis* Preyss.	2	1	2	0.30103	0.60206
26.	*Agrilinus rufus* Moller	2	1	2	0.30103	0.60206
27.	*Trichonotulus scropha* Fabr.	1	0	0	0	0
28	*Bodilus ictericus* Laich.	1	0	0	0	0
	Total	**11,588 N**	**11,560 Σ(n-1)**	**13,402,734 Σn(n-1)**	**53.75726 $\Sigma\log_{10}n$**	**34,278.89316 $\Sigma n\log_{10}n$**

The Simpson diversity index:

$$D = \frac{N(N-1)}{\sum n(n-1)},$$

$$D = \frac{11588 \cdot 11587}{13402734} = \frac{134270156}{13402734} = 10.02$$

The Shannon-Wiener index:

$$H(S) = \frac{K}{N}(N \cdot \log_{10} N - \sum_{n=1}^{S} n \cdot \log_{10} n),$$

$$H(28) = \frac{3.321928}{11588}\left(11588 \cdot \log_{10} 11588 - \sum_{n=1}^{28} n \cdot \log_{10} n\right)$$

$$H(28) = \frac{3.321928}{11588}(11588 \cdot 4.06401 - 34278.89316)$$

$$H(28) = \frac{3.321928}{11588}(47093.74788 - 34278.89316)$$

$$H(28) = \frac{3.321928}{11588}12814.85472 = \frac{42570.02471}{11588}$$

$$H(28) = 3.67363$$

The theoretical diversity:

$$H(S)_{max.} = K \cdot \log_{10} S,$$

$$H(28)_{max.} = 3.321928 \cdot \log_{10} 28$$

$$H(28)_{max.} = 3.321928 \cdot 1.44716 = 4.80736$$

The equitability:

$$E = \frac{S'}{S} \cdot 100, \quad E = \frac{18}{28} \cdot 100 = 64.28\%$$

Conclusions

1. For studying the diversity of scarabeoid dung beetles from the meadow of Siret River area it was necessary to investigate 11,588 insects collected in 2004, 2005 and 2006. Systematically, this entomological material belong to twenty-eight species, included into two families (Geotrupidae and Scarabaeidae), three subfamilies (Geotrupinae, Aphodiinae and Scarabaeinae), and eighteen genera.

2. From the twenty-eight species collected from the cattle pastures of Holt Village (Letea Veche Commune), *Onthophagus taurus* Schr. was the dominant species (17.97%). This species was followed by *Euoniticellus fulvus* Goeze (14.13%), *Aphodius fimetarius* L. (11.77), *Caccobius schreberi* L. (10.53%) and *Colobopterus erraticus* L. (8.73%). Seven species have had less than ten specimens (maximum 0.007%).

3. Eight species: *Onthophagus taurus* Schr., *Euoniticellus fulvus* Goeze, *Aphodius fimetarius* L., *Caccobius schreberi* L., *Colobopterus erraticus* L., *Onthophagus illyricus* Scop., *Onthophagus ruficapillus* Brullé, *Acanthobodilus immundus* Creutz.) were represented by over 600 of individuals (over 5%). This paper presents the numerical dynamic for these eight species during 2004-2006.

4. Studying the diversity of the coprophagous species from the meadow of Siret River area, it have been necessary to calculate the next diversity indexes: the Simpson diversity index (D = 10.02), the Shannon-Wiener index (H(28) = 3.67363), the theoretical diversity (H(28)max. = 7.80736) and the equitability (E = 64.28%).

Rezumat

Cercetările asupra faunei de scarabeoidee coprofage din zona de luncă a Siretului au fost realizate în perioada 2004-2006, materialul fiind colectat săptămânal, începând din luna mai şi până în septembrie. Astfel, pentru fiecare an, am analizat 16 probe (ceea ce corespunde la tot atâtea săptămâni de studiu). În total, în cele 48 de săptămâni de studiu (2004-2006), au fost colectate 11.588 de scarabeoidee coprofage, care din punct de vedere sistematic aparţin la 28 de specii.

Pentru scarabeoideele coprofage colectate în zona de luncă a Siretului, indicele de diversitate Simpson are valoarea 10,02, iar indicele de diversitate Shannon-Wiener - 3,67363. Numărul teoretic de specii corespunzător acestui indice este 18 şi întrucât numărul de specii identificate este 28, echitabilitatea este de 64,28%. Din cele 28 de specii coprofage identificate, *Onthophagus taurus* Schr. a fost reprezentată prin cel mai mare număr de indivizi (2.083 de exemplare). Ea a fost urmată de *Euoniticellus fulvus* Goeze (1.638 de indivizi). Foarte bine reprezentate au fost şi speciile: *Aphodius fimetarius* L., *Caccobius schreberi* L. şi *Colobopterus erraticus* L. (care au avut peste 1.000 de indivizi).

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THE CATALOG OF CLICK BEETLES SPECIES (COLEOPTERA: ELATERIDAE) FROM THE COLLECTION OF THE NATURAL SCIENCES MUSEUM PIATRA NEAMȚ

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ABSTRACT

The paper is a catalog of click beetles species (Coleoptera: Elateridae) preserved in the collection of the Museum of Natural Sciences Piatra Neamț. The 443 museum collection specimens were identified belonging to family Elateridae, they were collected during the period between the years 1966-2001. The systematic used in this catalog is the one proposed by Crowson in 1981.

Key words: click beetles, collection, museum, Piatra Neamț.

Introduction

Elateridae family counts about 10,000 species known to be spread in all regions of the world except the polar one (Platia 1994; Sancez, 1998).

Adults occur in most species, in April-May and by species are diurnal, crepuscular or nocturnal. Larvae develop in soil, Poliporacee or rotten wood. Species whose larval development takes place in wood and Poliporacee are exclusively carnivorous in advances stages, feeding on the larvae of Cerambicidae, Cetoniidae or Curculionidae. Species whose larvae develop in soil are mostly phytophagus.

The fauna of Europe quoted so far 693 species (Fauna Europaea) and for Central European area a number of 199 species belonging to 61 genera. Out of the species quoted for central Europe, in the fauna of our country have been identified, so far, 142 species belonging to the Elateridae family placed in 58 genera of 7 subfamilies.

Material and methods

The material studied is part of the entomological collections of the Museum of Natural Sciences Piatra Neamț. There were analyzed 443 specimens belonging to the Elateridae family, collected between the years 1966 - 2001 from 38 localities generally spread in the Neamț district. Systematic used in this catalog is the one proposed by Crowson (1981). Most of the specimens were collected by Mrs. Maria Apetrei.

Data collection are presented for each species separately in alphabetical order of collection places. The specimens studied were collected directly from plants or with entomological net.

1. Agapia (NT)
2. Almaş (NT)
3. Ardeluța (NT)
4. Balaur Hill (NT)
5. Bâtca Doamnei (NT)
6. Bicaz (NT)
7. Bicaz Gorges (NT)
8. Bicăjel (NT)
9. Bisericani (NT)
10. Bistricioara (Lutărie) (NT)
11. Broşteni (NT)
12. Bursucărie (Scheia) (IS)
13. Brusturi (NT)
14. Ceahlău (NT)
15. Cernegura (NT)
16. Cozla Hill (P. Neamț) (NT)
17. Crăcăoanei (NT)
18. Dărmăneşti (NT)
19. Doamana (NT)
20. Dobreni (NT)
21. Dulceşti (NT)
22. Durău (NT)
23. Farcaşa (NT)
24. Gârcina (NT)
25. Ghilcaş Mount. (NT)
26. Horaița (NT)
27. Izvorul Muntelui (NT)
28. Lacul Roşu (NT)
29. Mărgineni (NT)
30. Minteana Hill (P. Neamț) (NT)
31. Piatra Neamț (NT)
32. Pietricica (NT)
33. Poiana (NT)
34. Potoci (NT)
35. Târgu Neamț (Horaviţa) (NT)
36. Tazlău (NT)
37. Târpeşti (NT)
38. Vulpii Hill (P. Neamț) (NT)

Results and discussion

In the material studied we identified specimens belonging to 35 species and 14 genera of the following subfamilies: Pyrophorinae, Elaterinae, Dendrometrinae, Melanotinae and Athoinae. In the collection studied were identified fauna elements belonging to the following zoogeography areas: holarctic, palearctic, European, Central European, Euro-Siberian, Eurasian, submediteraneean. Below are presented elaterids species identified as a result of the study of entomology collection of the Museum of Natural Sciences heritage Piatra Neamt.

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I. Subfamily Pyrophorinae

1. ***Agrypnus murinus*** (Linnaeus, 1758)
Bicăjel (NT): 1 sp. – 08.06.1967; Bisericani (NT): 1 sp – 18.06.1987; Bistricioara – Lutărie (NT): 1 sp. – 16.06.1966; Ceahlău (NT): 1 sp. – 09.07.1998; Cernegura (NT): 1 sp – 08.06.1996; Cozla (NT): 1 so. – 08.10.1980, 1 sp. - 02.05.1984, 1 sp – 28.05.1984; Doamna (NT): 2 sp. – 24,05.1966; Fărcaşa (NT): 1 sp – 20.08.1986; Ghilcaş (NT): 1 sp – 07.06.1967; Horaiţa (NT): 4 sp. – 15-17.06.1986; Poiana (NT): 5 sp. – 11-12.05.1983, 1 sp. – 12.05.1985, 1 sp – 31.05.1985, 1 sp -29.06.1986, 2 sp – 23.06.1987, 1 sp. – 10.06.1991; Vulpe Hill (NT): 1 sp – 21.05.1984.

II. Subfamily Elaterinae

1. *Ampedus erythrogonus* (Müller, 1821)
Pietricica (NT): 1 sp. – 30.06.1972.

2. *Ampedus pomorum* (Herbst, 1784)
Bursucărie – Scheia (IS): 1 sp. – 10.03.1966.

3. *Ampedus nigerrimus* (Lacordaire, 1835)
Bursucărie – Scheia (IS): 1 sp. – 10.03.1966.

4. ***Ampedus sanguinolentus*** (Schrank, 1776)
Pietricica (NT): 1 sp. – 30.06.1972.

5. *Dalopius marginatus* (Linnaus, 1758)
Cernegura (NT): 2 sp. – 15.06.1970; 3 sp – 09.06.1972; 3 sp – 21.06.1972; Cozla (NT): 1 sp. – 25.06.1971, Bistricioara –Lutărie (NT): 1 sp – 16.06.1966.

6. *Agriotes ustulatus* (Schaller, 1767)
7 Noiembrie – Ceahlău (NT): 10 sp – 23.07.1970, 2 sp. – 8.08.1966; Almaş (NT): 3 sp. – 17.06.1972; Brusturi (NT): 2 – 23.07.1999; Cernegura: 11 sp. – 3.06.1967, 5 sp. -21.06.1972; Cozla (NT): 3 sp. – 23.06.1972, 1 sp. – 17.07.1972, 2 sp. – 17.07.1974; 1 sp. – 14.07.1981; Crăcăoani (NT): 1 sp. – 13.08.1984, 1 sp. – 15.08.1984; Duruitoarea (NT): 4 sp. – 9.08.1966; Farcaşa (NT): 1 sp – 26.07.1976, 3 sp – 1-6.08.1984, 2 sp. - 24-25.07.1996; Piatra Neamţ (NT): 1 sp. – 4.09.1984; Potoci (NT): 1 – 29.08.1984; Vulpei Hill (NT): 2 sp – 18.07.2002.

7. *Agriotes pilosellus* (Schönherr, 1817)
Pietricica (NT): 1 sp. – 30.05.1972

8. *Agriotes lineatus* (Linnaus, 1758)
Dărmăneşti (NT): 1 sp. – 17.06.1970.

9. *Agriotes sputator* (Linnaus, 1758)
Almaş (NT): 1 sp. – 17.06.1972; Cozla (NT): 1 sp. – 21.06.1971; Dărmăneşti (NT): 1 sp.- 26.05.1972, 3 sp. – 1.06.1972; Gârcina (NT): 4 sp. – 7.06.1972.

10. *Synaptus filiformis* (Fabricius, 1781)
Dărmăneşti (NT): 1 sp. – 6.06.1986; Doamna Stream (NT): 1 sp. 6.05.1966.

III. Subfamily Melanotinae

1. *Melanotus brunnipes* (Germar, 1824)
Almaş (NT): 1 sp – 17.06.1972; Balaur (NT): 1 sp. – 8.06.1980, 1 sp. – 29.06.1988; Dărmăneşti (NT): 7 sp. – 17.06.1970, 1 sp. – 26.05.1972; Gârcina (NT): 1 sp. – 7.06.1972.Mărgineni (NT): 1 sp. – 24.06.1982.

2. *Melanotus punctolineatus* (Pélerin, 1829)
Bisericani (NT): 1 sp – 18.06.1987.

IV. Subfamily Athoinae

1. *Cidnopus pilosus* (Leske, 1785)
Balaur Hill (NT): 2 sp. – 3.06.1980; Bicaz Gorges (NT): 1 sp. – 27.06.1974; Bicăjel (NT): 1 sp. – 8.06.1967; Cernegura (NT): 2 sp. – 9.06.1972; 1 sp. – 21.06.1972, 1 sp. – 17.05.1975; Cozla (NT): 1 sp. – 2.05.1966, 1 sp. – 7.05.1966, 4 sp. - 16-17.05.1966, 1 sp. – 14.05.1975, 1 sp. – 20.05.1975; 1 sp. – 22.05.1975, 1 sp. – 28.05.1984; Dărmăneşti (NT): 4 sp. – 17.06.1970, 2 sp. – 26.05.1972, 4 sp. – 1.06.1972, 1 sp. – 6.06.1986; Doamna (NT): 4 sp. – 6.05.1966, 3 sp. – 24.05.1966; Horaiţa (NT): 1 sp. – 15.06.1981; 2 sp. – 15 -16.06.1986; Gârcina (NT): 1 sp. – 7.06.1972; Pietricica (NT):1 sp. – 24.06.1970; 4 sp. – 14.05.1971, 3 sp. – 30.05.1972, 2 sp. – 31.05.1981 Vulpe Hill (NT): 2 sp. – 14.06.1972.

2. *Cidnopus minutus* (Linne, 1758)
Cernegura (NT): 1 sp. – 3.07.1970; Cozla (NT): 1 sp. – 7.05.1966, 1 sp. – 30.06.1970; 1 sp. – 25.06.1971; 3 sp. – 24.05.1972; Pietricica (NT): 1 sp. – 29.06.1970; 2 sp – 30.05.1972.

3. *Nothodes parvulus* (Panzer, 1799)
Pietricica (NT): 1 sp. – 10.06.1967.

4. *Hemicrepidius hirtus* (Herbst, 1784)
Balaur Hill (NT): 1 sp. – 18.07.1969; Bicaz Gorges (NT): 1 sp. – 25.07.1997; Cozla (NT): 1 sp. – 25.06.1971; 1 sp. – 15.06.1972, 1 sp. – 17.07.1974; Dulceşti (NT): 1 sp. – 21.06.1987; Farcaşa (NT): 1 sp. – 6.07.1984; Horaiţa (NT): 1 sp. 14.06.1986; Izvorul Muntelui (NT): 1 sp. – 26.07.1988; Roşu Lake (NT): 1 sp. – 24.07.1997.

5. *Hemicrepidius niger* (Linnaeus, 1758)
7 Noiembrie (NT): 1 sp. – 23.07.1970; Ardeluţa (NT): 1 sp. – 16.07.1971; Bicaz (NT): 1 sp. –

27.06.1971; Bicăjel (NT): 1 sp. – 8.06.1967; Ceahlău (NT): 2 sp. – 15.05.1966; 2 sp. – 13-14.06.1966, 1 sp. – 5.08.1966; Cernegura (NT): 1 sp. – 9.06.1971; Dărmăneşti (NT): 3 sp. – 17.06.1970, 1 sp. – 1.06.1972; Doamna (NT): 4 sp. – 28-30.05.1986; Dobrani (NT): 1 sp. – 16.06.1985; Horaiţa (NT): 1 sp. – 2.07.1982, 1 sp. – 16.05.1986; 5 sp. – 15-17.06.1986, 1 sp. – 29.06.1986, 6 sp. – 15.07.1986, 2 sp. – 13.06.1999; Izvorul Muntelui (NT): 1 sp. – 17.06.1966; Roşu Lake (NT): 1 sp. – 24.07.1997; Lutărie (NT): 9 sp. – 10-16.06.1966; Mărgineni (NT): 1 sp. – 24.06.1987; Poiana (NT): 7 sp. – 23.06.1987; Tazlău (NT): 4 sp. – 20.05.1979; Vulpe Hill (NT): 1 sp. – 14.06.1972.

6. ***Athous (Grypocarus) vittatus*** (Fabricius, 1792)
Cernegura (NT): 1 sp. – 9.06.1972; Doamna (NT): 1 sp. – 6.06.1966.

7. ***Athous (Grypocarus) hamorrhoidalis*** (Fabricius, 1801)
Bicaz (NT): 1 sp. – 24.06.1974; Bîtca Doamnei (NT): 1 sp. – 31.05.1967; Cozla (NT): 1 sp. – 7.05.1966; 1 sp. – 24.05.1972, 1 sp. – 12.06.1981; Doamna (NT): 4 sp. – 6.05.1966; Pietricica (NT): 3 sp. – 4.05.1966, 1 sp. – 14.05.1971; 1 sp. – 30.05.1972.

8. ***Athous (Anathrotus) subfuscus*** (Müller, 1767)
7 Noiembrie (NT): 1 sp. – 5.08.1966; Cernegura (NT): 1 sp. – 9.06.1972; Izvorul Muntelui (NT): 1 sp. – 17.06.1966; Lutărie (NT): 2 sp. – 10.06.1966.

9. ***Athous (Anathrotus) austriacus*** (Desbr.)
7 Noiembrie (NT): 1 sp. – 22.07.1966; Lutărie (NT): 1 sp. – 10.06.1966.

10. ***Athous (Haplathous) zebei*** (Bach, 1854)
Bicaz Gorges (NT): 1 sp. – 9.06.1967, 4 sp. – 24-27.06.1974; Ceahlău (NT): 1 sp. – 14.06.1966; Cernegura (NT): 1 sp. – 3.07.1970; 1 sp. – 21.06.1972; Poiana (NT): 1 sp. -23.06.1987.

11. Athous (Anathrotus) mollis (Reitter, 1889)
Bicaz Gorges (NT): 1 sp. – 27.06.1974;Broşteni (NT): 1 sp. – 25.05.1989; Cernegura (NT): 2 sp. – 9.06.1972; 3 sp. – 21.06.1972; Lutărie (NT): 1 sp. – 16.06.1966.

12. ***Athous (Orthathous) lomnikii*** **(Reitter, 1905)**
Almaş (NT): 5 sp. – 17.06.1972; Cernegura (NT): 1 sp. – 3.06.1967, 1 sp. – 9.06.1972; Cozla (NT): 6 sp. – 21-25.06.1971; 1 sp. - 15.06.1972, 1 sp. – 23.06.1972; 5 sp. – 17.07.1974; Dărmăneşti (NT): 3 sp. – 17.06.1970; Gârcina (NT): 7 sp. – 7.06.1972; Pietricica (NT): 1 sp. – 10.06.1967, 2 sp. – 24.06.1970, 2 sp. – 29.06.1970; Vulpe Hill (NT): 3 sp. – 14.06.1972.

13. ***Athous (Orthathous) picipennis*** (Reitter, 1905)
Almaş (NT): 7 sp. – 17.06.1972; Cernegura (NT): 1 sp. – 9.06.1972; Cozla (NT): 2 sp. – 25.06.1971, 3 sp. – 17.07.1974; Gârcina (NT): 5 sp. – 7.06.1972; Pietricica (NT): 3 sp. – 24-29.06.1970; Vulpe Hill (NT): 3 sp. – 14.06.1972.

V. Subfamily Dendrometrinae

1. ***Ctenicera heyeri*** (Saxesen, 1838)
Agapia (NT): 1 sp. – 29.05.1975.

2. ***Ctenicera pectinicornis*** (Linnaeus, 1758)
Cozla (NT): 1 sp. – 22.05.1975, 1 sp. – 8.10.1980; Doamna (NT): 4 sp. – 6.05.1966; Ghilcaş Mount (NT): 7.06.1967; Izvorul Muntelui (NT): 1 sp. – 17.06.1966; Pietricica (NT): 14.05.1971; Poiana Dobru (NT): 1 sp. – 12.05.1989.

3. ***Ctenicera cuprea*** (Fabricius, 1781)
Poiana Albă (NT): 1 sp. – 10.06.1993; Tazlău (NT): 1 sp. – 20.05.1978.

4. ***Ctenicera virens*** (Schrank, 1781)
Cozla (NT): 1 sp. – 8.10.1980.

5. ***Selatosomus aeneus*** (Linnaeus, 1758)
Poiana Dobrului (NT): 2 sp. – 22.05.1988; Vulpe Hill (NT): 1 sp. – 22.07.1997.

6. ***Selatosomus (s. st.) latus*** (Fabricius, 1801)
Balaur Hill (NT): 1 sp. – 30.06.1980; Pietricica (NT): 1 sp. – 14.05.1971; Vulpii Hill (NT): 5 sp. – 21.05.1989.

7. ***Selatosomus*** **(*Pristilophus*)** ***melancholicus*** (Fabricius, 1798)
Agapia (NT): 1 sp. – 29.05.1975.

8. ***Prostenon tessellatum*** (Linnaeus, 1758)
Bicăjel (NT): 3 sp. – 18.07.2001; Bicazului Gorges (NT): 1 sp. – 12.07.1970; Cernegura (NT): 1 sp. – 15.06.1970; 2 sp. – 13.07.1971; Cozla (NT): 1 sp. – 25.06.1971; Farcaşa (NT): 1 sp. – 10.06.1985; 1 sp. – 10.06.1986; Pietricica (NT): 1 sp. – 14.05.1971.

9. ***Actenicerus sjaelandicus*** (Műller, 1754)
Agapia (NT): 1 sp. – 29.05.0975; Bicăjel (NT): 1 sp. – 8.06.1967; Cernegura (NT): 1 sp. – 9.06.1972; Doamna (NT): 3 sp. – 6.05.1966; Horaiţa (NT): 1 sp. – 17.06.1986; Târpeşti (NT): 3 sp. – 1.06.1987.

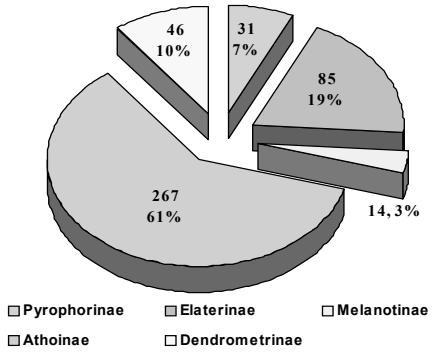

Fig. 1 - The percentage of the subfamilies of Elateridae family in etomologic material preserved at the museum collection in Piatra Neamt

Agrypnus murinus and *Prostenon tessellatum* species are spread throughout the holarctic region. *Ampedus sanguinolentus*, *Ampedus erythrogomus*, *Agriotes lineatus*, *Agriotes brevis* and *Athous hamorrhoidalis* are present in palearctic region. Among the specimens examined were identified six species spread in Central European belonging to the genus *Athous*: *A. subfuscus, A. austriacus, A. subfuscus, A. zebei, A. mollis, A. picipennis* and *A. lomnikii* and one from genus *Ctenicera* - *C. heyeri*.

Most elaterids specimens from the collection of the Museum of Natural Sciences Piatra Neamt belong to the subfamily Athoinae (61%).

Acknowledgements

Thank to Mrs. Maria Apetrei for giving me the chance to study the specimens from the family Elateridae preserved in the collection of Piatra Neamț Museum.

Conclusions

Specimens studied were collected during the period betweent the years 1966 - 2004 from 38 localities in the counties of Neamt and Iasi. Have been studied a number of 443 specimenes of the family Elateridae, order Coleoptera, preserved in the collections of the Museum of Natural Sciences Piatra Neamt.

There were identified 35 species belonging to the 14 genera included in 5 subfamilies. In the studied material from the collection a large number of specimens belong to the following species: *Hemicrepidius niger* (76 specimens), *Agriotes ustulatus* (56 specimens); *Cidnopus pilosus* (55 specimens) and *Athous lomnikii* (43 specimens).

We identified species spread in holarctic region *Agrypnus murinus* and *Prostenon tessellatum* but, also species with a narrower distribution and species present only in Central Europe. The species identified in the collection studied are typical for collection areas.

Rezumat

Lucrarea reprezintă catalogul speciilor de elateride (Coleoptera: Elateridae) conservate în colecția Muzeului de Ştiințele Naturii Piatra Neamț. În patrimoniul muzeului au fost identificate 443 de exemplare care aparțin familiei Elateridae, colectate între anii 1966-2001.

Au fost identificate 35 de specii care aparțin la 14 genuri incluse în 5 subfamilii.

În cadrul materialului din colecția studiată un număr mare de exemplare aparțin speciilor: *Hemicrepidius niger* (76 exemplare); *Agriotes ustulatus* (56 exemplare); *Cidnopus pilosus* (55 exemplare) şi *Athous lomnikii* (43 exemplare).

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Table 1 - Zoogeography of the species spread from the collection of the Museum of Natural Sciences Piatra Neamț

	Species	No. of specimen	Spreading
	Subfamily Pyrophorinae		
1.	*Agrypnus murinus* Linnaeus, 1758	31	holarctic
	Subfamily Elaterinae		
2.	*Ampedus erythrogonus* Müller, 1821	1	est-european
3.	*Ampedus pomorum* Herbst, 1784	1	palearctic
4.	*Ampedus nigerrimus* Lacordaire, 1835	1	eurasiatic
5.	*Ampedus sanguinolentus* Schrank, 1776	1	palearctic
6.	*Dalopius marginatus* Linnaus, 1758	10	euro-siberian
7.	*Agriotes ustulatus* Schaller, 1767	56	eurasiatic
8.	*Agriotes pilosellus* Schönherr, 1817	2	eurasiatic
9.	*Agriotes lineatus* Linnaus, 1758	1	palearctic
10.	*Agriotes sputator* Linnaus, 1758	10	palearctic
11.	*Synaptus filiformis* Fabricius, 1781	2	eurasiatic
	Subfamily Melanotinae		
12.	*Melanotus brunnipes* Germar, 1824	13	submediteraneean
13.	*Melanotus punctolineatus* Pélerin, 1829	1	eurasiatic
	Subfamily Athoinae		
14.	*Cidnopus pilosus* Leske, 1785	55	eurasiatic
15.	*Cidnopus minutus* Linne, 1758	10	eurasiatic
16.	*Nothodes parvulus* Panzer, 1799	8	euro-siberian
17.	*Hemicrepidius hirtus* Herbst, 1784	10	eurasiatic
18.	*Hemicrepidius niger* Linnaeus, 1758	76	eurasiatic
19.	*Athous (Grypocarus) vittatus* Fabricius, 1792	2	eurasiatic
20.	*Athous (Grypocarus) hamorrhoidalis* Fabricius,1801	15	palearctic
21.	*Athous (Anathrotus) subfuscus* Müller, 1767	5	central-european
22.	*Athous (Anathrotus) austriacus* Desbr.	2	central-european
23.	*Athous (Haplathous) zebei* Bach, 1854	9	central-european
24.	*Athous (Anathrotus) mollis* Reitter, 1889	8	central-european
25.	*Athous(Orthathous) lomnikii* Reitter, 1905	43	central-european
26.	*Athous(Orthathous) picipennis* Reitter, 1905	24	central-european
	Subfamily Dendrometrinae		
27.	*Ctenicera heyeri* Saxesen, 1838	1	central-european
28.	*Ctenicera pectinicornis* Linnaeus, 1758	10	euro-siberian
29.	*Ctenicera cuprea* Fabricius, 1781	2	eurasiatic
30.	*Ctenicera virens* Schrank, 1781	1	eurasiatic
31.	*Selatosomus aeneus* Linnaeus, 1758	3	eurasiatic
32.	*Selatosomus (s. st.) latus* Fabricius, 1801	7	eurasiatic
33.	*Selatosomus* (*Pristilophus*) *melancholicus* Fabricius, 1798	1	palearctic
34.	*Prostenon tessellatum* Linnaeus, 1758	11	holarctic
35.	*Actenicerus sjaelandicus* Műller, 1754	10	euro-siberian
	Total number of specimens	443	

COMPLEXUL MUZEAL DE ŞTIINȚELE NATURII „ION BORCEA" BACĂU

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CONTRIBUTIONS TOWARD THE KNOWLEDGE OF THE NOCTURNAL MACROLEPIDOPTERA FROM THE BOTANICAL GARDEN GALAȚI (Nota 1)

MIHAELA CRISTESCU[1]

ABSTRACT

The research have been made with three light traps in The Botanical Garden Galati during 2004 and 2005. There were trapped 105 species belonging to 9 nocturnal lepidoptera families. I must mention *Aedia leucomelas* L., *Earias vernana* Fab, *Mythimna congrua* Hbn (Noctuidae Family)., that were identified for the first time in Galati county. The best represented family was Noctuidae (62,85%) followed by Geometridae family (16,2%).

Key words: *Nocturnal Macrolepidoptera, Botanical Garden Galați, light traps.*

Introduction

The Botanical Garden is part of The Natural Sciences Museum Galați. It is situated in the NV of Galați city near The Danube River. From a geological point of view it belongs to the Moldovenesc Plateau. The altitude of the garden land varies from 20 m up to 42 m, and it is crossed over by a sporadically thread of water from N to S.

The climate is steppe typical with some pontic and mediterranean influences.

The atmospheric precipitation has one of the lowest values in the country.

The Botanical Garden is divided into six areas with different types of vegetation and spreads over 18 hectares.

The nocturnal macrolepidopterans haven't been studied too much in Galați county. The programes of research have been made in the Garboavele Forest (Alexinschi & Olaru 1967, Olaru & Nemeş 1968, Olaru & Nemeş 1969), Hanu Conachi (Alexinschi 1954, Olaru & colab.1968), Tecuci, Rogojeni and Galati city (catched by Olaru, publ. Marcu & Rakosy 2002). They identified a number of 368 species belonging to 11 families of nocturnal macrolepidopterans.

The big difference between the number of species found in Moldova, 1036 (Rakosy et.al. 2003) and the number of species found in Galati reveals that the researches in this area are insufficient and must continue.

Material and method

To examine the diversity of nocturnal macrolepidoptera I used 3 fixed light traps identical like size and building. The light source was a 250W bulb emiting UV and visible light. The light traps were situated in 3 areas of the garden: The Rose Garden, the Romanian Flora and in the Medicinal Flora. One trap per site was operated from dusk to dawn, 3 days a week every week from april to octomber. In 2004 I used just one light trap in the Medicinal Flora and in 2005 I installed other two traps in the Romanian Flora and the Rose Garden. The garden areas have different types of vegetation as ornamental plants (The Rose Garden), medicinal, economic plants and vegetables (The Medicinal Flora) and The Romanian Flora is well represented by the vegetation specific to the mountains, plains, sand dunes, and Dobrudja.

The collected specimens were determined in the laboratory using different bibliographical resources as it follows: L.Rakosy, 1996 for noctuids, P.Skou, 1984 for geometrids and J.Fajcik & F. Slamka, 1996 for the others lepidoptera families.

Results and discussions

Fauna analysis. During 2004-2005 were catched 655 individuals for 105 species belonging to 9 nocturnal lepidoptera families.

I must mention *Aedia leucomelas* L., *Earias vernana* Fab, *Mythimna congrua* Hbn. (Noctuidae Family), that were identified for the first time in Moldova.

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The best represented family was Noctuidae (62,85%) followed by Geometridae family (16,2%)- fig. 1.

The sistematic list of the trapped species is presented in tabel 1.

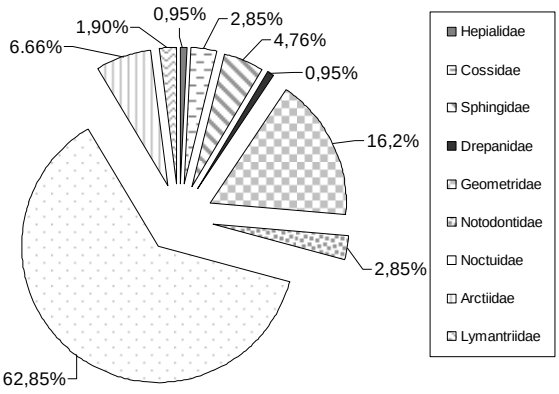

Fig. 1 - Percentage of nocturnal macrolepidoptera families.

Ecologic analysis. The analysis of the ecological preferences showed that the mesophilous species are prevalent (31,42%) wich is in accordance with the climatic conditions of our country.

The xero-thermophilous species are also abundant (16,19%) because of the steppe climate of the investigated area. The steppe habitat is favourable for some xero-thermophilous species like *Mycteroplus puniceago* Boisduval, *Lacanobia blenna* Hub., *Aedia leucomelas* L., *Eublemma purpurina* Den.&Schiff., *Agrotis crassa* Hub. (Noctuidae Family).

The meso-higrophyl species who preferes most humidity are presented in a significant percentage (13,3%) because the Botanical Garden is situated very close to the Danube River. The presence of meso-thermophyl species (8,57%) is the consequence of a high annual average temperature, over 10 Celsius degrees.

The percentage of higrophyl species is little (1,9%) because the level of the atmospheric precipitacions is reduced.

Some of the identified species are migratory: *Agrius convolvuli* L. (Sphingidae Family), *Autographa gamma* L., *Agrotis ipsilon* Hfn. (Noctuidae Family) (Rakosy 1991).

The ecological analysis of the nocturnal macrolepidoptera (fig.2) reveals a diversity of categories because the investigated areas in the Botanical Garden have different types of vegetation that formes different types of microhabitats. Therefore some areas are totaly exposed to the sun, meanwhile others have many trees and herbaceous plants which maintains the humidity and creates a particular microclimate.

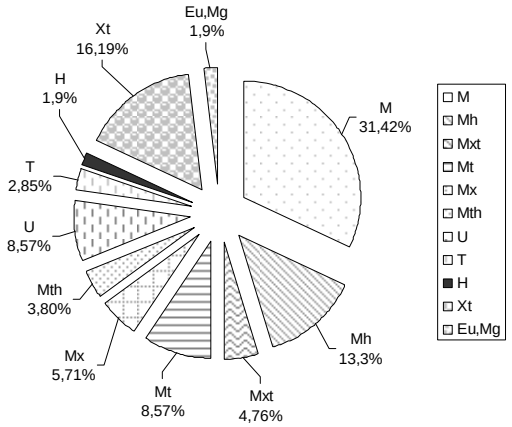

Fig.2 - Ecological spectrum as related to preferences to different habitats.

U = ubicvist; M = mesophilous; T = termophyl; H = higrophyl; Mh = meso-higrophyl; Mt = meso-termophyl; Xt = xero-thermophyl; Mxt = meso-xero-termophyl; Mx = meso-xerophyl; Mth = meso-termo-higrophyl; Mhf = meso-higrophyl; Eu,Mg = euritrop, migratory.

Zoogeographic analysis. The zoogeographic categories have been established after Rakosy (1996) for Noctuidae family and for the others families, after Rakosy& Laszloffy (1997), Cremene & Rakosy & Erhardt (2002).

Zoogeographical analysis (fig.3) has indicated a clear dominance of Euro-Asian elements (62,85%), followed by the West-Asian-Mediterranean species (13,3%), the Ponto-Mediterranean elements (10,47%) and Holarctic elements (8,57%).

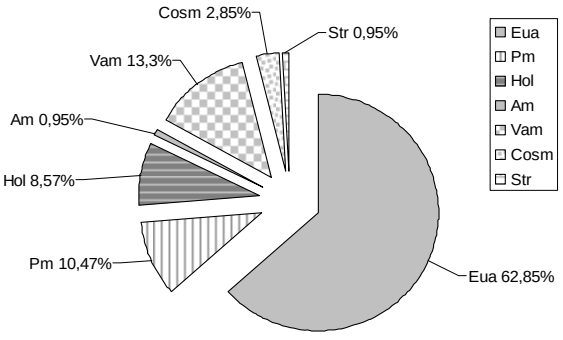

Fig.3 - Zoogeographical spectrum.

Eua = Euroasian; Pm = Ponto-Mediterranean; Hol = Holarctic; Am = Atlanto-Mediterranean; Vam = West-Asian-Mediterranean; Cosm = Cosmopolite; Str = Subtropical.

The dominance of the Euro-Asian elements is natural taken in consideration the geographical position of our country. The presence of the western-Asian-Mediterranean and Ponto-Mediterranean elements in a significant percentage is explained by the neighborhood with Dobrudja where these species are dominant.

There are similarities with Dobrudja fauna of nocturnal lepidoptera, for example some species that are found mostly in Dobrudja like *Mythimna congrua* Hub.(Noctuidae Family) or others that are very well represented in Dobrudja like *Tephrina arenacearia* Den.&Schiff. (Geometridae Family), *Earias vernana* Fab.(Noctuidae Family).

Trophic spectrum. The trophic analysis (fig.4) of the identified macrolepidopterans showed the preponderence of lower plant consumers (62,85%) because of the diversity of herbaceous plants. The trees attracted an important number of defoliators (17,14%).

The majority of the defoliators (72,2%) are on *Salix sp*. and *Populus sp*., because these species are the most abundant in the Botanical Garden.

There is also a specie who's larvas feed on lichens, *Eilema sororcula* Hfn. (Arctiidae Family). The larvas feed on the lichens that grows on *Quercus* and *Fagus sp.* trunks (Kimber 2005).

The larvas of *Lymantria dispar* L. (Lymantriidae Family) feed on many species of trees like: *Betula*, *Larix*, *Picea*, *Malus*, *Populus*, *Prunus*, *Quercus*, *Salix*, *Ulmus*.

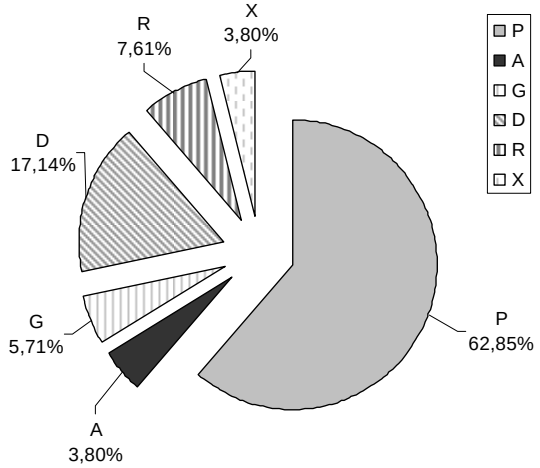

Fig. 4 - Trophic spectrum.
P = low plant consumers; A = lichens consumers; G = graminaceae consumers; D = defoliators; R = roots consumers; X = xylophagous.

Red list. According to Red List classification (Rakosy, Goia, Kovacs 2003), 8 species are vulnerables (7,61%), 17 are near threatened (16,19%) and 80 species arent't threatened (76,19%). (fig.5).

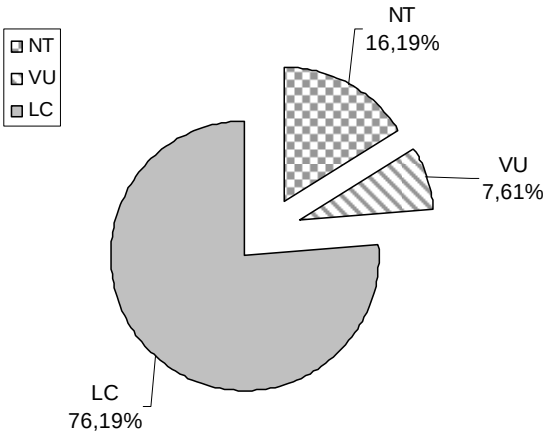

Fig. 5 - Distribution of the nocturnal macrolepidoptera according to the Red List categories.
VU = vulnerable; NT = nearthreatened; LC = least concern.

Conclusions

The Botanical Garden Galati is relatively new, the trees were cultivated here in 1995. Since than the trees grew up, ornamental and spontaneous herbaceous plants were cultivated, the flora diversified a lot. In this way were created microhabitats with microclimates that offered conditions for the nocturnal macrolepidopterans to fed and survive.

Three species are new for the fauna of the studied zone: *Aedia leucomelas* L., *Earias vernana* Fab, *Mythimna congrua* Hbn. (Noctuidae Family).

The results of this study leads us to the conclusion that during the following years at the same time as the the diversity of the flora will grow up in The Botanical Garden the species list of nocturnal macrolepidoptera will be bigger.

Rezumat

Materialul biologic pentru lucrarea de față a fost colectat în Grădina Botanică a Complexului Muzeal de Ştiinţele Naturii Galaţi, în anii 2004 şi 2005 cu ajutorul capcanelor luminoase fixe. Acestea au fost instalate în trei sectoare diferite din punct de vedere al vegetației (preponderent flora spontană ierboasă şi lemnoasă–Flora Romaniei, preponderent floră cultivată autohtonă ierboasă - Flora utilă, preponderent plante cultivate ornamentale - Rosarium.)

Pe parcursul celor 2 ani am colectat 655 exemplare de lepidoptere ce aparţin macro - şi microlepidopterelor. În urma determinării am identificat 105 specii ce fac parte din 9 familii.

Materialul colectat a fost analizat din punct de vedere faunistic, al preferinţelor speciilor faţă de habitat, din punct de vedere zoogeografic şi al bazei trofice larvare.

Cel mai bine reprezentată este familia Noctuidae (66 specii), urmată de familia Geometridae (17 specii).

Dintre aceşti taxoni, se remarcă: *Aedia leucomelas* L.*, Earias vernana* Fab, *Mythimna congrua* Hbn (familia Noctuidae), care nu au mai fost citaţi pentru fauna de lepidoptere a Moldovei.

Dintre cele 105 specii de macrolepidoptere nocturne colectate, 8 sunt incluse pe lista roşie (Rakosy, 2003) în categoria VU (vulnerable), 17 specii sunt taxoni potenţial ameninţaţi (NT) , iar restul nu sunt periclitaţi (LC).

Acknowledgements

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Table.1 - The systematic list of the nocturnal macrolepidoptera from The Botanical Garden Galați

No.	Species	Number ind.	Collecting points			Zoogeog.	Ecol.	B.t.l.	L.R.
			Roumanian Flora	Medicinal Flora	Rose Garden				
	Hepialidae Family								
1.	*Triodia sylvina* L.	1		✓		Eua	M	R	
	Cossidae Family								
2.	*Cossus cossus* L.	1		✓		Pm	M	X	
3.	*Zeuzera pyrina* L.	1		✓		Hol	M	X	
4.	*Phragmatecia castanea* Hbn.	3		✓		Eua	Mh	R	
	Sphingidae Family								
5.	*Agrius convolvuli* L.	5		✓		Am	U	P	
6.	*Sphinx ligustri* L.	1		✓		Eua	M	P	NT
7.	*Macroglossum stellatum* L.	1		✓		Eua	Mx	P	
8.	*Hyles galii* Rottemburg	9		✓		Hol	Mxt	P	VU
9.	*Deilephila porcellus* L.	22	✓	✓		Pm	M	P	
	Drepanidae Family								
10.	*Tethea or* Den.&Shiff.	1	✓			Eua	Mh	D	NT
	Geometridae Family								
11.	*Stegania dilectaria* Hbn.	1		✓		Eua	Mx	D	NT
12.	*Heliomata glarearia* Den.&Schiff.	3	✓	✓		Eua	Xt	P	
13.	*Macaria notata* L.	1		✓		Eua	Mx	D	
14.	*Chiasmia clathrata* L.	22	✓	✓	✓	Eua	M	P	
15.	*Tephrina arenacearia* Den.&Schiff.	23	✓	✓	✓	Vam	Mxt	P	NT
16.	*Biston betularia* L.	1	✓			Eua	M	D	
17.	*Peribatodes rhomboidaria* Den.&Schiff.	4		✓		Eua	M	P	
18.	*Ascotis selenaria* Den.&Schiff.	9	✓	✓		Eua	M	P	
19.	*Ematurga atomaria* L.	4	✓			Eua	M	P	
20.	*Chlorissa viridata* L.	6	✓	✓		Eua	Mt	A	
21.	*Timandra comae* Schmidt	6	✓	✓		Eua	M	P	
22.	*Scopula corivalaria* Kretschmar	2		✓		Eua	Mh	P	VU
23.	*Scopula marginepunctata* Goeze	2		✓		Eua	Mxt	P	
24.	*Lythria purpuraria* L.	2	✓	✓		Pm	Mt	P	NT
25.	*Costaconvexa polygrammata* Borkhausen	1		✓		Eua	Mh	P	NT
26.	*Lithostege farinata* Hfn.	1	✓			Pm	Mxt	P	
27.	*Lithostege griseata* Den.&Schiff.	6	✓	✓		Eua	Mx	P	
	Notodontidae Family								
28.	*Clostera curtula* L.	1	✓			Eua	Mh	D	
29.	*Clostera pigra* Hufn.	1		✓		Eua	Mh	D	
30.	*Clostera anastomosis* L.	2		✓		Eua	Mh	D	
	Noctuidae Family								
31.	*Acronicta rumicis* L.	6		✓		Eua	Mh	A,D	
32.	*Catocala elocata elocata* Esp.	2	✓	✓		Vam	Mth	D	NT
33.	*Dysgonia algira algira* L.	1			✓	Vam	Xt	D	NT

34.	*Lygephila craccae* Den.&Schiff	1		✓		Eua	Xt	P	
35.	*Aedia leucomelas* L.	1	✓			Str	Xt	P	VU
36.	*Tyta luctuosa* Den.&Schiff.	47	✓	✓	✓	Eua	Xt	P	
37.	*Scoliopteryx libatrix* L.	1	✓			Hol	M	D	
38.	*Diachrysia chrysitis chrysitis* L.	2		✓	✓	Eua	M	P	
39.	*Diachrysia tutti* Kostrowicki	1	✓			Eua	Mht	P	
40.	*Macdunnoughia confusa confusa* Stephens	16	✓	✓		Eua	Mt	P	
41.	*Autographa gamma* L.	14		✓		Eua	U	P	
42.	*Emmelia trabealis* Scop.	41	✓	✓	✓	Eua	Mt	P	
43.	*Acontia lucida* Hufn.	3		✓		Eua	Xt	P	
44.	*Protodeltode pygarga* Hufn.	1		✓		Eua	Mh	P	
45.	*Eublema purpurina* Den.&Schiff.	1		✓		Pm	Xt	P	
46.	*Cucullia umbratica* L.	2		✓	✓	Eua	U	P	
47.	*Calophasia opalina* Esp.	3		✓		Vam	Xt	P	VU
48.	*Mycteroplus puniceago* Boisduval	4		✓		Vam	Xt	P	VU
49.	*Schinia scutosa* Den.&Schiff.	4	✓	✓		Hol	Xt	P	
50.	*Heliothis viriplaca viriplaca* Hufn.	4	✓	✓		Eua	T	P	
51.	*Helicoverpa armigera armigera* Hbn.	19		✓		Cosm	T	P	
52.	*Pyrrhia umbra* Hufn.	1	✓			Hol	Mth	P	
53.	*Elaphria venustula* Hbn.	1			✓	Eua	Mt	P	
54.	*Platyperigea kadenii* Freyer	2		✓		Vam	Xt	P	NT
55.	*Paradrina clavipalpis* Scop.	2	✓	✓		Eua	Eu, Mg	P	
56.	*Hoplodrina ambigua* Den.&Schiff.	43	✓	✓	✓	Pm	Mt	P,A	
57.	*Charanyca trigrammica* Hufn.	1			✓	Pm	M	P,G	
58.	*Athetis gluteosa* Tr.	2		✓		Eua	Xt	P,G	NT
59.	*Athetis furvula* Hbn.	1		✓		Eua	Mxt	P	NT
60.	*Trachea atriplicis* L.	10	✓	✓	✓	Eua	M	P	
61.	*Oligia strigilis* L.	2		✓	✓	Eua	M	G,R	
62.	*Oligia versicolor* Borkhausen	3		✓	✓	Eua	M	P	
63.	*Mesapamea secalis* L.	1		✓		Eua	M	G	
64.	*Luperina testacea* Den.&Schiff	1		✓		Vam	M	R	
65.	*Archanara sparganii* Esp.	1		✓		Vam	H	X	NT
66.	*Hadula trifolii* Hfn.	22	✓	✓	✓	Hol	U	P	
67.	*Lacanobia w-latinum* Hufn.	9	✓	✓	✓	Eua	M	P,A	
68.	*Lacanobia oleracea* L.	14	✓	✓		Eua	M	P	
69.	*Lacanobia blenna* Hbn	2		✓		Vm	Xt	P	VU
70.	*Lacanobia suasa* Den.&Schiff.	6	✓	✓		Eua	Mh	P,D	
71.	*Mythimna turca* L.	6	✓	✓		Eua	Mh	G	
72.	*Mythimna vitelina* Hbn.	1			✓	Vam	Xt	G	
73.	*Mythimna albipuncta* Den.&Schiff.	5	✓	✓	✓	Pm	Xt	G	
74.	*Mythimna congrua* Hbn.	3	✓	✓	✓	Pm	T,H	P	VU
75.	*Mythimna l-album* L.	2		✓	✓	Eua	U	G	
76.	*Leucania obsoleta* Hbn.	3	✓			Eua	H	X	
77.	*Orthosia incerta* Hufn.	9	✓	✓	✓	Eu	M	D,P	
78.	*Anorthoa munda* Den.&Schiff.	1	✓			Eua	M	D	

79.	*Egira conspicillaris* L.	3	✓			Pm	Mt	P,A	
80.	*Xanthia gilvago* Den.&Schiff.	1		✓		Eua	Mh	D	NT
81.	*Agrochola litura* L.	2		✓		Vam	Mh	P	
82.	*Eupsilia transversa* Hufn.	1			✓	Eua	Eu,Mg	D	
83.	*Axylia putris* L.	17	✓	✓		Eua	M	P	
84.	*Ochropleura plecta* L.	6	✓	✓		Hol	M	P	
85.	*Noctua orbona* Hufn.	1		✓		Pm	Mx	P	
86.	*Noctua janthina* Den.&Schiff.	1	✓			Eua	Mt	P	NT
87.	*Xestia c-nigrum* L.	21	✓	✓	✓	Cosm	U	P	
88.	*Xestia xantographa* Den.&Schiff	1		✓		Vam	M	P	
89.	*Cerastis rubricosa* Den.&Schiff.	5	✓	✓	✓	Eua	M	P	
90.	*Cerastis leucographa* Den.&Schiff	1	✓			Eua	Mx	P	NT
91.	*Euxoa aquilina* Den.&Schiff.	1		✓		Eua	Xt	R	
92.	*Agrotis crassa* Hbn.	1		✓		Vam	Xt	R	VU
93.	*Agrotis ipsilon* Hufn.	5		✓	✓	Cosm	U	R	
94.	*Agrotis exclamationis* L.	12	✓	✓	✓	Eua	U	R	
95.	*Agrotis segetum* Den.&Schiff.	10	✓	✓		Eua	U	R	
96.	*Earias vernana* Fab.	7		✓	✓	Vam	Mth	D	NT
	Lymantriidae Family								
97.	*Lymantria dispar* L.	13		✓		Hol	M	D	
98.	*Euproctis similis* Fuessly	1		✓		Eua	M	D	
	Arctiidae Family								
99.	*Atolmis rubricolis* L.	3		✓		Eua	M	A	
100.	*Eilema sororcula* Hfn.	1		✓		Eua	M	A	
101.	*Phragmatobia fuliginosa* L.	17	✓	✓	✓	Eua	M	P	
102.	*Spilosoma lubricipeda* L.	31	✓	✓	✓	Eua	M	P	
103.	*Spilosoma urticae* Esp.	1		✓		Eua	M	P	NT
104.	*Hyphantria cunea* Drury	16		✓		Hol	Mt	D	
105.	*Diaphora mendica* Clerck	6	✓	✓		Eua	Mh	P	

Zoog .= Zoogeographic analysis
Eua = euroasian; Pm = ponto-mediterranean; Hol = holarctic; Am = atlanto-mediterranean; Vam = west-asian-mediterranean; Cosm = cosmopolite; Str = subtropical;

Ecol. = Ecological analysis
U = ubicvist; M = mesophilous; T = termophyl; H = higrophyl; Mh = meso-higrophyl; Mt = meso-termophyl; Xt = xero-thermophyl; Mxt = meso-xero- termophyl; Mx = meso-xerophyl; Mth = meso-termo- higrophyl; Mhf = meso-higrophyl; Eu,Mg = euritrop, migratory;

B.t.l .= Trophic spectrum
P = low plant consumers; A = lichens consumers; G = graminaceae consumers; D = defoliators; R = roots consumers; X = xylophagous;

L.R. = Red List
VU = vulnerable; NT = nearthreatened; LC = least concern.

COMPLEXUL MUZEAL DE ŞTIINȚELE NATURII „ION BORCEA" BACĂU

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MYMARID WASPS (HYMENOPTERA, CHALCIDOIDEA, FAM. MYMARIDAE) ASSOCIATED WITH MEDICAGO SATIVA L. (FIRST NOTE)

EMILIAN I. PRICOP[1]

ABSTRACT

In this paper we present the *Mymaridae* species, which had been collected and identified from *Medicago sativa* fields in Bacau (BC), Botosani (BT) and Suceava (SV) county, Romania. *M. sativa* is known as a medicinal and meliferous plant species (Ciurdărescu et al., 1972; Lisenchi Murariu, 2006). In this first note we present a total of 20 identified species: *Alaptus pallidornis, Anagrus atomus, Anagrus* affinis *atomus, Anagrus breviphragma, Anagrus similis, Anagrus* affinis *similis, Anaphes diana, Anaphes* affinis *euryale, Anaphes fuscipennis* Hal. *sensu* Deb., *Erythmelus lygivorus, Gonatocerus chrysis, Gonatocerus litoralis, Gonatocerus longicornis, Gonatocerus ovicenatus, Gonatocerus pictus, Gonatocerus sulphuripes, Mymar pulchellum, Ooctonus flaviventris, Stephanodes similis and Stethynium triclavatum* (affinis = near).

Key words: *Mymaridae, parasitoids, associated species, distribution, fauna*

Introduction

The *Mymaridae* species like other chalcid families (*Eulophidae, Trichogrammatidae*) are the most commonly encountered parasitoids of pest species and have potential as biological control agents against different pests belonging to *Cicadellidae, Miridae, Membracidae* and *Chrysomelidae* families in different crops or in their natural environment (Noyes, 2003). This parasitoids attacks different eggs in a variety of habitats and crops, but its efficacy appears to vary with host plant species (Graham et al., 1986). Field studies in Arizona showed that only *Anaphes iole* successfully parasitized *Lygus* eggs in various plant species sampled, and rates of parasitism ranged from 0-100% (Jackson and Graham, 1983; Graham et al., 1986). Weekly releases of *A. iole* in strawberry fields in California resulted in nearly 80% parasitism of *L. hesperus* eggs, and nymphs were suppressed by 43-64% (Norton at al., 1992; Udayagiri et al., 2000). In addition, *A. iole* attacks eggs of other *Miridae* and *Membracidae*, all of which are embedded in plant tissue (Stoner and Surber, 1969; Huber and Rajakulendran, 1988). *A. iole* successfully parasitized also eggs of *Nabis americoferus* Carayon and *N. alternatus* Parshley in the laboratory conditions (Manrique, 2003). Many studies reveal the importance of this parasitic wasps, the host management, the fight against this pest species and biology aspects in general, regarding this matter we have to mention the studies of Sahad (1982), Virla (2001), Macgill (1934), Miura (1979), Anderson and Paschke (1968), Conti et al. (1996), De Moraes and Mescher (1999), Doutt (1959). The Family *Mymaridae* was studied in Romania by: Radu and Botoc (1958, 1960); Botoc (1959, 1962, 1963, 1964, 1965, 1972, 1974, 1975); Andriescu (1993, 1996); Dimitriu (2001), Pricop (2007, 2008, 2009). All the *Mymaridae*, are exclusively egg parasitoids (Huber, 1986).

Material and methods

The species ware collected with an entomological sweep-net and pan traps in *Medicago sativa* L. fields, between 2004 and 2007, from some areas of the North-East of Romania, county's - Bacau - **BC**, Botosani - **BT** and Suceava - **SV**. The material, collected in the sweep-net, was examined with a stereomicroscope, we also use the insect potter (aspirator) to collect in the field the insects from the sweep-net, we have collected insects with pan traps as well, methods recommended by Noyes, (2003). The specimens war mounted in *Faure's medium,* or pointed on cardboards (*dry mounted*) and examined with the stereomicroscope and an optical microscope. We have illustrated the morphology of the specimens utilizing microphotography's obtained whit a camera attached to the stereomicroscope or the optical microscope **(Fig. 1, 2).** For the identification we had use keys published by Bakkendorf (1934), Baquero and Jordana (1999), Chiappini (1989), Debauche (1948), Donev (1998), Hincks (1959), Huber (1992), Noyes (2003), Pricop (2007, 2008), Triapitsyn (2003).

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Results and discussions

The aim of our investigation was to identify the species of *Mymaridae* which are present in the *Medicago sativa* fields. In this first note we reveal the distribution of the identified species. The collected data is presented in **Tables 1** and **2**.

Table 1 - The data regarding the identified species and no. of specimens/localities

1. *Alaptus pallidornis* Forster, 1856 - 1♀, 17.06.2006, **Siminicea, SV;** 1♀, 6.08.2006, **Cucorani, BT;** 1♀, 30.07.2004, **Ipotesti, BT.**
2. *Anagrus atomus* (Linnaeus, 1767) - 4♀, 6.08.2006, **Cucorani, BT**; 6♀, 6.08.2006, **Ipotesti, BT**; 2♀, 2.07.2006, **Dumbraveni, BT**; 1♀ and 1♂, 3.07.2006, **Vorona, BT**; 1♀, 17.06.2006; **Bucecea, BT**; 1♀, 14.08.2006, **Vorona, BT**; 1♀, 6.08.2006, **Dumbraveni, BT**; 4♀, 6.08.2006, **Siminicea, SV**; 1♀, 17.06.2006, **Bucecea, BT;** 1♀, 6.08.2006, **Bucecea, BT;** 2♀, 6.08.2006, **Siminicea, SV;** 1♀, 14.08.2006, **Vorona, BT**; 1♀, 6.08.2006, **Dumbraveni, SV**; 6♀, 6.08.2006, **Ipotesti, BT;** 1♀ and 1♂, 3.07.2006, **Vorona, BT.**
3. *Anagrus affinis atomus* (Linnaeus, 1767) - 1♀, 30.04.2006, **Bucecea, BT**
4. *Anagrus breviphragma* Soyka, 1955 - 2♀, 2.09.2006, **Ipotesti, BT;** 3♀, 8.10.2006, **Bucecea, BT**; 1♀, 2.09.2006, **Cucorani, BT**; 1♀ and 1♂, 2.07.2006, **Dumbraveni, BT**; 1♀, 8.10.2006, **Siminicea, SV;** 2♀, 8.10.2006, **Dumbraveni, BT**; 1♀, 2.09.2006, **Bucecea, BT**; 1♀, 8.10.2006, **Bucecea, BT;** 1♀, 8.10.2006, **Dumbraveni, SV;** 4♀, 6.08.2006, **Cucorani, BT;** 2♀, 2.09.2006, **Ipotesti, BT;** 2♀, 2.10.2006, **Bucecea, BT;** 1♀, 2.09.2006, **Cucorani, BT;** 1♀, 2.10.2006, **Siminicea, SV.**
5. *Anagrus similis* Soyka, 1955 1♀, 8.10.2006, **Siminicea, SV;** 1♀, 2.10.2006, **Siminicea, SV.**
6. *Anagrus affinis similis* Soyka, 1955 - 1♀, 2.09.2006, **Siminicea, SV;** 1♀, 3.07.2006, Vorona, Bt.; 1♀, 2.09.2006, **Siminicea, SV.**
7. *Anaphes (P.) diana* (Girault, 1911)) - 3♀, 1.06.2006, **Vorona, BT;** 2♀, 6.08.2006, **Ipotesti, BT;** 2♀, 2.07.2006, **Dumbraveni, BT**; 1♀, 8.10.2006, **Siminicea, SV;** 3♀, 3.07.2006, **Vorona, BT;** 2♀, 8.10.2006, **Cucorani, BT;** 2♀, 31.05.2006, **Dumbraveni, SV;** 1♀, 28.09.2004, **Cucorani, BT;** 2♀, 5.07.2006, **Cucorani, BT;** 1♀, 5.07.2006, **Ipotesti**, **BT;** 2♀, 17.06.2006, **Ipotesti, BT;** 1♀, 6.08.2006; **Bucecea, BT;** 1♂, 28.08.2004, **Ipotesti, BT;** 1♀, 30.04.2007, **Ipotesti, BT;** 1♀, 5.07.2006, **Bucecea, BT;** 1♂, 28.10.2004, **Ipotesti, BT;** 4♀ and 2♂, 17.06.2006, **Cucorani, BT;** 3♀, 8.10.2006, **Dumbraveni, BT;** 4♀, 19.06.2006, **Vorona, BT;** 3♀, 14.08.2006, **Vorona, BT;** 2♀, 6.08.2006, **Dumbraveni, BT;** 5♀, 6.08.2006, **Siminicea, SV;** 3♀, 1.06.2006, **Vorona, BT;** 2♀, 6.08.2006, **Ipotesti, BT;** 2♀, 2.07.2008, **Siminicea, SV;** 1♀, 2.10.2006, **Siminicea, SV;** 3♂, 3.07.2006, **Vorona, BT;** 2♀, 8.10.2006, **Cucorani**, **BT;** 2♀, 31.05.2006, **Dumbraveni, BT;** 1♀, 28.09.2004, **Cucorani**, **BT;** 2♀, 5.07.2007, **Cucorani, BT;** 1♀, 30.07.2004, **Ipotesti, BT;** 1♀, 5.07.2006, **Ipotesti, BT;** 2♀, 17.06.2006, **Ipotesti, BT.**
8. *Anaphes (P.) affinis euryale* (Debauche, 1948) – 1♀, 29.04.2006, **Siminicea, SV;** 1♀, 2.07.2006, **Siminicea, SV**; 1♀ and 2♂, 17.06.2006, **Cucorani**, **BT;** 1♀, 6.08.2006, **Dumbraveni, BT**; 1♀, 29.04.2006, **Siminicea**, **SV.**
9. *Anaphes fuscipennis* Hal. *sensu* Debauche, 1948 - 2♀, 6.08.2006, **Cucorani, BT;** 4♀, 6.08.2006, **Ipotesti, BT**; 1♀, 2.09.2006, **Ipotesti, BT**; 1♀, 8.10.2006, **Bucecea, BT**; 1♀ and 1♂, 3.07.2006, **Vorona, BT**; 1♀, 17.06.2006, **Siminicea, SV**; 1♀, 5.07.2006, **Ipotesti, BT**; 1♀, 6.08.2006; **Bucecea, BT**; 1♀, 17.06.2006; **Bucecea, BT**; 1♀ and 1♂, 2.09.2006, **Bucecea, BT**; 7♀, 6.08.2006, **Siminicea, SV**; 1♂, 16.09.2004, **Vadul Moldovei, SV**; 2♀, 6.08.2006, **Cucorani, BT;** 4♀, 6.08.2006, **Ipotesti, BT;** 1♀, 2.09.2006, **Ipotesti, BT;** 1♂, 2.10.2006, **Bucecea, BT;** 1♀ and 1♂, 3.07.2006, **Vorona, BT;** 1♀, 30.07.2004, **Ipotesti, BT;** 1♀, 5.07.2006, **Ipotesti, BT.**
10. *Erythmelus lygivorus* Viggiani & Jesu 1985 - 1♀, 5.07.2006, **Cucorani, BT**; 1♀, 5.07.2007, **Cucorani, BT**
11. *Gonatocerus chrysis* (Debauche, 1948) - 1♀, 2.09.2006, **Cucorani, BT**; 1♀, 6.08.2006; **Bucecea, BT**; 1♀, 17.06.2006; **Bucecea, BT**; 1♀, 2.09.2006, **Cucorani**, **BT.**
12. *Gonatocerus litoralis* (Haliday, 1833) - 1♀, 14.08.2006, **Vorona, BT**; 1♀, 22.7.2004, **Vadul Moldovei, SV**; 1♂, 27.07.2004, **Vadul Moldovei, SV**; 1♂, 12.08.2004, **Vadul Moldovei, SV.**
13. *Gonatocerus longicornis* Nees, 1834 - 2♀, 6.08.2006, **Cucorani, BT**; 2♂, 6.08.2006, **Ipotesti, BT**; 1♀,, 2.09.2006, **Ipotesti, BT**; 1♀, 2.09.2006, **Cucorani, BT**; 1♀, 3.07.2006, **Vorona, BT;** 1♀ and 2♂, 6.08.2006 **Bucecea, BT;** 1♀, 2.07.2006, **Siminicea, SV**; 2♂, 22.07.2004, **Blagesti, BC**; 1♀ and 1♂, 2.09.2006, **Bucecea, BT**; 1♀ and 1♂, 14.08.2006, **Vorona, BT**; 1♀, 6.08.2006, **Dumbraveni, BT**; 2♀, 6.08.2006, **Cucorani, BT**; 2♂, 6.08.2006, **Ipotesti, BT;** 1♀, 2.09.2006, **Ipotesti, BT;** 1♀, 2.09.2006, **Cucorani**, **BT;** 1♀, 3.07.2006, **Vorona, BT.**
14. *Gonatocerus ovicenatus* Leonard & Crosby 1915 - 3♀, 2.09.2006, **Cucorani**, **BT;**

1♀, 2.09.2006, **Siminicea, SV**; 2♀, 5.07.2006, **Cucorani, BT**; 1♀, 28.08.2004, **Ipotesti, BT**; 3♀, 2.09.2006, **Cucorani**, **BT;** 1♀, 2.09.2006, **Siminicea, SV;** 2♀, 5.07.2007, **Cucorani, BT.**
15. ***Gonatocerus pictus*** **(Haliday, 1833) -** 1♀, 14.08.2006, **Vorona, BT.**
16. ***Gonatocerus sulphuripes*** **(Förster, 1847) -** 1♀, 6.08.2006, **Cucorani, BT**; 1♀1.06.2006, **Vorona, BT**; 1♀, 8.10.2006, **Bucecea, BT**; 1♀, 2.09.2006, **Siminicea, SV**; 1♀, 8.10.2006, **Siminicea, SV**; 2♂, 30. 07.2004, **Ipotesti, BT;** 1♀, 5.07.2006, **Ipotesti, BT**; 1♂, 30.04.2007, **Ipotesti, BT**; 2♀, 2.09.2006, **Bucecea, BT**; 1♀, 12.08.2004, **Cristesti, BT**; 1♀, 6.08.2006, **Siminicea, SV;** 1♀, 6.08.2006, **Cucorani, BT**; 1♀, 2.10.2006, **Bucecea, BT;** 1♀, 2.09.2006, **Siminicea, SV;** 1♀, 2.10.2006, **Siminicea, SV;** 2♂,30.07.2004, **Ipotesti, BT;** 1♀, 5.07.2006, **Ipotesti, BT.**

17. ***Mymar pulchellum*** **Curtis, 1832** - 1♀, 6.08.2006, **Cucorani, BT.**
18. ***Ooctonus flaviventris*** **Donev, 1990 -** 1♀, 9.10.2006, **Vorona, BT.**
19. ***Stephanodes similis*** **(Förster, 1847)** - 1♀ and 3♂, 6.08.2006, **Cucorani, BT**; 2♀, 6.08.2006, **Ipotesti, BT**; 1♀ and 1♂, 2.09.2006, **Siminicea, SV**; 2♀, 6.08.2006; **Bucecea, BT**.; 2♀ and 2♂, 5.07.2006, **Bucecea, BT**; 2♀, 22.07.2004, **Blagesti, BC**; 5♀, 8.10.2006, **Dumbraveni, BT**; 1♀, 19.06.2006, **Vorona, BT**; 3♀, 14.08.2006, **Vorona, BT**; 1♀ and 1♂, 6.08.2006, **Siminicea, SV**; 1♀, 22.7.2004, **Vadul Moldovei, SV**; 1♀, 8.10.2006, **Cucorani, BT**; 1♀ and 1♂, 6.08.2006, **Cucorani, BT**; 2♀, 6.08.2006, **Ipotesti, BT;** 1♀ and 1♂, 2.09.2006, **Siminicea, SV.**
20. ***Stethynium triclavatum*** **Enock 1909 -** 1♀, 12.08.2004, **Cristesti, BT.**

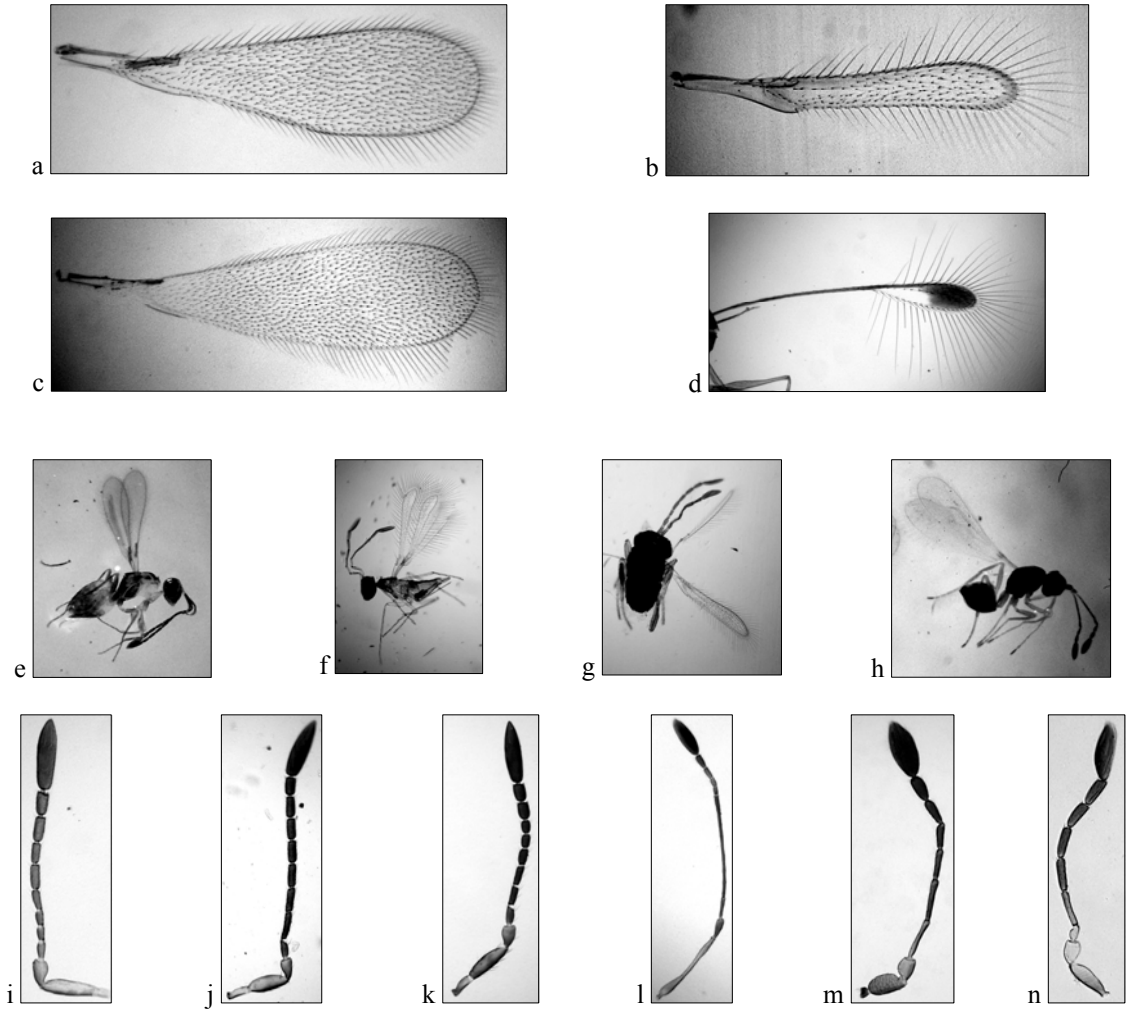

Fig. 1 - Forewings: a-*Gonatocerus litoralis*, b-*Anaphes diana*, c-*Stephanodes similis*, d-*Mymar pulchellum*; Femele habitus: e-*G. litoralis*, f-*Anagrus atomus*, g-*A. (P.) diana*, h-*S. similis*; Female antennas: i-*G. litoralis*, j-*G. longicornis*, k-*G. sulphuripes*, l-*M. pulchellum*, m-*S. similis*, n-*A. similis* (original)

Table 2 - The distribution table of the *Mymaridae* species in the studied areas/localities

Nr.	Species	Bl	Bu	Cr	Cu	Du	I	S	VM	V
1	***Alaptus pallidornis***	-	-	-	+	-	+	+	-	-
2	***Anagrus atomus***	-	+	-	+	+	+	+	-	+
3	***Anagrus affinis atomus***	-	+	-	-	-	-	-	-	-
4	***Anagrus breviphragma***	-	+	-	+	+	+	+	-	-
5	***Anagrus similis***	-	-	-	-	-	-	+	-	-
6	***Anagrus affinis similis***	-	-	-	-	-	-	+	-	-
7	***Anaphes diana***	-	+	-	+	+	+	+	-	+
8	***Anaphes affinis. euryale***	-	-	-	+	+	-	+	-	-
9	***Anaphes fuscipennis*** Hal. ***sensu*** Deb.	-	+	-	+	-	+	+	+	+
10	***Erythmelus lygivorus***	-	-	-	+	-	-	-	-	-
11	***Gonatocerus chrysis***	-	+	-	+	-	-	-	-	-
12	***Gonatocerus litoralis***	-	-	-	-	-	-	-	+	+
13	***Gonatocerus longicornis***	+	+	-	+	+	+	+	-	+
14	***Gonatocerus ovicenatus***	-	-	-	+	-	+	+	-	-
15	***Gonatocerus pictus***	-	-	-	-	-	-	-	-	+
16	***Gonatocerus sulphuripes***	-	+	+	+	-	+	+	-	+
17	***Mymar pulchellum***	-	-	-	+	-	-	-	-	-
18	***Ooctonus flaviventris***	-	-	-	-	-	-	-	-	+
19	***Stephanodes similis***	+	+	-	+	+	+	+	+	+
20	***Stethynium triclavatum***	-	-	+	-	-	-	-	-	-

Blagesti = Bl; Bucecea = Bu; Cristesti = Cr; Cucorani = Cu; Dumbraveni = Du; Ipotesti = I; Siminicea = S; Vadul Moldovei = VM; Vorona = V.

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PHENOLOGY OF THE BIRDS' FAUNA FROM THE TALABASCA MARSH (GALAȚI COUNTY)

VIORICA ARCAN[1], CARMEN GACHE[2]

ABSTRACT

Our study was undertook in Tălăbasca Marsh between the years 2005 to 2007. This wetland is a natural meadow lake, with protected natural area status. Since 2007, is part of Natura 2000 in Romania, is included in the site "Lunca Siretului Inferior" (with special protection area status for birds - ASPA).

We inventoried 95 species of birds, the aquatic and semi-aquatic being dominant, with the status of a summer guest in the region. Bird fauna is represented by 67 brooding species, 7 species probably brooding. We note the presence of a breeding colony consists of species belonging to the families Ardeidae and Threskiornithidae, but also the appearance during summer of flocks of pelicans (*Pelecanus onocrotalus*), which feed on the perimeter of the marsh.

During migration, there are rare species like *Tadorna tadorna*, *Milvus migrans*, *Glareola pratincola*, *Recurvirostra avosetta* or *Himantopus himantopus*.

Keywords: birds' fauna, phenology, Talabasca Marsh

Introduction

The Siret River takes it source from the Cernauti region (Ukraine), crossing the western side of historical Romanian Moldova and represent one of the last two principal affluents of the Danube River before the Danube Delta.

The Siret River represent the western limit (about 12 kilometres length) of the village Tudor Vladimirescu and, during the high rainfalls' period, can produce flooding in this area. The Talabasca Marsh is situated in this area (about 40 km distance from Galati city), being a natural meadow lake, with a surface about 139 hectares.

The climate is temperate-continental, with hot dry summers and very cold winters. The average temperatures of the winter are negative, but in some years, the November and March can be very cold, too, so, the lake is frozen during the winter period.

The habitats are various, typically for the wetland areas; the reed beds formed by *Phragmites communis* and *Typha angustifolia*, are dominant covering about 60 % from the whole surfaces, but there are present, also, open waters, marshes vegetation and a meadow forest in the western side, between the lake and the Siret River. The surrounding perimeters have agricultural using or represent grazing area for the local community.

The fauna is rich; the invertebrates are dominant, qualitative and quantitative viewing. The fish fauna is represented by species like *Esox lucius*, *Cyprinus carpio*, *Carassius auratus gibelio*, *Scardinius erythrophthalmus*, *Stizosteidon lucioperca*, *Perca fluviatilis*. The frogs are present through species like the *Rana sp*. complex, *Hyla arborea* or *Bombina bombina*, while between the reptiles group we met *Emys orbicularis*, *Lacerta viridis*, *Natrix natrix* and *Natrix tesselata*. The small mammals are dominant - *Citellus citellus*, *Cricetus cricetus* and others.

There are just few scientific information regarding the birds' fauna from the lower basin of the Siret River (Gache, 1994 or Müller & co., 2005) and no one properly scientific publication about the bird's fauna phenology in the Talabasca Marsh's perimeter; one preliminary study about the birds' fauna diversity of this marsh is in press (Gache, 2008).

Methods and period of study

Our present study use the fieldwork' records done beginning from the 2005' summer till the 2007' spring, covering all the phenological aspects. We used the direct observation with binoculars and telescope, along a transect that covered the whole perimeter of the Talabasca Marsh, but also from some fixed points. We done census of the aquatic and semi-aquatic birds counting all the individual birds or from the small flocks, but also using the bands' counting in the larger flocks, comprising more than 200 birds.

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Results and discussions

We recorded 95 bird species in the perimeter of the Talabasca Marsh, presenting them, their phenological and breeding status in the table 1.

The general environmental conditions and the high variety of the habitats permit the presence of an enough high diversity of the birds' fauna. As we can see at the first side, the aquatic and semi-aquatic bird species are dominant (69.47 %) and most of them are visiting this area during the summer time.

Regarding the birds' phenology (figure 1), in this wetland, the summer visitors are dominant (60 %), followed by the passage species (15.78 %), sedentary species (12.63 %) and partial migratory species (11.57 %), while the winter visitors are represented just by 5 species (5.26 %).

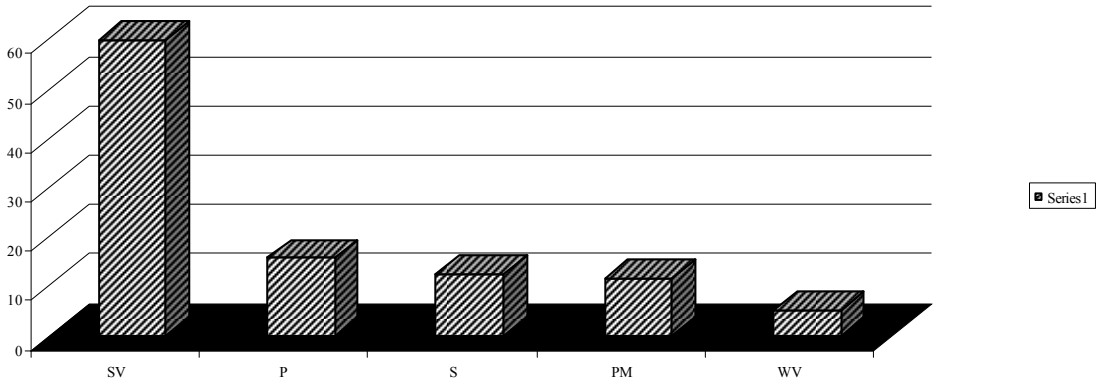

Fig. 1 – The phenology of birds' fauna recorded in the Talabasca Marsh's perimeter (2005 - 2007)

During our field research, we observed that some bird species have different phenological status from one year to other due the meteorological conditions, especially, the temperatures and the rainfalls' level. We recorded, too, some variance of the phenological status for some species from the official status in Romania. Some aquatic or semi-aquatic species appear just in passage on the Talabasca Marh, while in Romania are summer visitors (*Podiceps nigricollis*, *Pelecanus onocrotalus*, *Ciconia nigra*, etc.). In the warm winters, we met small groups of *Anas strepera*, till the middle part of December; in Romania, this duck species is summer visitors.

The wintering birds' fauna is really poor (28 species) because, usual, beginning from the middle November, the water is frozen on the 70 % from the marsh's perimeter. The aquatic birds (*Cygnus olor*, *Cygnus cygnus*, *Anser anser*, *Anas platyrhynchos*, *Anas penelope*, *Anas crecca*, *Anas clypeata* or *Aythya ferina*) are constantly presence, but with no large flocks. We notice the presence of *Aythya fuligula* that is a wintering rare species is in this area.

Like in the all wetlands, the higher bird's fauna diversity was recorded during the migration time in the Talabasca Marsh's perimeter, when the aquatic birds and the waders are forming flocks about hundreds or more than one thousand individuals.

In beginning of the 2006' spring (12th March 2006), about half part of the marsh was still frozen, dominant being the anseriform group, represented by the species *Anas plathyrhynchos, Anas acuta*, *Aythya fuligula*, *Aythya ferina* and *Aythya nyroca*. We saw 15 Mute Swans (*Cygnus olor*), too. In the last decade of March (25th March 2006), we recorded the first 6 Spoonbills (*Platalea leucorodia*) and a flock about 10 White Storks (*Ciconia ciconia*) in the area.

The 2006's winter was not so cold and on the 4th March 2007, the marsh's water was not frozen, sheltering about one thousand anseriform birds - 18 individuals of *Cygnus olor*, a flock about 120 individuals of *Anser anser*, 10 pairs of *Anas plathyrhynchos*, 3 pairs of *Anas strepera*, 105 pairs of *Anas penelope*, 177 pairs of *Anas crecca*, 39 pairs of *Anas clypeata* and 18 males of *Aythya ferina*. We recorded, also, the first groups of waders (about 320 exemplars of *Vanellus vanellus* and 90 exemplars of *Limosa limosa*) on the swampy territory from the north-eastern side of the marsh.

During the April, the cormorants (*Phalacrocorax carbo*) appear in small flocks, just in passage, the habitats being unfavourable for their breeding in this area. During the first middle part of the April, we met solitary individuals of Black Stork (*Ciconia nigra*), flying to the north-eastern direction.

In the late July, the first groups of waders appear in the area, coming from the north in the autumn migration. The breeding pairs of *Cuculus canorus*, *Streptopelia turtur* or *Ciconia ciconia* are leaving this perimeter in August, but large flocks of White Storks breeding in the northern Europe will cross the marsh's area by the beginning of September.

During the autumn migration, the anseriform group is dominant, too, forming larger flocks than in the spring passage, beginning from the second part of August till the end of November in the coldest winters. The Mallard (*Anas plathyrhynchos*) and

Greylag Goose (*Anser anser*) are constantly dominant species, but other duck species are common presence, with flocks of tens individuals (*Anas strepera*, *Anas penelope*, *Anas crecca*, *Anas clypeata*, *Aythya ferina*, *Aythya nyroca*), while some species appear just with small groups of individuals (*Anas acuta*, *Aythya fuligula*).

The gulls - *Larus sp.*, appear with groups about hundreds individuals, while thousands waders can stay searching food in the swampy territories from the area for more than one week, the last flocks of hundreds Lapwings (*Vanellus vanellus*) and Black-tailed Godwit (*Limosa limosa*) being present till the beginning of December on the swampy areas.

The migration time give the opportunity neither to record rare species nor only for the Talabasca Marsh, but, also, for the Siret River's basin, like *Plegadis falcinellus*, *Tadorna tadorna*, *Recurvirostra avosetta*, *Himantopus himantopus*, *Glareola pratincola* (just, one observation, 14 exemplars, 14th May 2006) or *Milvus migrans* (only one observation, one adult, 29th September 2006).

The breeding birds' fauna (figure 2) is about 67 species but we mention another 7 bird species like probably breeding species in the area (these species were present during the reproduction season and we recorded including mating displays for ones of them). The majority of the breeding birds are using the reed beds to build their nests. Between these, notice the presence of one breeding colony formed by species from the families Ardeidae and Threskiornithidae, including the Spoonbill (*Platalea leucorodia*), a rare breeding species out of the Danube Delta – as we know, this is the first certainly breeding observation of this species in the Siret River basin. Beginning from 2007' summer, one or two pairs of Greylag Goose (*Anser anser*) seem to become breeding species in the area, like a sign of the environmental conditions' improving and of the human pressure's decreasing. We observed mating displays and one bird transporting material for the nest's building on the 9th April 2007.

The terns are constantly breeding species on the Talabasca Marsh. We notice also the breeding presence of the White-winged Tern (*Chlidonias leucopterus*), with 2 – 5 pairs/yearly, the rarest species of this genus in the eastern part of Romania.

We were not focused our study on the meadow forest, too, but we not exclude the possibilities to record rare breeding species in this habitat because we observed solitary individuals searching food in the marsh's perimeter.

For the all species, the breeding effectives are small but seem to have a positive trend.

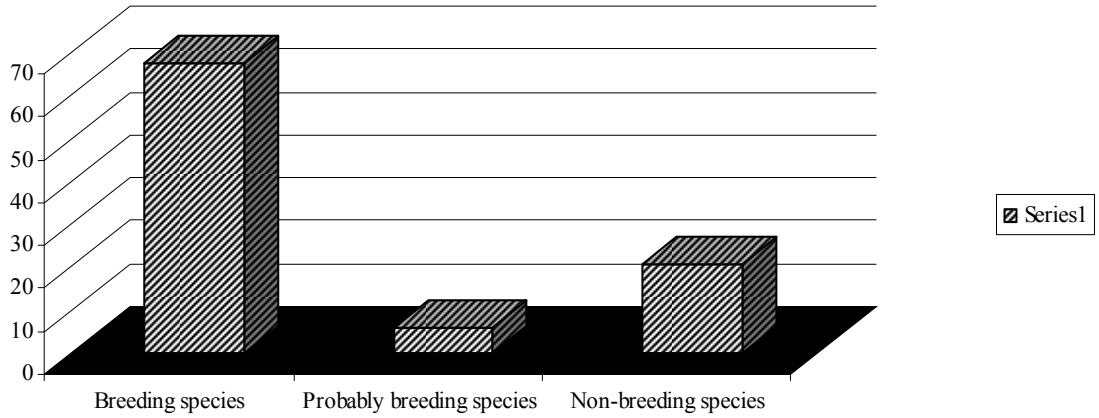

Fig. 2 – The phenology of birds' fauna recorded in the Talabasca Marsh's perimeter (2005 - 2007)

We must mention, too, the summer presence of pelican flocks (*Pelecanus onocrotalus*), searching food in the marsh's perimeter. Usual, there are tens pelicans that are forming the flocks, probably immature birds coming from the Danube Delta - the largest group (112 individuals) was observed on the 4th June 2006.

Beginning from 1994, the Talabasca Marsh is a natural protected area, having an official ranger (S.C. Negro S.R.L.). In 2007, the marsh was included in the Natura 2000 Romanian Network like part of one Special Protected Area – *Lower Meadow of Siret River*.

Despite this status, the human presence is constantly and, sometimes, represents a seriously disturbing factor for the birds' fauna. The fishermen were present around the marsh, more frequently in the north-eastern, eastern and southern part, all the time during our fieldwork and, especially, during the week-end they use to take with them radio stations. The swampy territory from the north-eastern side of the Talabasca Marsh is used by the local community for grazing activities (large groups of cows), while we observed groups of sheep on the flooding meadow, situated between the western part of the Talabasca Marsh and the Siret River valley.

Our present researches are focused on the whole lower valley of the Siret River in order to evaluate the present status of the birds' fauna in some ponds and natural swampy areas after the great changes of the territory using during the last two decades. As we saw during the fieldworks, the Talabasca Marsh became the most important ornithological refuge in this area, while large swampy territories were completely disappeared (like those nearest the Vames village) and some fisheries were abandoned, the aquatic surfaces decreasing slowly due the sedimentation.

Conclusions

The bird's fauna diversity is enough high for a small area like the Talabasca Marsh, recording a positive trend. A good management plan and a sustainable development of the area could improve the habitats' condition, offering better opportunities for the aquatic and semi-aquatic birds.

Rezumat

Studiul nostru avifaunistic în perimetrul Bălții Tălăbasca a fost realizat în perioada 2005 – 2007. Această zonă umedă este un lac natural de luncă, având statut de arie naturală protajată. Din 2007, este parte a rețelei Natura 2000 din România, fiind inclusă în situl "Lunca Inferioară a Siretului" (cu statut de arie specială de protecție avifaunistică - ASPA).

Am inventariat 95 de specii de păsări, cele acvatice şi semi-acvatice fiind dominante, cu statut de oaspeți de vară în regiune. Avifauna clocitoare este reprezentată de 67 de specii, alte 7 specii fiind probabil clocitoare. Remarcâm prezența unei colonii de reproducere formată din specii aparținând familiilor Ardeidae şi Threskiornithidae, dar şi apariția estivală a unor stoluri de pelicani (*Pelecanus onocrotalus*), care se hrănesc în perimetrul bălții.

În timpul migrației, apar specii rare ca *Tadorna tadorna*, *Milvus migrans*, *Glareola pratincola*, *Recurvirostra avosetta* sau *Himantopus himantopus*.

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Table 1 – The birds' fauna from the Talabasca Marsh (2005 - 2007)

No.	Species' name	Phenology	Breeding status
1.	Podiceps cristatus	PM	B
2.	Podiceps grisegena	SV	
3.	Podiceps nigricollis	P	
4.	Pelecanus onocrotalus	P	
5.	Phalacrocorax carbo	SV	
6.	Botaurus stellaris	SV	B
7.	Ixobrychus minutus	SV	B
8.	Egretta garzetta	SV	B
9.	Egretta alba	SV	B
10.	Ardeola ralloides	SV	B
11.	Ardea cinerea	SV	B
12.	Ardea purpurea	SV	B
13.	Nycticorax nycticorax	SV	B
14.	Plegadis falcinellus	SV	B?
15.	Ciconia ciconia	SV	B
16.	Ciconia nigra	P	
17.	Platalea leucorodia	SV	B
18.	Cygnus olor	PM	B
19.	Cygnus cygnus	WV	
20.	Anser anser	PM	B?
21.	Anas plathyrhynchos	PM	B
22.	Anas strepera	PM	B
23.	Anas acuta	P	
24.	Anas penelope	WV	
25.	Anas crecca	WV	
26.	Anas querquedula	SV	B
27.	Anas clypeata	WV, P	
28.	Tadorna tadorna	SV, P	B?

29.	Aythya fuluigula	WV	
30.	Aythya ferina	PM	B
31.	Aythya nyroca	SV	B
32.	Buteo buteo	PM	
33.	Pernis apivorus	P	
34.	Milvus migrans	P	
35.	Circus aeruginosus	SV	B
36.	Falco tinnunculus	SV, P	B
37.	Phasianus colchicus	S	B
38.	Rallus aquaticus	SV	B?
39.	Gallinula chloropus	SV	B
40.	Fulica atra	PM	B
41.	Vanellus vanellus	SV	B
42.	Himantopus himantopus	SV, P	B?
43.	Recurvirostra avosetta	SV, P	B?
44.	Glareola pratincola	P	
45.	Tringa erythropus	P	
46.	Limosa limosa	SV, P	
47.	Charadrius dubius	SV	B?
48.	Calidris minutus	P	
49.	Larus ridibundus	PM	B
50.	Larus cachinnans	SV	B
51.	Larus minutus	P	
52.	Chlidonias niger	SV	B
53.	Chlidonias leucopterus	SV	B
54.	Chlidonias hybridus	SV	B
55.	Columba palustris	SV, RWV	B
56.	Sterna hirundo	SV	B
57.	Streptopelia turtur	SV	B
58.	Streptopelia decaocto	S	B
59.	Cuculus canorus	SV	B
60.	Athene noctua	S	B
61.	Alcedo athis	SV	B
62.	Merops apiaster	SV	B
63.	Upupa epops	SV	B
64.	Dendrocops syriacus	S	B
65.	Galerida cristata	S	B
66.	Alauda arvensis	SV	B
67.	Hirundo rustica	SV	B
68.	Delichon urbica	SV	B
69.	Motacilla alba	SV	B
70.	Motacilla flava	SV	B
71.	Lanius collurio	SV	B
72.	Lanius minor	SV	B
73.	Oriolus oriolus	SV	B
74.	Sturnus vulgaris	PM	B
75.	Pica pica	S	B
76.	Corvus frugilegus	S	B
77.	Corvus corone cornix	S	B
78.	Corvus monedula	S	B
79.	Troglodytes troglodytes	SV	B
80.	Acrocephalus scirpaceus	SV	B
81.	Acrocephalus arundinaceus	SV	B
82.	Acrocephalus schoenobaenus	SV	B
83.	Sylvia communis	SV	B
84.	Phylloscopus collybita	SV	B
85.	Muscicapa striata	SV	B
86.	Saxicola rubetra	SV	B
87.	Panurus biarmicus	SV	B
88.	Passer domesticus	S	B
89.	Passer montanus	S	B
90.	Fringilla coelebs	SV	
91.	Carduelis chloris	SV	B
92.	Carduelis carduelis	S	B
93.	Carduelis canabina	PM	B
94.	Miliaria calandra	SV	B
95.	Emberiza schoeniclus	PM	B

Legend: SV – summer visitor; WV – winter visitor; P – passage species; S – sedentary species; PM – partial migratory species; RWV = rare winter visitor; B - breeding species; B? – probably breeding species.

COMPLEXUL MUZEAL DE ŞTIINŢELE NATURII „ION BORCEA" BACĂU

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RESEARCH CONCERNING SMALL MAMMALS IN SIRET MIDDLE BASIN

DALIA PARASCHIV [1], CĂTĂLIN RANG [2], IULIAN PERŢA [2], BOGDAN LOZINCĂ [2]

Abstract

Based on the analysis of biological material represented by 161 specimens (Order Rodentia) collected from 4 localities (Cernu, Glăvăneşti, Uz Valley and Dendrologic Park Hemeiuş) in Bacau County, were identified 9 species belonging to 5 genera: *Apodemus*, *Microtus*, Mus, *Clethrionomys*, *Pitymys* and 2 families: Muridae and Arvicolidae.

Out of the analysis of captured specimens, it has been observed that the Muridae family is better represented numerically than Arvicolidae family.

Rodents collected in the agricultural crops ecosystems (Cernu and Glăvăneşti) have a higher share both of numbers and in terms of species diversity compared with the populations from mixed coniferous - deciduous forest ecosystems (Uz Valley and Dendrologic Park Hemeiuş).

Key words: small mammals, faunistics, Siret Basin

Introduction

The great diversity of small mammals can be explained by their obvious plasticity and adaptability to enviromental changes. They had always the possibilty to fill up new ecological niches due to their small dimensions compared to other mammals. The rhythm of numerical increase and decrease in rodent populations and their specific diversity are correlated with conditions offered by the researched ecosystems.

The research was made in order to identify the small mammal species (Rodentia order) which can be found in various ecosystems in the Siret basin, mentioning the fact that previous research concerning the rodent fauna in this area are sporadic and insufficient.

Material and method

Considering our research aim as exposed in the foreword, we collected the biological material during 2007-2008 in the following areas: Cernu, Glăvăneşti (agricultural ecosystem), Valea Uzului and Hemeiuş Dendrological Park (resinuous-deciduous forest ecosystem), Bacău County (figure 1).

Among methods of collecting material we used captures with spring traps and direct captures with tennis rackets.Traps were laid in batteries, 10 placed several meters apart, in a 7 day-period, during June-July and October-November.

For determination we used corporal measurements (biometrical data) and well-known preparation techniques of rodent skin and skulls.

Results and discussions

In the research areas 161 individuals belonging to Rodentia order were collected. Among them there were identified 9 species belonging to 5 genera: *Apodemus, Microtus, Mus, Clethrionomys, Pitymys* and 2 families: **Muridae** and **Arvicolidae.**

Analysing the capture material we could notice that **Muridae** family is better numerically represented in comparison with **Arvicolidae** family (table 1).

Conclusions

In the resinuous-deciduous forest ecosystem the small mammal fauna captured during June-July 2008 is represented by 14 individuals (table 2), of which *Apodemus flavicollis* is best represented – 6 individuals.

In the agricultural ecosystem, the small mammal fauna captured in October 2008 and November 2007 is represented by 147 individuals (table 3) of which *Pitymys subterraneus* species is best represented – 33 individuals.

Considering data in tables 2 and 3 we represented graphically the weight of small mammals in the two types of studied ecosystems (figures 2 and 3).

While in the agricultural ecosystem the *Pitymys subterraneus* species has the greatest weight (23%), in the resinuous-deciduous forest ecosystem

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this species was not found. *Apodemus agrarius*, *Microtus agrestis, Microtus arvalis, Mus musculus* and *Mus spicilegus* species were found only in the agricultural ecosystem, as they prefer this type of habitat and the *Clethrionomys glareolus* species was captured only in the resinuous-deciduous forests, being specific for deciduous and coniferous forests.

The *Apodemus flavicollis* and *Apodemus sylvaticus* species were captured in both types of ecosystems, having a larger extent, up to 2000 m altitude.

Analysing the material collected in the two types of ecosystems, we could notice rodents have greater numbers and diversity in the agricultural ecosystems than in the resinuous-deciduous forest ecosystem (Valea Uzului and Hemeiuş Dendrological Park). In agricultural ecosystems food resources are more abundant during the material collecting period (October-November), a fact which explains the diversity and the great number of individuals of the respective populations, unlike the mixture forest ecosystems where food resources are relatively constant all year, here intervening the interspecific competition.

Fig. 1 – Bacău County map with the location of study areas

Table 1 - Taxonomical analysis of studied material

No.	Order	Family	Genera / Species	Specimen number	Total
1	Rodentia	Arvicolidae	*Clethrionomys glareolus*	5	68
2			*Pitymys subterraneus*	33	
3			*Microtus arvalis*	20	
4			*Microtus agrestis*	10	
5		Muridae	*Apodemus agrarius*	17	93
6			*Apodemus flavicollis*	27	
7			*Apodemus sylvaticus*	26	
8			*Mus musculus*	20	
9			*Mus spicilegus*	3	
10			**Total number of specimens**		**161**

Table 2 - Small mammals species in the resinuous-deciduous forest ecosystem

No.	Species	Specimen no.	%
1	*Apodemus flavicollis*	6	43
2	*Apodemus sylvaticus*	3	22
3	*Clethrionomys glareolus*	5	35

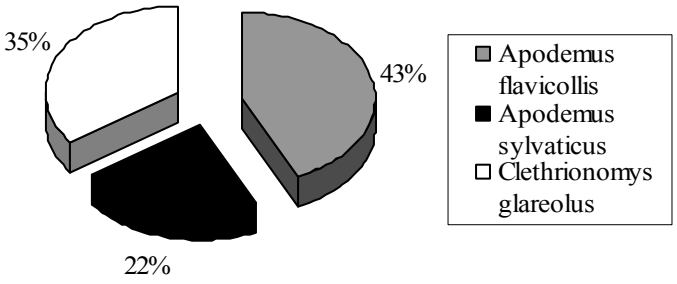

Fig. 2 – Small mammals weight in the resinuous-deciduous forests

Table 3 - Small mammals species in agricultural ecosystem

No.	Species	Specimen no.	%
1	*Apodemus agrarius*	17	12
2	*Apodemus flavicollis*	21	15
3	*Apodemus sylvaticus*	23	16
4	*Microtus agrestis*	10	7
5	*Microtus arvalis*	20	14
6	*Mus musculus*	20	14
7	*Mus spicilegus*	3	2
8	*Pitymys subterraneus*	33	23

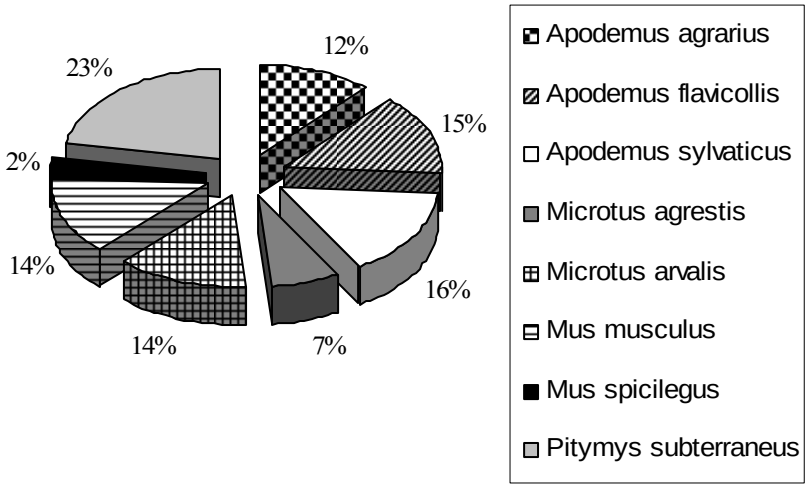

Fig. 3 - Small mammals weight in agriculture

Rezumat

Pe baza materialului biologic analizat reprezentat de 161 exemplare (Ord. Rodentia), colectat din 4 localităţi (Cernu, Glăvăneşti, Valea Uzului şi Parcul Dendrologic Hemeiuş) din jud. Bacău, s-au putut identifica 9 specii aparţinând la 5 genuri: *Apodemus, Microtus, Mus, Clethrionomys, Pitymys* şi 2 familii: **Muridae** şi **Arvicolidae.**

Din analiza materialului capturat, s-a putut constata faptul că familia **Muridae** este mai bine reprezentată numeric față de familia **Arvicolidae.**

Rozătoarele colectate din ecosistemul de cultură agricolă (Cernu şi Glăvăneşti) au o pondere mai mare atât numerică cât şi din punct de vedere al diversității speciilor față de ecosistemul pădurilor de amestec răşinoase – foioase (Valea Uzului şi Parcul Dendrologic Hemeiuş).

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THE IMPACT OF EUROPEAN BISON POPULATION OVER FOREST VEGETATION WITHIN THE ACLIMATISATION ENCLOSURE, THE VANATORI NEAMT NATURE PARK

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ABSTRACT

The study has been done in the vegetation season of 2008 within the aclimatisation enclosure of bison, within Vanatori Neamt Nature Park. The object of the present paper is an analysis performed upon the the impact of bison population over forest vegetation in an area of 180 m length and 100 meters width. There were obtained relevant data regarding the damages made, the preference for some specific species, the altitude at which the damages were performed.

Key words: Vanatori Neamt Nature Park, European bison, aclimatisation enclosure.

Introduction

Since Vanatori Neamt Nature Park was established in 1999, as a part of Biodiversity Conservation Management Project, a real chance for the restoration of this species has occured. One of the main objectives of the Park is the program of European Bison reintroduction in freedom, and the development of an appropriate management strategy to integrate bison population with local wildlife.

Starting with May 2005, the first animals were brought from abroad after 19 years break (last bison from abroad was brought in 1986 along with a female from Innsbruck Zoo). From Switzerland (Goldau Zoo and Bern zoo) there were imported 4 young animals (3 males and 1 female). In December 2005, other bisons were imported (4 animals: 1 male and 3 female) from Germany (Springe Zoo and Hardehausen Zoo) and at the level of 2006 there were transferred 3 bisons (1 male and 2 female) from Karlsruhe Zoo – Germany. The composition of the initial group of European bison for Vanatori Neamt was developed in order to minimise the level of potential inbred. Supplementation of the local stock with animals selected from foreign breeding centres will be required subsequently.

Nowadays, the bison are living in acclimatisation enclosure of 180 ha and a length of 7 ha for few years, in order to establish their bond with the site, and to increase the initial number of the herd. The bison herd counts 18 animals (7 males and 11 females), several animals transferred from Neagra Bucsani.

Material and method

This study was achieved in order to asses the damages (bark - 1, branch - 2, tear out from roots - 3) made by the bison population over forest vegetation within the aclimatisation enclosure, taking into consideration their preference for some forest species and the the height of damages.

It was considered a surface of 180 meters length and 100 meters width located in an area with young forest vegetation (seedling) small consistence, neglected slope. The surface was assesed on width, at a distance of 2 meters between between routes (90 passings). The observers had inventoried forest species taking in consideration the species, the species diameter, the height of damages and nature of damages.

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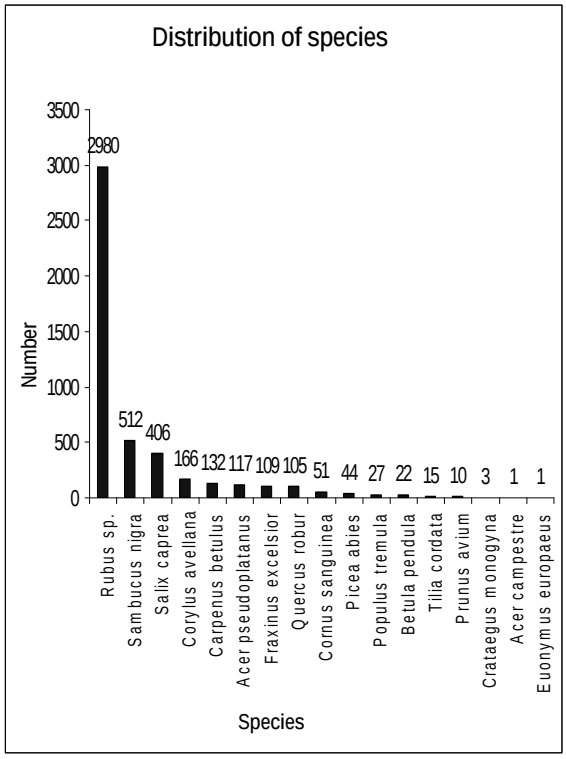
Results and discussions

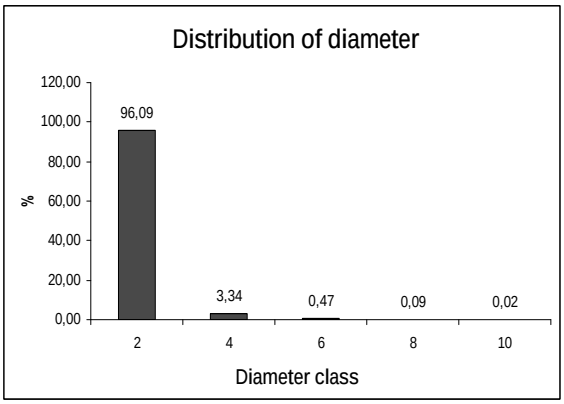
Table 1 - The distribution of damaged forest species



During monitoring a number of 4,701 forest species individuals were determined as being damaged by European bison. The area taken into consideration was covered previously by an artificial spruce stand. That stand was fallen down by wind, the wood was exploited and the area was afforestated with deciduous species as oak (*Quercus petraea*), sycamore (*Acer pseudoplatanus*), ash (*Fraxinus excelsior*).

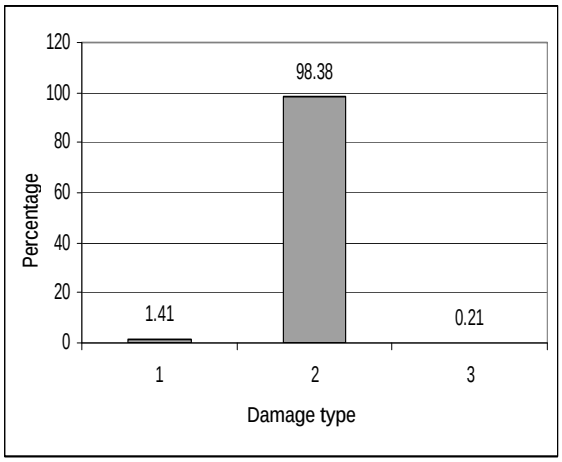
The most damaged were, hirtus), elder (*Sambucus nigra*) and willow (*Salix caprea*). It has to mention that these species are invasive species in case of our forest open areas, so their presence in our case is a significant one. All the above species (17), except the elder, are well known as tree species preferred by European bison in freedom, based on the studies done on the analyse of stomach content. The high percentage of damage for *Rubus sp.* is related with its abundance in the field and because *Rubus sp.* is used for leafs and springs even in winter. It has to be mentioned that the species taken into consideration are preferred for leaves, buds, stalks, branches and bark. The presence of elder in our list is a surprise, because these species is not mentioned in literature as a preferred one.

Table 2 - The distribution of diameters of damaged individuals



Taking into consideration the characteristics of the area (afforestation, young individuals, the presence of the invasive species) and the fact that shrub species are well present the present distribution is a normal one. The area, as an in-forest opening, due to its abundance of ground cover is an attractive site for bison. This distribution confirm that bison enjoy young trees because they are easy to access, so in case of commercial plantations, nurseries, afforestation areas such damages can locally be perceived as considerable nuisance.

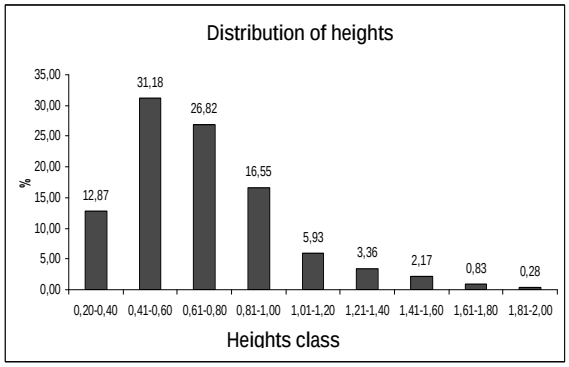
Table 3 - The distribution of damage types



This distribution is strongly connected with the first two distributions (species, diameters). It is obviously that in case of shrubs and young trees the most common damage is eating of branches, leaves and stalks. The debarking of young trees can be connected with some forage deficiencies or may happen in close relation with the close presence of feeding places. Observations done near the study area (in areas with young natural regeneration) revel

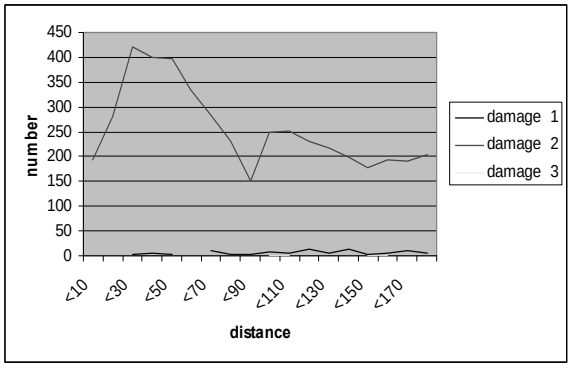
that the debark of young trees is non-existent, so there are no forage deficiencies in case of bisons population in the acclimatization enclosure. The only reason of the registered debarked trees is the proximity of the feeding places and the social behaviour of bison. Even we did not record the level of damages, higher levels of damagest were observed for *Salix sp.* and *Picea abies* (many individuals of this species were totally used).

Table 4 - The distribution of heights of damage places



The presence of higher heights is related with the debark damage, in case of the thicker trees. Almost 50% of damages, especially in case of the branches and stalks consumptions happened between 0,4-0,8 meter, as an expression of bison body size and of the height of usable part of seedling/young trees.

Table 5



Conclusions

In semi-natural conditions the group of bison moves gradually utilizing available food resources relatively uniformly. Damages to tree stands are recorded most frequently around points of winter supplementary feeding, where bison may concentrate for longer period of time, as in present chart.

The most damaged is the young forest vegetation- seedlings, shrubs- often leave, stalks and branches are used. The bison are dependent on an access to open and semi-open habitats like forest openings. The presence of this species may be very important for the maintenance of open areas within forest habitats and therefore contributes to an increase in heterogeneity of the environment and general biodiversity.

Further studies about European bison nutrition, in Romanian conditions, are required in order to develop a successful bison reintroduction in freedom.

Aknowledgements

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PART III – MUSEOGRAPHY

THE TEMPORARY EXHIBITION „MUSHROOM DELICACY, MEDICINE, POISON"

OTILIA CARMEN PAVEL[1], ORTANSA JIGĂU[1]

ABSTRACT

The temporary exhibition „Mushrooms - delicacy, medicine, poison" was organized by "Ion Borcea" Natural Sciences Museum Complex Bacău and the Mycological Society of Romania.

The 107 species of macromycetes collected from Slănic-Moldova and Traian areas were displayed in this exhibition according to scientific, aesthetic and didactic criteria.

The macromycetes species belong to 9 biological forms and 6 ecological categories.

Key words: fungi, macromycetes, exhibition, museum, Bacău, Romania.

Introduction

The 19th edition of National Symposium of Micology, was organized in Bacău by the "Ion Borcea" Natural Sciences Museum Complex Bacău and the Mycological Society of Romania during 29 August – 1 September 2007.

The activities of the symposium were: scientifical paper session on 30 August 2007; field application in forests from Nemira Mountains and Traian village, Bacău County on 31 August 2007; determination of mycological material collected and organization of fresh mushroom exhibition în the period 31 August - 1 September 2007 and the opening of fresh mushroom exhibition.

The temporary exhibition „Mushrooms - delicacy, medicine, poison" was realized with the support of mycologists who participated at the symposium in collaboration with the museographs and conservators of the "Ion Borcea" Natural Sciences Museum Complex Bacău.

The opening of the exhibition took place at Natural Sciences Museum of Bacău on 1st of September 2007.

The opening sppech was held by Dr. Gurău Gabriela - manager of the "Ion Borcea" Natural Sciences Museum Complex from Bacău. Some important guests such as proffesor Dr. Mihai Mititiuc - president of the Mycological Society of Romania, Proffesor Dr. Toader Chifu - vice-president of the same society, and Mitocaru Victor - vice-president of Bacau County Council held speeches stressing the importance of this exhibition and of the ecological and taxonomic mushroom researches.

The species from the exhibition were presented by Professor Dr. Tănase Cătălin who underlined the diversity of edible, toxic and non-edible mushroom, along with some aspects related to morphology and identification of different taxa.

At the opening of the exhibition were invited Romanian mycologists, guests from various institutions of Bacău County: local administration, culture, education and research, mass-media.

Material and method

The mycological application (31 August 2007) was organised in coniferous and deciduous forests from Slănic Moldova and Traian region.

At the mycological field application in Nemira Mountains attended 60 specialists (mycologists, botanists and biologists with other specialties). They followed 4 touristic route which had the starting and the destination points in Slăanic Moldova resort: Sănic Moldova: „300 de scări" – Dobru Mount; Slănic valley – Slănic Moldova touristic halt; Piatra stream valley – Cerdac – Slănic valley; Slănic valley – Cerdac.

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The mycological material was collected from different plant associations: *Pulmonario rubrae - Fagetum* (Soó 1964) Täuber 1987, *Leucanthemo waldsteinii – Fagetum* (Soó1964) Täuber 1987, *Carpino – Fagetum* Paucă 1941, *Symphyto cordati – Fagetum* Vida 1959.

The collected mushrooms specimens were identified using the mycological literature.

There were collected 107 taxa belonging to 2 kingdoms out of which one species belongs to Protozoa Kingdom and 106 species belong to Fungi Kingdom.

The mushroom species collected in the mycological application and exhibited in the temporary exhibition are systematically listed in Table 1, after Kirk and collab., 2009 (11).

The clasification of the macromycets regarding the bioform (life form), the food value and toxicity was made after Sălăgeanu G., 1985 (10).

Results and discussions

The 107 species of mushrooms identified belong to: 2 kingdooms (1 to Protozoa and 106 to Fungi), 3 phylums (1 species from Amoebozoa, 8 from Ascomycota and 98 from Basidiomycota), 5 classes, 15 orders, 34 families, 61 genera (Table 1). The genera with the most numerous species are *Russula* with 14 species and *Marasmius* with 5 species.

The macromycetes species belong to 9 biological forms and 6 ecological categories (Table 1).

The bioformes spectrum is dominated by mycetogeophyta mycorrhiza (Gm) with 31 species. The ecological spectrum is dominated by mycorrhizes fungi with 31 species.

From the economic importance point of view the most numeros are the inedible species – 63, followed by the edible species – 35, toxic species - 6 and medicinal mushrooms - 3 species.

Out of the edible mushrooms 23 species have a low food value (X), 7 have a medium food value (XX) and 5 species have a very high food value (XXX).

Conclusions

The temporary exhibition „Mushrooms - delicacy, medicine, poison" was an important cultural and scientific event which contributed to the spreading of knowledge about edible and toxic mushroom species growing in Bacău County.

A number of 107 mushroom species collected from Slănic-Moldova and Traian areas were presented in this exhibition according to scientific, aesthetic and didactic criteria. The macromycetes species belong to 9 biological forms and 6 ecological categories.

As a result of field application and temporary exhibition the macromicete collection of the "Ion Borcea" Natural Science Museum Complex from Bacău acquired a number of 100 new heritage museum specimens.

Rezumat

Simpozionul Național de Micologie, ediția a XIX-a, a fost organizat la Bacău, de Complexul Muzeal de Ştiinţele Naturii "Ion Borcea" Bacău, în colaborare cu Societatea Micologică din România, în perioada 29 august – 1 septembrie 2007.

Expoziția temporară cu titlul "Ciupercile, delicatesă, medicament, otravă" a fost realizată de către specialiştii micologi care au participat la simpozion, în colaborare cu muzeografii şi conservatorii din cadrul Complexul Muzeal de Ştiinţele Naturii "Ion Borcea" Bacău (31 august - 1 septembrie 2007).

Materialul micologic a fost colectat din pădurile din județul Bacău, a fost determinat de către micologi şi a fost expus după criterii ştiinţifice şi didactice.

Au fost colectați 107 taxoni ce aparțin la: 2 regnuri (Protozoa şi Fungi), 3 încrengături (1 Amoebozoa, 8 Ascomycota şi 98 Basidiomycota), 3 clase, 15 ordine, 34 familii şi 61 genuri.

Din analiza categoriilor ecologice, se constată că cele mai numeroase sunt speciile saprofite 49, urmate de macromicetele micorizante 31.

În cadrul expoziției au fost prezentate publicului: 107 specii de ciuperci, dintre care 63 de ciuperci necomestibile, 35 specii comestibile, 6 toxice şi 3 specii medicinale.

Table 1 **- The mycological material collected on 31 august 2007**

No.	Species	Biological forms	Ecological category	Economic importance	Slanic - Moldova	Traian
	Kingdom PROTOZOA					
	Phylum Amoebozoa, Class Myxogastria					
	Order Physarida, Family Physaraceae					
1.	*Fuligo septica var. septica* (L.) F.H. Wigg.				+	-
	Kingdom FUNGI					
	Phylum Ascomycota					
	Class Pezizomycetes					

	Order Pezizales					
	Family Helvellaceae					
2.	*Helvella elastica* Bull.	Gs	St		+	-
3.	*Helvella lacunosa* Afzel.	Gs-EPx	St	X	+	-
	Family Sarcoscyphaceae					
	Class Sordariomycetes					
	Order Hypocreales					
	Family Hypocreaceae					
4.	*Hypomyces aurantius* (Pers.) Fuckel on fruitbody of *Xerocomus* sp.				+	
	Order Xylariales					
	Family Xylariaceae					
5.	*Hypoxylon fragiforme* (Pers.) J. Kickx f.	EPx	Sl		+	-
6.	*Kretzschmaria deusta* (Hoffm.) P.M.D. Martin	EPx	Sl		+	+
7.	*Xylaria carpophila* (Pers.) Fr.	EPx	Sl		+	-
8.	*Xylaria hypoxylon* (L.) Grev.	EPx	Sl		+	-
9.	*Xylaria polymorpha* (Pers.) Grev	EPx	Sl		+	+
	Phylum Basidiomycota					
	Class Agaricomycetes					
	Order Agaricales					
	Family Agaricaceae					
10.	*Agaricus campestris* var. *campestris* L.	Gs	St	XXX	+	-
11.	*Lepiota castanea* Quél	Gs	St		+	-
12.	*Crucibulum laeve* (Huds.) Kambly	EPx	Sl		+	-
13.	*Cyathus striatus* (Huds.) Willd	EPx-Gs	Sl		+	-
14.	*Bovista nigrescens* Pers.	Gs	St	X	+	-
15.	*Lycoperdon perlatum* Pers	Gs	St	X	+	-
16.	*Lycoperdon pyriforme* Schaeff.	EPx	Sl		+	-
	Family Amanitaceae					
17.	*Amanita crocea* (Quél.) Singer	Gm	M		+	-
18.	*Amanita muscaria* var. muscaria (L.) Lam.	Gm	M	††	+	-
19.	*Amanita rubescens var. rubescens* Pers.	Gm	M	XXX	+	-
	Family Incertae sedis					
20.	*Panaeolus papilionaceus* var. *papilionaceus* (Bull.) Quél.	Th	St		+	-
	Family Inocybaceae					
21.	*Inocybe asterospora* Quél.	Gm	M	††	+	-
22.	*Inocybe geophylla var. lilacina* Gillet	Gm	M	††	+	-
23.	*Inocybe rimosa* (Bull.) P. Kumm.	Gm	M	††	+	-
	Family Fistulinaceae					
24.	*Fistulina hepatica* (Schaeff.) With.	Ex-EPx	SPl	X	+	-
	Family Hydnangiaceae					
25.	*Laccaria laccata* (Scop.) Cooke	Gm	M	X	+	-
	Family Marasmiaceae					
26.	*Gymnopus confluens* (Pers.) Antonín, Halling & Noordel.	Gs	St		+	+
27.	*Gymnopus dryophilus* (Bull.) Murrill	Gs	Sf	X	+	+
28.	*Gymnopus peronatus* (Bolton) Antonín	Gs	Sf		+	+
29.	*Marasmius alliaceus* (Jacq.) Fr.	Gs	Sf		+	-
30.	*Marasmius oreades* (Bolton) Fr.	Gp	Sf	XXX	+	+
31.	*Marasmius rotula* (Scop.) Fr.	EPx-Gs	St		+	-
32.	*Marasmius scorodonius* (Fr.) Fr.	Gp	Sl	X	+	-
33.	*Marasmius wynnei* Berk. & Broome	Gs	Sf		+	-
34.	*Rhodocollybia maculata* var. *maculata* (Alb. & Schwein.) Singer	Gs	St		-	+
	Family Mycenaceae					
35.	*Mycena crocata* (Schrad.) P. Karst	Gs	St		+	-
36.	*Mycena galericulata* (Scop.) Gray	Ex-EPx	SPl		+	+

37.	*Mycena haematopus* (Pers.) P. Kumm.	EPx	Sl		+	-
38.	*Mycena pura* (Pers.) P. Kumm	Gs	St		+	+
	Family Physalacriaceae	Gs	Sf			
39.	*Armillaria mellea* (Vahl) P. Kumm.	Ex-EPx	SPl	XX	+	+
40.	*Oudemansiella melanotricha* (Dörfelt) M.M. Moser,					
41.	*Xerula longipes* (P. Kumm.) Maire	Ex-EPx	SPl	XX	+	-
	Family Pluteaceae					
42	*Pluteus cervinus* var. *cervinus* P. Kumm.	EPx	Sl	X	+	+
	Family Psathyrellaceae					
43.	*Coprinellus disseminatus* (Pers.) J.E. Lange	Th	Sh		+	+
44.	*Coprinellus micaceus* (Bull.) Vilgalys, Hopple & Jacq. Johnson	Th	Sh		+	+
	Family Schizophyllaceae					
45.	*Schizophyllum commune* Fr.	Ex-EPx	SPl	╬	+	-
	Family Strophariaceae					
46.	*Hypholoma fasciculare* (Huds.) P. Kumm	EPx	Sl	†	+	+
	Family Tricholomataceae					
47.	*Clitocybe gibba* (Pers.) P. Kumm	Gs	Sf	X	+	+
48.	*Clitocybe odora* (Bull.) P. Kumm	Gs	Sf	X	+	-
49.	*Lepista flaccida* (Sowerby) Pat.	Gs	St	X	+	+
50.	*Megacollybian platyphylla* (Pers.) Kotl. & Pouzar	EPx	Sl	X	+	+
51.	*Tricholoma album* (Schaeff.) P. Kumm.	Gm	M		+	
52.	*Tricholoma imbricatum* (Fr.) P. Kumm**.**	Gm	M		+	-
53.	*Tricholomopsis rutilans* (Schaeff.) Singer	EPx	Sl		+	+
	Order Auriculariales					
	Family Auriculariaceae					
54.	*Auricularia auricula-judae* (Bull.) Quél.	Ex	Pl	X	+	+
55.	*Exidia glandulosa* (Bull.) Fr.	EPx	Sl		+	-
	Family - Incertae sedis					
56.	*Pseudohydnum gelatinosum* (Scop.) P. Karst.	EPx	Sl	X	+	-
	Order Boletales					
	Family Boletaceae					
57.	*Boletus appendiculatus* Schaeff.	Gm	M	XXX	+	-
58.	*Boletus calopus* Pers.	Gm	M		+	-
59.	*Boletus erythropus* Krombh.	Gm	M	XX	+	-
	Family Sclerodermataceae					
60.	*Scleroderma verrucosum* (Bull.) Pers.	Gm	M	†	+	-
	Order Geastrales					
	Family Geastraceae					
61.	*Geastrum fimbriatum* Fr.	Gs	St		+	-
	Order Gomphales					
	Family Gomphaceae					
62.	*Ramaria flava* (Schaeff.) Quél.	Gs	St	XX	+	-
	Order Gloeophyllales					
	Family Gloeophyllaceae					
63.	*Gloeophyllum odoratum* (Wulfen) Imazeki	Ex-EPx	SPl		+	-
	Order Hymenochaetales					
	Family Hymenochaetaceae					
64.	*Phellinus hartigii* (Allesch. & Schnabl) Pat.	Ex	Pl		+	-
	Order Polyporales					
	Family Ganodermataceae					
65.	*Ganoderma applanatum* (Pers.) Pat.	Ex-EPx	SPl		+	-
66.	*Ganoderma lucidum* (Curtis) P. Karst.	Ex-EPx	SPl	╬	+	-
	Family Fomitopsidaceae					
67.	*Climacocystis borealis* (Fr.) Kotl. & Pouzar	Ex-EPx	SPl		+	-
68.	*Fomitopsis pinicola* (Sw.) P. Karst.	Ex-EPx	SPl		+	-

69.	*Fomitopsis rosea* (Alb. & Schwein.) P. Karst.	Ex-EPx	SPl		+	-
70.	*Piptoporus betulinus* (Bull.) P. Karst.	Ex	Pl		+	-
	Family Meruliaceae					
71.	*Bjerkandera adusta* (Willd.) P. Karst.	EPx	Sl		+	-
	Family Meripilaceae					
72.	*Meripilus giganteus* (Pers.) P. Karst.	EPx	Sl		+	-
	Family Polyporaceae					
73.	*Daedaleopsis confragosa* (Bolton) J. Schröt.	Ex-EPx	SPl		+	-
74.	*Fomes fomentarius* (L.) J.J.Kickx	Ex	Pl		+	-
75.	*Laetiporus sulphureus* (Bull.) Murrill	Ex	Pl	X	+	-
76.	*Lenzites betulina* (L.) Fr**.**	EPx	Sl		+	-
77.	*Polyporus alveolaris* (DC.) Bondartsev & Singer	Ex	Pl		+	-
78.	*Polyporus melanopus* (Pers.) Fr.	Ex-EPx	SPl		+	-
79.	*Polyporus squamosus* (Huds.) Fr.	Ex-EPx	SPl	X	+	-
80.	*Polyporus varius* (Pers.) Fr.	Ex-EPx	SPl		+	+
81.	*Trametes gibbosa* (Pers.) Fr.	EPx	Sl		+	-
82.	*Trametes hirsuta* (Wulfen) Pilá	EPx	Sl		+	-
83.	*Trametes versicolor* (L.) Lloyd	EPx	Sl	╬	+	+
84.	*Trichaptum abietinum* (Dicks.) Ryvarden	EPx	Sl		+	-
	Order Russulales					
	Family Bondarzewiaceae					
85.	*Heterobasidion annosum* (Fr.) Bref	Ex-EPx	SPl		+	-
	Family Russulaceae					
86.	*Lactarius acerrimus* Britzelm.	Gm	M		+	-
87.	*Lactarius decipiens* Quél.	Gm	M		+	-
88.	*Lactarius vellereus* (Fr.) Fr.	Gm	M		+	-
89.	*Russula albonigra* (Krombh.) Fr.	Gm	M		+	-
90.	*Russula claroflava* Grove	Gm	M	X	+	-
91.	*Russula chloroides* (Krombh.) Bres.	Gm	M	X	+	-
92.	*Russula cyanoxantha* (Schaeff.) Fr	Gm	M	XX	+	+
93.	*Russula delica* Fr	Gm	M	XX	+	-
94.	*Russula foetens* (Pers.) Pers.	Gm	M		+	+
95.	*Russula integra* (L.) Fr.	Gm	M	X	+	-
96.	*Russula ochroleuca* (Pers.) Fr.	Gm	M	X	+	-
97.	*Russula olivacea* (Schaeff.) Fr.	Gm	M	X	+	-
98.	*Russula fageticola* (Romagn.) Bon	Gm	M		+	-
99.	*Russula mustelina Fr.*	Gm	M	X	+	-
100.	*Russula vesca* Fr.	Gm	M	XX	+	-
101.	*Russula virescens* (Schaeff.) Fr.	Gm	M	XXX	+	-
102.	*Russula xerampelina* (Schaeff.) Fr.	Gm	M	X	+	-
	Family Stereaceae					
103.	*Stereum hirsutum* (Willd.) Pers	Ex-EPx	SPl		+	+
104.	*Stereum rugosum* Pers	Ex	Pl		+	-
	Order Thelephorales					
	Family Thelephoraceae					
105.	*Thelephora terrestris* Ehrh.	Gm	M		+	-
	Order Trechisporales					
	Family Hydnodontaceae					
106.	*Trechispora farinacea* (Pers.) Liberta	EPx	Sl		+	-
	Class Tremellomycetes					
	Order Tremellales					
	Family Tremellaceae					
107.	*Tremella mesenterica* Retz	Ex-EPx	SPl		+	-
Total numbers of species - 107		**105**	**105**		**105**	**24**

	Legend:					
	Biological forms					
1.	Gm - mycetogeophyta mycorrhiza	31			31	2
2.	Gs - mycetogeophyta saprophytica	18			18	7
3.	Gs-EPx - mycetogeophyta saprophytica - mycetoepixilophyta	1			1	
4.	Th – mycetotherophyta	3			3	2
5.	EPx – mycetoepixilophyta	22			22	7
6.	EPx-Gs - mycetoepixilophyta - mycetogeophyta	2			2	
7.	Ex – mycetoedoxilophyta	7			7	1
8.	Ex-EPx - mycetoedoxilophyta - mycetoepixilophyta	19			19	4
9.	Gp – mycetogeophyta parasitica	2			2	1
	Ecological category					
1.	M - mycorrhizal fungi		31		31	2
2.	Sf - saprophytic fungi on litter		8		8	4
3.	Sl - saprophytic fungi on dead wood		24		24	7
4.	SPl - saproparasitic fungi on wood		18		18	4
5.	Pl - parasitic fungi on wood		7		7	1
6.	St - saprophytic fungi on soil or humus		17		17	6
	Economic importance					
	Edible (Food value)					
1.	X - eatable with little food value			23	23	6
2.	XX - eatable with a lot of food value			7	7	2
3.	XXX - eatable with great food value			5	5	1
	Toxicity					
1.	† - mushrooms which cause gastrointestinal intoxication			2	2	
2.	†† - mushrooms which cause intoxication of the nervos system			4	4	
1.	**Medicinal mushrooms** ╬			3	3	1
	Inedible mushrooms			**63**	**63**	**14**

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Fig. 1 - Issues of the The National Symposium of Micology, 19th edition (30 August 2007)




Fig. 2 - The opening of the exhibition „Mushrooms, delicacy, medicine, poison”
1 September 2007

Photos by Bogdan Barabaş

COMPLEXUL MUZEAL DE ŞTIINŢELE NATURII „ION BORCEA" BACĂU

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THE TEMPORARY EXHIBITION „MAGIC MUSHROOMS"

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ABSTRACT

The temporary exhibition "*Magic mushrooms"* was an important cultural and scientific event which contributed to the spreading of knowledge about edible and toxic mushroom species from Bacău County. The 102 species of mushrooms collected form Slănic-Moldova, Luncani and Racova areas were presented in this exhibition according to scientific, aesthetic and didactic criteria. The macromycetes species belong to 8 biological forms and 6 ecological categories.

Key words: fungi, mushrooms, macromycetes, exhibition, museum, Bacău, România.

Introduction

The temporary exhibition "Magic mushrooms" intended to bring to public attention the misterious world of mushrooms, to inform and educate the visitors regarding customs and folk beliefs about mushrooms and to present edible and toxic species. The exhibition addressed to general public, mushroom pickers, specialists, distributors of natural products obtained from mushrooms, who want to know the diversity of species which frequently occured in Bacău County forests.

The public had the opportunity to admire a great variety of fresh mushroom species collected from deciduous and coniferous forests from the surroundings of the following localities: Slănic-Moldova, Luncani and Racova.

This temporary exhibition also offered interactive educational activities organized mainly for students. The event offered the visitors the opportunity to learn about mushrooms and plants spread in the forests of their county and to have a dialogue with the experts of the museum.

Material and method

Organizing the exhibition "Magic mushrooms" involved a series of specific activities for setting up of such an event: mycological applications in different ecosystems, editing advertising materials, identification and exhibit of collected specimens, guiding the visitors and preserving the specimens for museum collection.

The mycological material was collected during the mycological application (13-14 October 2008) undertook in coniferous and deciduous forests from the following locations: Slănic Moldova, Luncani and Racova.

A 23-member group of museum curators and curatorial technicians participated in a 2-day activity of collecting various species of Macromycetes. This applications took place in 3 different areas from Bacău County: Nemira Mountains (13 October 2009) on the road between Slănic – Moldova (mixed forests of beech-fir-spruce and in coniferous forests dominated by spruce tree); Racova (14 October 2008) in Runc Forests (deciduous species); Luncani (14 October 2008) around the village in deciduous forests.

The macromycetes species displayed in the temporary exhibitions were identified by Dr. Pavel Otilia and Dr. Jigău Ortansa.

The mycological material collected was determined using the mycological literature.

The mushroom species collected in the mycological application and presented in the temporary exhibition are systematically listed in Table 1, after Kirk and collab. (11).

Results and discussions

The 102 species of mushrooms identified belong to: 2 kingdoms (1 to Protozoa and 101 to Fungi), 3 phylums (1 species from Amoebozoa, 6 species from Ascomycota and 95 species from Basidiomycota), 5 classes, 12 orders, 35 families, 56 genera (Table 1). The genera with the most numerous species being *Russula* with 13 species and *Lactarius* with 4 species.

The macromycetes species belong to 8 biological forms and to 6 ecological categories (Table 1).

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The bioformes spectrum is dominated by mycetogeophyta mycorrhiza (Gm) with 35 species. The ecological spectrum is dominated by mycorrhizes fungi with 35 species, followed by saprophyte fungi with 48 taxa.

Out of the edible mushrooms 31 species have a low food value (X), 7 species have a medium food value (XX) and 6 species have a very high food value (XXX).

In the exhibition were presented edible, toxic, medicinal and non-edible species of the following genera: *Russula, Lactarius, Boletus, Amanita, Armillaria, Mycena, Marasmius, Pholiota etc.*

Among rare species we mention *Hericium coralloides* (Scop.) Pers.

Table 1 - The mycological material collected, 13-14 October 2008

No.	Species	Biological forms	Ecological category	Economic importance	Slanic – Moldova 13.10. 08	Racova (Forest Runc) 14.10. 08	Luncani 14.10. 08
	Kingdom PROTOZOA						
	Phylum Amoebozoa, Class Myxogastria						
	Order Liceida, Family Tubiferaceae						
1.	*Lycoperdon epidendrum* J.C. Buxb. ex L.				+	-	-
	Kingdom FUNGI						
	Phylum Ascomycota						
	Class Pezizomycetes						
	Order Pezizales						
	Family Helvellaceae						
1.	*Helvella crispa* **(Scop.) Fr**	Gs	St		-	+	-
	Class Sordariomycetes						
	Order Xylariales						
	Family Xylariaceae						
2.	*Daldinia concentrica* (Bolton) Ces. & De Not.	EPx	Sl		+	-	-
3.	*Hypoxylon fragiforme* (Pers.) J. Kickx f.	EPx	Sl		+	+	+
4.	*Xylaria hypoxylon* (L.) Grev.	EPx	Sl		+	-	-
5.	*Xylaria longipes* Nitschke	EPx	Sl		-	+	-
6.	*Xylaria polymorpha* (Pers.) Grev	EPx	Sl		+	+	+
	Phylum Basidiomycota						
	Class Agaricomycetes						
	Order Agaricales						
	Family Agaricaceae						
7.	*Agaricus benesii* (Pilát) Pilát	Gs	St	XXX	-	-	+
8.	*Agaricus silvaticus* Schaeff.	Gs	St	XXX	+	+	+
9.	*Agaricus silvicola* var. *silvicola* (Vittad.) Peck,	Gs	St	X	+	+	+
10.	*Chlorophyllum rhacodes* (Vittad.) Vellinga	Gs	St		-	+	+
11.	*Lepiota aspera* (Pers.) Quél.	Gs	St		+	+	-
12.	*Lepiota cristata* (Bolton) P. Kumm.	Gs	St		+	-	-
13.	*Lycoperdon perlatum* Pers	Gs	St	X	+	+	+
14.	*Lycoperdon pyriforme* Schaeff.	EPx	Sl	X	+	+	+
15.	*Macrolepita procera* var. *procera* (Scop.) Singer	Gs	St		+	+	-
	Family Amanitaceae						
16.	*Amanita citrina* var. *citrina* (Pers.) Pers.	Gm	M	††	+	-	+
17.	*Amanita muscaria* var. *muscaria* (L.) Lam.	Gm	M	††	+	-	-
18.	*Amanita phalloides* (Vaill. ex Fr.) Link	Gm	M	†††	+	-	-
19.	*Amanita rubescens var. rubescens* Pers.	Gm	M	XXX	+	-	+
	Family Hygrophoraceae						
20.	*Hygrophorus agathosmus* (Fr.) Fr.	Gm	M	X	-	+	+
21.	*Hygrophorus eburneus* (Bull.) Fr.	Gm	M	X	+	+	+
22.	*Hygrophorus lindtneri* M.M.Moser	Gm	M	X	-	+	+
	Family Inocybaceae						
23.	*Inocybe geophylla var. geophylla* (Fr.) P. Kumm.	Gm	M	††	+	-	-
24.	*Inocybe asterospora* Quél.	Gm	M	††	+	-	-
	Family Hydnangiaceae						
25.	*Laccaria amethystina* Cooke	Gm	M	XX	+	+	+
26.	*Laccaria laccata* (Scop.) Cooke	Gm	M	X	+	+	+
	Family Marasmiaceae						
27.	*Gymnopus erythropus* (Pers.) Antonín, Halling & Noordel.	Gs	Sl		-	+	-

28.	*Gymnopus peronatus* (Bolton) Antonín	Gs	Sf		+	-	+
29.	*Marasmius alliaceus* (Jacq.) Fr.	Gs	Sf		+	+	+
30.	*Marasmius rotula* (Scop.) Fr.	EPx-Gs	St		+	+	+
31.	*Marasmius wynnei* Berk. & Broome	Gs	Sf		+	-	-
32.	*Rhodocollybia butyracea* f. *butyracea* (Bull.) Lennox	Gs	St	X	+	-	+
	Family Mycenaceae						
33.	*Mycena pura* (Pers.) P. Kumm	Gs	St		+	+	+
	Family Physalacriaceae						
34.	*Armillaria mellea* (Vahl) P. Kumm.	Ex-EPx	SPl	XX	+	-	+
35.	*Oudemansiella mucida* (Schrad.) Höhn.	Ex	Pl		+	+	
36.	*Xerula radicata* (Relhan) Dörfelt	Gp	St	X	+	-	-
	Family Pleurotaceae						
37.	*Pleurotus dryinus* (Pers.) P. Kumm.	Ex	Pl		-	+	+
38.	*Pleurotus ostreatus* (Jacq.) P. Kumm.	Ex-EPx	SPl	XXX ,╬	-	+	
	Family Pluteaceae						
39.	*Pluteus cervinus* var. *cervinus* P. Kumm.	EPx	Sl	XXX	+	+	+
	Family Psathyrellaceae						
40.	*Coprinellus micaceus* (Bull.) Vilgalys, Hopple & Jacq. Johnson	Th	St		+	+	+
41.	*Coprinopsis picacea* (Bull.) Redhead, Vilgalys & Moncalvo	Th	St			+	+
42.	*Psathyrella piluliformis* (Bull.) P.D. Orton	EPx	Sl	X	+	+	+
43.	*Psathyrella conopilus* (Fr.) A. Pearson & Dennis	Gs	St		+	-	-
	Family Schizophyllaceae						
44.	*Schizophyllum commune* Fr.	Ex-EPx	SPl	╬	+	-	-
	Family Strophariaceae						
45.	*Hypholoma fasciculare* (Huds.) P. Kumm	EPx	Sl	†	+	+	+
46.	*Hypholoma sublateritium* (Schaeff.) Quél.	EPx	Sl		+	+	+
47.	*Pholiota adiposa* (Batsch) P. Kumm.	Ex-EPx	SPl	X	+	+	+
48.	*Pholiota aurivella* (Batsch) P. Kumm.	Ex-EPx	SPl	X	+	+	+
49.	*Stropharia aeruginosa* (Curtis) Quél.	Gs	St		+	+	+
	Family Tricholomataceae						
50.	*Clitocybe candicans* (Pers.) P. Kumm.	Gs	Sf	†††	+	+	+
51.	*Clitocybe nebularis* (Batsch) P. Kumm.	Gs	St		+	+	+
52.	*Clitocybe odora* (Bull.) P. Kumm	Gs	Sf	X	+	+	+
53.	*Lepista flaccida* (Sowerby) Pat.	Gs	St	X	+	+	+
54.	*Lepista nuda* (Bull.) Cooke	Gs	St	XXX	+	+	+
55.	*Megacollybian platyphylla* (Pers.) Kotl. & Pouzar	EPx	Sl	X	+	+	+
56.	*Tricholoma myomyces* (Pers.) J.E. Lange	Gm	M	XX	+	+	+
	Order Auriculariales						
	Family Auriculariaceae						
57.	*Auricularia auricula-judae* (Bull.) Quél.	Ex	Pl	X	+	+	+
58.	*Pseudohydnum gelatinosum* (Scop.) P. Karst.	EPx	Sl	X	+	+	+
	Order Boletales						
	Family Boletaceae						
59.	*Boletus erythropus* Krombh.	Gm	M	XX	+	-	-
60.	*Boletus chrysenteron* Bull.	Gm	M	XX	+	+	+
	Order Cantharellales						
	Family Cantharellaceae						
61.	*Craterellus cornucopioides* (L.) Pers.	Gm	M	X	-	-	+
	Family Clavulinaceae						
62.	*Clavulina cinerea* (Bull.) J. Schröt.	Gs	St	X	+	-	-
63.	*Clavulina coralloides* (L.) J. Schröt.	Gs	St	X	+	-	-
	Family Hydnaceae						
64.	*Hydnum repandum* L.	Gm	M	X	+	-	-
	Order Gomphales						
	Family Clavariadelphaceae						
65.	*Clavariadelphus* ***pistillaris*** **(L.) Donk**	Gs	St		-	-	+
	Family Gomphaceae				-	-	+
66.	*Ramaria palmata* Pers.) Donk	Gs	St, Sf		+	-	-
	Order Hymenochaetales						
	Family Hymenochaetaceae						
67.	*Phellinus hartigii* (Allesch. & Schnabl) Pat.	Ex	Pl		+	-	-
	Order Polyporales						
	Family Ganodermataceae						
68.	*Ganoderma applanatum* (Pers.) Pat.	Ex-EPx	SPl		+	-	-

	Family Fomitopsidaceae						
69.	*Fomitopsis pinicola* (Sw.) P. Karst.	Ex-EPx	SPl		+	-	-
70.	*Piptoporus betulinus* (Bull.) P. Karst.	Ex	Pl		+		-
	Family Meripilaceae						
71.	*Meripilus giganteus* (Pers.) P. Karst.	EPx	Sl		-	+	-
	Family Polyporaceae						
72.	*Daedaleopsis confragosa* (Bolton) J. Schröt.	Ex-EPx	SPl		-	+	+
73.	*Fomes fomentarius* (L.) J.J.Kickx	Ex	Pl		-	+	+
74.	*Trametes gibbosa* (Pers.) Fr.	EPx	Sl		+	-	-
75.	*Trametes hirsuta* (Wulfen) Pilá	EPx	Sl			+	-
76.	*Trametes versicolor* (L.) Lloyd	EPx	Sl	╬	+	-	+
	Order Russulales						
	Family Bondarzewiaceae						
77.	*Heterobasidion annosum* (Fr.) Bref	Ex-EPx	SPl		+	-	-
	Family Hericiaceae						
78.	*Hericium coralloides* (Scop.) Pers.	Ex-EPx	SPl	X	+	-	+
	Family Russulaceae						
79.	*Lactarius blennius* (Fr.) Fr.	Gm	M		-	+	+
80.	*Lactarius deliciosus* (L.) Gray	Gm	M	X	+	+	+
81.	*Lactarius* fluens Boud.	Gm	M		-	-	+
82.	*Lactarius subdulcis* (Pers.) Gray	Gm	M	X	-	+	+
83.	*Lactarius vellereus* (Fr.) Fr.	Gm	M		+	+	+
84.	*Russula alutacea* (Fr.) Fr.	Gm	M	X	+	-	-
85.	*Russula chloroides* (Krombh.) Bres.	Gm	M	X	+	-	-
86.	*Russula cyanoxantha* (Schaeff.) Fr	Gm	M	XX	+	-	-
87.	*Russula delica* Fr	Gm	M	XX	+	-	-
88.	*Russula exalbicans* (Pers.) Melzer & Zvára	Gm	M		-	+	-
89.	*Russula fellea* (Fr.) Fr.	Gm	M		+	+	+
90.	*Russula integra* (L.) Fr.	Gm	M	X	+	+	+
91.	*Russula ochroleuca* (Pers.) Fr.	Gm	M	X	+	+	+
92.	*Russula paludosa* Britzelm.	Gm	M	X	+	-	-
93.	*Russula nigricans* (Bull.) Fr.	Gm	M		+	-	-
94.	*Russula risigallina* (Batsch) Sacc.	Gm	M	X	-	+	-
95.	*Russula violacea* Quél.	Gm	M		-	+	-
96.	*Russula viscida* Kudřna	Gm	M	X	-	+	-
	Family Stereaceae						
97.	*Stereum fuscum* Britzelm.	EPx	Sl		+	-	-
98.	*Stereum hirsutum* (Willd.) Pers	Ex-EPx	SPl		+	+	+
	Order Thelephorales						
	Family Bankeraceae						
99.	*Sarcodon imbricatus* (L.) P. Karst.	Gm	M	X	+	-	-
	Class Dacrymycetes						
	Order Dacrymycetales						
	Family Dacrymycetaceae						
100.	*Calocera viscosa* (Pers.) Fr.	EPx	Sl		+	-	-
	Class Tremellomycetes						
	Order Tremellales						
	Family Tremellaceae						
101.	*Tremella mesenterica* Retz	Ex-EPx	SPl		+	-	-
	Total number of species 102	**101**	**101**		**79**	**60**	**55**
	Legend:						
	Biological forms						
1.	Gm - mycetogeophyta mycorrhiza	35			25	18	17
2.	Gs - mycetogeophyta saprophytica	26			21	17	16
3.	Th – mycetotherophyta	2			1	2	2
4.	EPx – mycetoepixilophyta	18			15	12	10
5.	EPx-Gs - mycetoepixilophyta - mycetogeophyta	1			1	1	1
6.	Ex – mycetoedoxilophyta	6			4	4	3
7.	Ex-EPx - mycetoedoxilophyta - mycetoepixilophyta	12			10	5	6
8.	Gp – mycetogeophyta parasitica	1			1	1	
	Ecological category						
1.	M - mycorrhizal fungi		35		25	18	17
2.	Sf - saprophytic fungi on litter		5		5	4	4

3.	Sl - saprophytic fungi on dead wood		19		14	11	10
4.	SPl - saproparasitic fungi on wood		12		11	6	6
5.	Pl - parasitic fungi on wood		6		4	4	3
6.	St - saprophytic fungi on soil or humus		24		19	17	15
	Edible (Food value)						
1.	X – eatable with little food value			31	27	21	22
2.	XX - eatable with a lot of food value			7	7	3	4
3.	XXX - eatable with great food value			6	4	5	5
	Toxicity						
1.	† - mushrooms wich cause gastrointestinal intoxication			1	1	1	1
2.	†† - mushrooms which cause intoxication of the nervos system			4	4		2
3.	††† - mushrooms which cause fatal intoxication			2	2	1	2
1.	**Medicinal mushrooms ╬**			4	2	1	1
Inedible mushrooms				**47**	**31**	**28**	**18**

Conclusions

The temporary exhibition was an important cultural and scientific event which contributed to the spreading of knowledge about edible and toxic mushroom species from Bacău County.

The 102 species of mushrooms collected in the areas of Slănic-Moldova, Racova (Runc Forests), and Luncani were presented in this exhibition according to scientific, aesthetic and didactic criteria. The macromycetes species belong to 8 biological forms and to 6 ecological categories.

From the economic importance point of view the most numeros are the inedible mushroom with 47 species, followed by the edible macromycetes with 44 species, toxic mushroom with 7 taxa and 4 medicinal species.

Rezumat

Expoziția temporară „*Magia ciupercilor*" a fost organizată de Complexul Muzeal de Ştiinţele Naturii "Ion Borcea" Bacău în perioada 13-17 octombrie 2007. În cadrul expoziției au fost expuse 102 specii de ciuperci, ce aparţin la 2 regnuri, 3 încrengături, 5 clase, 12 ordine, 35 familii şi 56 genuri.

Din punct de vedere al importanței economice, cele mai numeroase au fost ciupercile necomestibile - 47, urmate de cele comestibile - 44, specii toxice – 7 şi medicinale – 4, din genurile: *Russula, Lactarius, Boletus, Amanita, Armillaria, Mycena, Marasmius, Pholiota etc.*

Expoziția a fost cuprinsă în *Programul manifestărilor culturale şi ştiinţifice* aprobate şi finanțate de Consiliul Județean Bacău, pe anul 2008.

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Fig. 1 - The opening of the exhibition"Magic mushrooms" (15 October 2008)

Photos of Otilia Pavel and Bogdan Barabaş

COMPLEXUL MUZEAL DE ŞTIINȚELE NATURII „ION BORCEA" BACĂU

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THE CONTRIBUTION OF THE "ION BORCEA" MUSEUM OF NATURAL SCIENCES BACAU TO THE ECOLOGICAL EDUCATION EVENTS – "FOREST MONTH 2005-2008"

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ABSTRACT

Currently topics such as pollution, environmental protection, energy crisis or global warming, are issues that concern and affect every inhabitant of the planet regardless of social position. Forest is the most complex terrestrial ecosystem and we believe that is central to the problems affecting the planet today. Major environmental problems facing us today are much related to global wooded areas. "Forest Moon" was first celebrated in Romania in 1953, following the issuance of a law providing for holding of specific actions with environmental and educational significance.

Since lately there is more and more reasons for us to engage each environmental issue, our institution has joined educational projects whose themes ranged in environmental protection, working with many schools (Bacau County School Inspectorate, Teachers House, kindergartens, schools) and local authorities (Municipality of Bacau, Bacau Forestry Department). Each year, from March 15 to April 15 we contributed to information and promotion campaigns included in the series of events celebrating the "Forest Moon" by producing themed multimedia materials related to human and environmental importance of forests, organizing competitions on environmental issues, planting of saplings.

Key words: forest month, ecological education, school, trees planting

„If you are planning for a year, sow rice; if you are planning for a decade, plant trees; if you are planning for a lifetime, educate people." (Chinese Proverb)

Introduction

The forest ecosystem is the main oxygen producer and carbon dioxide "consumer", representing a huge source of natural resources and economically important products; it prevents flooding and pollution of aquatic ecosystems, and becomes a favourite place for leisure.

The forest is the most complex terrestrial ecosystems holding the key role in the complex environmental problems of the entire planet.

Nowadays the subjects such as pollution, environmental protection, energy crisis or global warming are issues which concern and affect all the human beings on the planet regardless of their social position.

The important environmental issues that we are dealing with today are linked to the considerable decreasing, at global level, of the forested areas.

History

Since the beginning of history, the forest played an essential role in the human life, mainly as a food source. Step by step, humanity discovered the priceless treasures of forests which could be industrially exploited, so that the wood became a fuel and raw material for many industrial braches (constructions, furniture, paper and cellulose, textile industry, etc.).

The first who noticed the danger of the intensive deforestation was *Sterling Morton,* the American Minister of Agriculture, who established by law the date of 22nd of April as the "Tree Day", a day when the Americans took part in tree planting campaigns as an attempt to counteract the effects of the intense deforestation.

On the occasion of the 50th anniversary of the "Tree Day", the American president issued a proclamation:"*Men speak of natural rights, but I challenge anyone to show where in the nature any rights existed or were recognized until there was established for their declaration and protection a duly promulgated body of corresponding laws*". (Calvin Coolidge). In that year the celebration turned into a forest week and the American nation understood the importance of forests, therefore the strategy for restoring the severly exploited forest lands became a priority.

In the following years this event became an international celebration, many European countries

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took the American idea of involving the youth in tree planting campaigns. In France, for instance, these actions were initiated by the president and the government.

In 1902 Romania started ecological campaigns with the aim of increasing the forest surfaces, together with a good opportunity to educate the young generation in connection with the respect towards the environment. In order to celebrate the "Tree Day", Spiru Haret who was the Minister of Education at the time forwarded instructions to all school managers to encourage the pupils' involvement in tree planting activities.

Since then, every year in Romania took place in October ecological education actions which involved pupils and students in planting trees activities and maintaining a clean environment. In 1953 was issued a law to establish that in the period March-April of each year (according to the weather conditions) the "Forest Month" is celebrated. Starting from 1989 between the 15th of March and 15th of April activities are carried out for pointing out this celebration which involves specialists, press and especially young people.

Today the "Forest Month" means more than tree planting activities and includes seedling, tree nurseries, forest pest control, maintaining clean forest, etc.

Methodology

Because lately there are more and more reasons for each of us to be involved in the environmental issues, our institution joins the educative projects with environment protection thematic, working together with many education institution (kindergartens, schools, Bacău School Inspectorate) and local authorities (Bacau Town Hall, Forest Direction Bacau). The "Ion Borcea" Museum of Natural Sciences of Bacău was represented by a team of three museographers: Lăcrămioara-Gabriela Zaharia, Anca Tudor-Andrei and Florin-Cătălin Tofan.

Starting from 2005, "Ion Borcea" Natural Science Museum Complex undertook projects with respect to the celebration of the "Forest Month". The projects were issued by the above-mentioned team in collaboration with the Bacău Forest Direction and different education institutions. The activities carried out during the last four years included: debates on ecological issues regarding the conservation and restoration of forest surfaces, the importance of forest ecosystems biodiversity, tree planting campaigns, contests.

Proposed objective

1. The active implication of the museum in the education of the new generation with respect to the environment protection.
2. The argumentation based on scientific reasons for involving people in environmental protection action.
3. To transmit to the young generation the feeling of responsibility towards the environment and the practice of planting trees.
4. The contribution for increasing the ornamental and recreational values of the small parks from the neighbourhood of the public education institution within the town and county.
5. To promote the museum as a scientific and cultural institution and its public educational offer.

Main activities
"Forest Month" - 2005 edition

The public activities began with the symposium "*The role and importance of forest within the environment, providing the continuity of forest with its consequences and implication in social life*". This manifestation took place in the period 23 March – 11 April and involved the local communities, local authorities and institution: Forest Direction Bacau, Agăş Village Hall, Brusturoasa Village Hall, Palanca Village Hall, Ghimeş Village Hall and the local schools.

On the 5th of April the pupils from the Izvorul Berheciului School had the opportunity to assist to a lecture on the importance of forests for soil fixation which prevents the landslides. The museographers and forest engineers delivered lectures on the topic "*The forests role in stabilization of degraded soils*".

Fig. 1 - Lespezi Kindergarten

At the schools of Racova, Lespezi and Bereşti Bistrita a team of biologists and forest engineers delivered lectures with the aim of teaching pupils regarding the types of forests in Romania and their cynegetic values.

In the same time with the conference "*The Planting tree holiday*" held on 7th of April took place the XV edition of posters, black-and-white pictures and caricature competition. The artworks were created by the pupils of the "G. Apostu" Art High-school and by the members of the "*Veniţi cu noi*" NGO. The works were exhibited in the hall of the "G. Bacovia" Theatre Bacau.

On the 11th of April the pupils of the "G. Antipa" College of Ecology and Environment Protection Bacău took part in a conference which was called "*The forest and humans*" and in actions of tree planting of a 1500 m^2 surface under the coordination of the forest engineers.

The pupils of the "Alexandru cel Bun" School of Bacău attended multimedia presentations held by the museographers of the "Ion Borcea" Museum Of Natural Sciences Bacău on the issue "*Chlorophyll- the engine of life*".

The biologist museographers lectured at the "Ferdinand I" National College in order to present the importance of the forest as the most complex terrestrial ecosystem and its complex trophic relations which provide a permanent balance between the ecosystem components.

During that period the Forest Direction Bacău provided the technical support and the tree sapling in order to improve the aspect of the green areas from 10 countryside and urban localities of the Bacău County, 2500 tree saplings were planted on a surface of 4.5 ha.

Under the coordination of forest engineers, the pupils and the youth from many localities of the Bacău County took part in action of waste collecting from the forest ecosystems and planting trees and ornamental shrubs.

Competitions on various ecological issues were held in a number of 18 education institutions and prizes were awarded to the winner pupils.

"Forest Month" - 2005 edition ended with a round table on the issue "*The forest – national inheritance*" which was attended by students and specialists from the Museum of Natural Sciences Bacau, Forest Direction Bacau, Bacău University and Bacău County Council. The manifestation was held at the "Victor Anestin" Astronomical Observer of the "Ion Borcea" Natural Sciences Museum Complex Bacău, and the debates included the following topics: "*The history of Planting Tree Celebration world-wide and in Romania*", "*The origin of forests and the evolution of forest vegetation*", "*The importance of forest ecosystem*", "*The forest in the culture of Romanian nation"*, "*Reforestation*".

In the period between 15th March and 15th April 2005, we succeeded in involving a number of about 2000 young people and local communities within the actions and activities held on the occasion of the "Forest Month" 2005, and a number of 4.900 saplings of deciduous and coniferous species, and ornamental scrubs were planted.

"Forest Month" - 2006 edition

In the year 2006, we carried on the collaboration with the Forest Direction Bacău and we signed a protocol of collaboration with the Bacău School Inspectorate which involved new collaborations among the education institutions. Starting with that year our institution was co-opted in projects initiated by different school teachers and with different funding sources.

This year the activities started with a meeting held at the Forest Direction Bacău which brought together forest engineers, biologists and local authorities. There were discussed topics regarding the ecological an economical importance of forests and the schedule of further activities was announced.

The first actions consisted in providing information and rising the public awareness for the forest ecosystems, followed by tree planting campaigns. On 16th and 17th of March the school pupils from Văleni and Horgeşti (Bacău County) took part in activities which aimed to improving the aspect of the green areas around the schools. The museographers of the "Ion Borcea" Museum of Natural Sciences Bacău presented a multimedia show on the importance of forests to the pupils.

In this year a team of educators from the "Crai Nou" Kindergarten started a project in which our institution was a partner. The aim was to increase the interest for the nature in pre-school children by means of activities adjusted to their age. Thus the children learned more about forest flora and fauna, they played and learned at the same time about how to plant tree, they drew forests and presented artistic programmes. Later we received requests for similar activities from other kindergartens in Bacău city and in the countryside.

Fig. 2 - "Dimitrie Leonida" School

The actions carried on with the activities at the "Dimitrie Leonida" School of Bacau, where multimedia shows were presented with the theme "*The wood adventure*". The pupils found out that the wood had many qualities and they understood that the forests shelter great ecological and economical values. We organized a team competition in which pupils proved their knowledge on the environment and the winners were rewarded with prizes.

On the 5th of April we were invited to take part in two activities organized at rural schools in Bereşti-Tazlău and Turluianu. The issue of this manifestation was "*The green lungs of the Earth"*. The theoretical part of the event was held by museographers, who underlined during their lectures the importance of the forests for life on Earth. By means of the multimedia show called "*Forest – living treasure*" the pupils found out which are the types of forests from Romania and some of the most common species of plants and animals. The practical skill of planting trees were developed under the coordination of forest engineers who taught the children how to plant and nurse a sapling.

Within the projects „*Saving the forests means saing the life*" initiated by the teachers from Paricea School (Bacău County), our institution took part in some activities which included: multimedia shows, tree planting and artistic moments presented by pupils.

The activities organized at the "G. Antipa" Ecology and Environmental Protection College Bacău and "Ferdinand I" National College Bacău involved multimedia shows and team competition on the issue "*The importance of forest ecosystem"*.

The activities ended with a round table during which the guests participated in discussions on the inheritance value of the forest ecosystem and the importance of a good management of woodlands in Romania.

Within the "*Forest Month*" celebration from 2006 toghether with the pupils we improved the aspect of the small parks from the schoolyards. There were involved about 2.100 pupils from 20 schools from Bacău City and County.

"Forest Month" - 2007 edition

This year edition was less extended than the previous two editions due to the fact that the museum team was involved in organizing two exhibitions and a national Contest of Environment Projects – county stage. Despite the fact that the preparatory period for one of our own exhibition overlaped with the period 15 March -15 April we managed to organize some activities for celebrating the "Forest Month" in 18 education institutions from urban and rural localities within the Bacău County. We also had two schools and three kindergartens as new partners. Within the project linden, coniferous and ornamental shrubs saplings where planted and the children improved their knowledge on the natural environment which became the arguments for the community involvement in ecological activities. Like in the previous years the project was carried on in the collaboration with Forest Direction Bacău which provided the saplings and organized the competitions within the manifestations.

"Forest Month" - 2008 edition

The opening of this year manifestation for celebration of "Forest Month" was shelter by the conference room at the "Ion Borcea" Museum of Natural Sciences Bacău. The event was attended by 80 pupils with the age of 8-12 years and guests from County Council Bacău, Forest Direction Bacău, Environment Protection Agency, the University of Bacău and other invited teachers from the partner schools. The audience attended a multimedia shows on the issues "*Her Highness the Forest"* and "*Trees beside us*" which offered valuable information on the forest types on Earth, tree age and the importance of forests. The activity ended with a tree planting application in the schoolyard of the School no. 10 from Bacau.

In the period 28th March – 3rd April over 400 pupils from the Economy College "Ion Ghica" Bacău attended different multimedia shows presented by the museographers and were actively involved in debates on the following issues: "*The diversity of living world*", "*The importance of forests for pollution control*" and "*Economic value of wood*".

The pupils from the "Mihai Drăgan" School of Bacău proved their love towards nature and their knowledge on the living world within an action organized for forest celebration. They organized an artistic moment in which they drew up the attention on humans lack of concerning regarding the protection of forest lands and sent message to the audience that this would affect all of us.

On the 8th of April we met the pupils from "Georgeta Mircea Cancicov" School and "Al. I. Cuza" School. Museographers, forest engineers and teachers were invited at the activity "*Forest, forest…"*. The pupils watched educative movies, attended debates on the biodiversity of the forest ecosystems in the Bacău County and the winners of a competition regarding the knowledge on forest ecosystem were rewarded with prizes.

The pupil from Barați School made drawings with the thematic "*Trees beside us*" and the Forest Direction awarded the best artworks. The biologists from the Museum of Natural Science Bacău

explained the importance of knowing and respecting the forests by using multimedia shows.

In the following day the museographers visited the "Alexandru cel Bun" School where the pupils from the "step-by-step" classes, guided by their teachers, organized an exhibition of drawings and paintings with topics on the anthropic activities impact on the environment. The best works were awarded by the Forest Direction Bacău.

The 2008 edition of the "Forest Month" ended in a festive environment with a symposium which was attended by the biologists, forest engineers, local authorities and teachers.

In the end, the conclusion was that our events involved more than 2.300 pupils and teenagers, and we "won" new partners.

Almost all the activities were popularized in mass-media hence we succeeded to inform the wide public on the educational activities and their role for the community.

Conclusions

All the activities organized by the museum were well-received by the young generation. Along the four editions we had 30 partners among the kindergartens, schools and highschools, reprezenting 9% of the education institutions within the Bacău County.

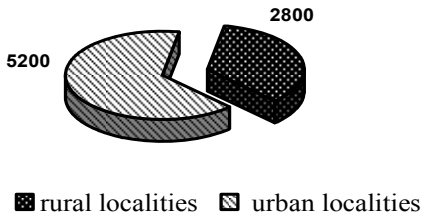

Fig. 3 - The percentage of rural and urban partipants

The pupils were very receptive, proving in the same time that they are eager to find out more about nature and to be involved in ecological education campaigns. Along the four years we involved in educative activities children of different ages, from 4-5 year old children to teenagers. We observed that the primary school pupils are more sensitive towards the environment issues and they became aware that their behaviour is very important. Hence the preschool children love nature very much and take part, with a lot of enthusiasm, in actions which involve direct interaction with the environment. Therefore we can start to guide them toward knowing the value of the natural and cultural inheritance from small ages and to develop attitudes of respect towards the natural environment and its protection.

We also notice that, unfortunately, the interest for nature decreases in inverse ratio with the age, thus the teenagers are less interested in learning about the ecological problems. We tried to seek for an explanation for this situation and we figure that the ecological issues have been popularized for a short period of time. In the past, 10-15 years ago when today teenager's personality started to sketch and to form their priorities the ecological education was not so pronounced. Nowadays, the biology and ecology, subject matters which could widen their knowledge horizon in this field and could motivate them almost disappeared from the national curriculum. Therefore through the multimedia shows made up by the museographer, very well-informed and in harmony with the school curricula, presented in our activities we successfully completed pupil's knowledge.

Certainly we also met exceptions, young people which were directly involved in important ecological projects and which showed great concern towards environmental issues, being aware that on our behaviour depends the quality of natural environment from the near future.

The pupils understood that the anthropic activities could cause damages to natural environment but in the same time we could learn how to use natural reserves rationally, developing strategies for ecological reconstruction and to diminish highly pollutant human activities. The children and the youth become aware that they can be involved in protections of different ecosystems through different behaviours: in outdoor trips, avoiding paper waste, taking part in waste collection campaigns or getting used to rationally consume the electric power.

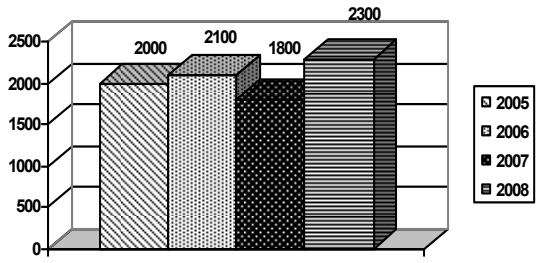

Fig. 4 - The evolution of participants number along the fourth editions

The involvement of the youth in the tree planting activities made them proud and responsible of planted saplings hence they become directly interested in keeping clean the small green park they arranged within the schoolyard. Therefore they become aware that tens of years it takes one tree to

grow and reach maturity and to become economically valuable and it can disappear in a few minutes.

The children and young people planted almost 6200 coniferous and deciduous tree samplings in Bacău town during the events organized by the Museum of Natural Sciences and the Forest Direction of Bacău. We involved 8.200 preschool children, pupils and students in these activities, and their number increased every year. Almost 30 % of the involved persons are from the countryside localities, some of them from localities situated at great distances from towns and with limited access to cultural-educative offers.

Taking into account the fact that the visiting museum public is mainly represented by preschool children, pupils and students, the events organized by us on the theme "Forest Month" were also good advertising campaigns for our institution, disseminating our educational and scientific programmes.

To organize complex manifestations for celebrating the "Forest Month" became a "tradition" for our institution, therefore we wish to continue to be involved in this action in the future, and to maintain the collaborations with our partners. At the same time, we would like to establish new collaborations with new partners so that our message to reach more and more people.

Rezumat

În prezent subiectele precum: poluarea, protecția mediului înconjurător, criza energetică sau încălzirea globală, reprezintă problemele care preocupă şi afectează fiecare locuitor al planetei indiferent de poziția socială.

Pădurea este cel mai complex ecosistem terestru şi putem considera că se află în centrul problemelor care afectează planeta astăzi. Marile probleme de mediu cu care ne confruntăm în prezent sunt legate de diminuarea considerabilă, la nivel global, a suprafețelor împădurite. "Luna Pădurii" a fost celebrată prima dată în România în anul 1953, ca urmare a emiterii unei legi care prevedea organizarea unor acțiuni cu specific ecologic şi cu un pronunțat caracter educativ.

Întrucât în ultimul timp există tot mai multe motive pentru a ne implica fiecare în problematica de mediu, instituția noastră s-a alăturat proiectelor educaționale a căror tematică s-a încadrat în domeniul protecției mediului, colaborând cu numeroase unități de învățământ (Inspectoratul Şcolar Județean Bacău, Casa Corpului Didactic grădinițe, şcoli) şi cu autorități locale (Primăria Bacău, Direcția Silvică Bacău). În fiecare an, în perioada 15 martie - 15 aprilie am contribuit la campaniile de informare şi promovare incluse în seria de manifestări prilejuite de "Luna Pădurii", prin prezentarea de materiale multimedia cu tematică legată de importanța pădurilor pentru om şi mediu, organizarea de concursuri pe teme ecologice, plantări de puieți.

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PART IV – ANNIVERSARIES, COMMEMORATIONS

IN MEMORIAM - PROFESSOR DR. MIHAELA NIȚĂ (27.X.1958 – 31.V.2006)

CONSTANTIN TOMA[1]

Generally, children lead their parents on the last road, students lead their teachers on last journey and commemorates them. But, not infrequently, unfortunately, is going around. It is the case of the student, collaborator and my good friend Nita Mihaela, from whose birth would have reached half a century this year, fate would not be so, my student leaving this world too soon, only at the age of 48 years.

Mihaela Nita was born on November 27, 1958, in the city of Bacău, her parent were Constanta (teacher) and Constantine (officer) Nita. She attended primary school (1965-1909), Gymnasium (1969-1973) and "George Bacovia" High School (1973-1977) in Bacău.

In 1978 she participated in the competition for admission to the Faculty of Biology-Geography-Geology, University "Alexandru Ioan Cuza" University from Iaşi, becoming a student in the Biology Department. During the 4 years of study she highlighted very seriously, working power and passion for the natural sciences, both in the amphitheatre, laboratory, library and the field trips in different parts of the country, from the plains to the peaks of the mountains, especially during summer field applications.

As mentor of the year and professor of the course Plant morphology and anatomy I followed closely both the work as teacher and the scientific research (as-yet begun at the end of her I-st student year) for development of her licence work in experimental plant-anatomy (researching the influence of herbicides on the structure of weeds damaging crops).

Following the very good results as a student, she was proposed, at the end of III-rd year, and was part of a small group of students who carried out the practice in Germany, at University of Jena.

At the end of the four years of study and after graduating the exam in 1982, given the overall average over 9.00, she has received government allocation for higher education and scientific research, after completing a training period of 2 years in pre-university education (the Economic High School in Bacău).

In 1984 she was assigned to the Biological Research Center of Iaşi, and in 1990 following a competition got a position of assistant at the Department of Plant Biology, Faculty of Biology. Subsequently, throughout another competition, got a lecturer position (in 1991) and, then, one of senior lecturer (in 1998).

At. 1.03.1989 she is admitted to the doctorate under my leadership in the field of plant morphology and anatomy, and the 17octombrie 2007 hold her dissertation thesis with the subject "Researches of experimental morphology and anatomy on the influence of various pesticides on some weeds and cultivated plants", obtaining the scientific title Ph.D. in biology.

As a teacher taught and conducted the practical work of Plant cytology, Plant eco-morphology, Morphology and anatomy of plants. To help students, she published in cooperation different synthesis (Mitosis and meiosis, The statolitic root apparatus - structure and ultra-structure, The cito-histological support of plants sensitivity, Structure and ultra-structure of plant tissues), manuals of practical work (Plant cytology, Plant morphology and anatomy) and education monographs (Plant cell). Also she led the practice field, license and the

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dissertation, methodical and scientific work to achieve the I degree in teaching in pre-university education.

She was a close mentor to the students, both in laboratory and field, a fair evaluator of their work, a person respected by students, colleagues and professors. She was part of various committees for acceptance of completed I and II degree-granting in pre-university education, employment positions in the university education.

As a researcher, she distinguished by thoroughness, analytical ability, accuracy in the work of observation and writing of scientific works and by making the accompanying illustration.

In the 24 years she worked at the Centre for Biological Research and at the Faculty of Biology of Iaşi conducted an extensive scientific research, embodied in the publication (jointly or as sole author) of a large number of articles: 80 original paper works, 5 popularization and on the history of biology, 8 reviews, 10 articles in the form of abstracts in volumes of national and international scientific meetings, attended directly or through hers co-workers.

Almost all scientific work in which she worked were developed, written and published together so I had the opportunity to follow step by step the professional development of Mihaela Nita, her passion and interest in research.

Out of the research directions, all from plant biology field, I quote: the structure of various herbs, morpho-anatomical adaptations of some aquatic and salt soil plants, the influence of pesticides on weeds and crop plants, the influence of various pollutants on the morphology and structure of some woody and herbaceous plants, mineral fertilizers influence on morphology and anatomy of forage plants, leaf and bud morpho-biometry from fruit trees and forest trees, the behaviour of some medicinal species „in vitro" cultures, the structure of industrial celolignine. Therefore, the work produced in collaboration by Mihaela Nita are in the field of comparative, ecological and experimental plant morpho-anatomy, and they are published in special books and various magazines, Romanian and foreign, and are quoted by various Romanian and foreign researchers.

For a set of works in the field of experimental plant-anatomy, Mihaela Nita was awarded in 1994 with the "Emanoil Teodorescu" Award of the Romanian Academy.

To the above fact is added that in 1993 she made a specialization internship in France, at the University of Anger, on electronic microscopy issues. However, she participated with papers on scientific events that have taken place in Sweden, Greece, France and the Republic of Moldova.

Mihaela Nita could offer even more, from the teaching and scientific level, if the thread of life would not be stopped from May 31, 2006, after a long, hard suffering. For her rich and appreciated activity as teacher and researcher, Mihaela Nita has her deserved place in the team of plant biology at the Iaşi University. I invested heavily in training Mihaela Nita as a specialist and lived the joy of her professional perfection, her assessment through academic distinctions, her contribution to enriching the scope of which she was devoted.

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EMIL RACOVIȚĂ'S EVOLUTIONIST THINKING

GHEORGHE MUSTAȚĂ*

"Creator of the biospeleology and of the first Institute of Biospeleology, founder of the filogenetics systematics, codifier of protecting the natural monuments, Emil Racoviță was a radiant figure of culture and science".

C. Motaş (1996)

Emil Racoviță was one of the most brilliant biologists of his time and of our ancestry. His scientific activity was manifested in different fields: zoology, oceanology, ethology, ecology, evolutionism etc. He was a fine observer of nature, he put the basis of a new science – **biospeleology** and brought his contribution to the fundament of evolutionism, many of his ideas being current, nowadays.

In his Weltanschauung named *Evolution and Its Problems*, (Cluj, 1929) he presents the main ideas which draw the biological and philosophical conception. In the following lines we will point out some of his deep evolutionist ideas.

The work begins with the following statement: "*it is appropriate from the beginning to define what we understand by the word **evolution** in science and how the content of this so determining notion of knowledge is restrained"*[1] .

Firstly, we must emphasize the fact that Emil Racoviță tried to include in the concept of evolution, the entire becoming of the universe. He considered evolution merely the antonym of creation, "*namely the opposite of the concept of "creation"; it is thus the verbal expression of noticing that what it is actually comes from what it was, that there is not a phenomenon that does not come from other phenomenon, human being without origin and without parents, like it was thought in the scientific world until the middle of the last century and like it is thought today in the entire world"*[2] .

According to Racoviță evolution is a **fact** that results from the ensemble of the scientific knowledge of the universe; talking about **the theory of evolution** and moreover believing that it is a simple hypothesis is a fundamental error:

"*The notion of evolution is neither hypothesis, nor theory, it is a fact finding, it is one of the most certain and fundamental achievements of science and represents, together with the principle of conserving energy, the most invaluable treasure from the heritage that has been so hard scraped together"*[3] .

Therefore, as Racoviță states, **evolution is a certainty**, and the mechanism of evolution represents another subject for research.

As far as the role of the environment in the process of evolution is concerned, Emil Racoviță fully adheres to the Mecanolamarckist conception which, starting from Lamarck's ideas, considers that the environment has a direct action on organisms, determining both the biologic progress and evolution.

"*The environment is variable in time and space: the biota, in order to continue living in it has to adapt to it continuously under the direct influence of the external factors (what it did in the past and what many of them do nowadays, by various means), or to oppose to this influence by isolating its internal medium. The evolution provoked by the action of the external medium has as a result the progressive realization of an internal medium that is getting*

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[2] Ibidem, p.15
[3] Ibidem, p.17

more and more "impervious" to the influence of the external factors"[4] .

At this point we draw the attention upon two aspects which are worth to be taken into consideration:

- on the one hand it concerns what we were trying to demonstrate beforehand, the role of the external environment in the transformation of the organism, sustained by Lamarck and accentuated by the Neo-Lamarckism and questioned by the sustainers of the synthetic theory of evolution that deny the role of the direct action of the environment on the adaptation and evolution process, considering that accepting the direct role of the environment we have to accept **from the beginning** the heritage of the already-acquired characters, too (1, 3, 6). And, nevertheless, the modern representatives of Neo-Lamarckism bring pertinent arguments through which they try to test the direct influence of the external environment in the adaptation of organisms (6). In this direction it is mentioned the functioning of the restriction-modification system. Hence, the bacterial cell, host of the beech, possesses enzymatic equipment with a double action, through which it can accomplish the modification of its own bases from DNA, as well as the restriction of the DNA with the aid of the endonucleases of restriction, degrading the foreign DNA and protecting the cell. Another example can be the amplification of the genes: the gene that directs the synthesis of the enzyme dihydrofolate reductase can be found uniquely in the cells that are sensitive to low concentrations of metothrexate. The cells cultivated in mediums with progressively high concentrations of metothrexate resort to the amplification of these genes, hundreds of its copies being realized, which determines the considerable growth of the production of dihydrofolate reductase, offering the cell a greater resistance to high concentrations of metothrexate. In the same way we can explain the appearance of the resistance phenomenon of some insects to DDT;
- the second aspect is connected with the formation and the role of the internal medium at the metazoon organisms.

"*Another important part of the vital environment is opposed to the external medium, namely the internal medium, in which all the human beings scraped their sufferings, throughout the millenniums, under the action of the environment factors and as a reaction more or less successful against the biological and primary factors (clime…)"*[5] .

Perfectly guessing the relationship between the external and internal medium, Emil Racoviță mentions that "*we can formulate the principle according to which the most isolated internal medium generally corresponds to the most perfect organization on the scale of beings"*[6] .

Understanding the relationship between the external and the internal medium becomes much easier nowadays, when the explanation of the biological process and in general the explanation of the living will be done using the systematic theory and approaching the study of the organisms in a cybernetic way.

How can we differentiate from a living and a not-living system? Unlike the not-living, not-animated system that is continuous and totally subjected to a homogenization, to an all-leveling action, thanks to the external medium, the living system can oppose to this action through the capacity of releasing the extra entropy (3).

A living system can furnish its **order** within its dialog with the medium, the cosmic ocean, nourishing not only a permanent adequacy to the medium conditions, meaning a homeostate, but especially an active character that implies selectivity at the level of the possible stimuli range (2,3).

The living organism, seen as a cybernetic system achieves adequacy within the dialog with the medium, in an important degree through the self-adjustment mechanisms, through feed-back. In this way the transformation of the external conditions in internal conditions is accomplished.

Through its characteristics of a cybernetic system, the organism gains a feature: **autonomy**, meaning the possibility of maintaining the internal conditions within limits that are compatible with **being** (homeostate) in the middle of **the exterior ocean**, seldom haunted by storms that try it out. Autonomy means limiting the dependence on this ocean, a certain degree of release (**freedom**). This autonomy, generated by the creation of an internal medium which, in a low or a high degree always exists in the living world, represents one of the main characteristics that make **the biological car** be superior to the forms of being from the not-alive world.

Emil Racoviță considers that: *"…through the accomplishment of an internal medium the living being tends to set itself free from the influence of the external medium: it acquires a* ***freedom*** *of action*

[4] Ibidem, p.44

[5] Ibidem, p.44-45

[6] Ibidem, p.49

that is getting more and more complete and a bigger and bigger power of conquering new places for its family"[7] .

The idea of connecting the notions of **freedom** and **homeostate**, that appears so clearly at Emil Racoviță, is considered nowadays as a fertilized idea, that helps us understand the meaning of the biological evolution and in general the meaning of progress in the living world. The homeostate of the living organisms that is accomplished with the aid of some self-adjustment organisms, can be more or less corresponding, which offers the system a certain degree of freedom, of autonomy, more extended than the harshness of the variations of the medium conditions.

The living organism, elaborated as a cybernetic system, obtains the transformation of the external conditions in internal conditions that is what Emil Racoviță also admitted, without knowing cybernetics, but genially guessing such a mechanism.

"*I will also draw the attention upon an important point for understanding the biological evolution and the history of the evolutionist doctrine. As I have seen, the internal medium is a kind of micro cosmos, a world more or less smaller, but often very well isolated from the influence of the external medium: a small world as complex, as rich in different material elements, as full in all kinds of energetic manifestations as the big world; a kingdom of dwarfs, out of which, when unceasingly unbalanced, answers what lasts what we call life, an unbeaten tendency of re-establishing the balance"*[8].

We find here, stated even from 1929, the cybernetic principles of the direct and converse connection. The transformation of the external medium into the internal medium, or the formation of an internal medium that counteracts the action of the external medium, a disturbing action, represents the essence of the life, according to Emil Racoviță.

"*For this is the truth that is to get along for that is my belief after a life full of research about beings"*[9]. This is how Emil Racoviță wants to convince us of the pertinence of the evolutionist theory and he does it with arguments that even nowadays are topical.

As far as the species is concerned, Emil Racoviță does his best to define it so that it should be all-embracing. Answering to the statements of some biologists that declared that **species does not exist**, that the term of species is full of emptiness, Racovita replied:"*Let's not allow ourselves to be drawn by the words of these simplistic spirits. Yes, there is no entity in nature, namely the being named "species", whose elements enter perfectly into one another form the biologists' definitions, but the notion of species corresponds to a reality, as ordinary categories of beings exist and, because these categories are isolated form the others, so they play an individual part in the nature economy, for the moment they have the right to the dignity of fundamental biological unity"*[10].

Emil Racoviță considers that "*the best definition of species, as it is the most "practical", may seem to be the one proposed in 1912:* ***an isolated colony of co-blooders****"*[11]. A series of arguments follows that manages to convince of the given definition. "*Such a colony is inevitably doomed to morphologically and physiologically differentiate itself from its origin; therefore, it deserves to be emphasized, as it has developed as a new entity of the biological world and a new factor of evolution"*[12].

Analyzing the species in its essence, Racoviță notices some elements without which we cannot understand it:

"*The notion of species established under the influence of the creational ideas applies to a present phenomenon that is exclusively morphological and geographical; hence, this notion is fake in its essence and in any case inadequate to the evolutionist studies. We have to substitute, "****line****" as a biological unit, considered as a historical event as well as a morphological and a geographical one. The taxonomy will have as a main mission "the scientific mission of discovering "****homogeneous lines"*** *that represent the best "raw material" far all the comparative studies"*[13].

Racoviță opens the temporal dimension of species. Thus, at the same time the species becomes the result of an evolution process and a stage in the evolution. The species becomes dynamic and gains unity.

"*The fact that I connected the species to its past, I connected to the species or the crowd of species that it came from; in a forced way, we are presented, instead of a "taxonomic unity", a chain of "unities" of such a nature, in a tight decadency, connected to the kinship bound, in a word a line,* ***une lignée****, like the French calls it. Of course, if we knew all the detailed history of life on earth, we would find the lined connected to one another, all united into a past more or less far; they would look*

[7] Ibidem, p.47
[8] Ibidem, p.53
[9] Ibidem, p.55
[10] Ibidem, p.59-60
[11] Ibidem, p.61.
[12] Ibidem, p.61.
[13] Ibidem, p.69

like the little branches more and more bushy and more and more scattered of a common trunk"[14].

Going through the path of the analysis of the line, the taxonomic research becomes more complex, because we do not have to emphasize only certain structures, but we have to find their origin and to guess their evolution direction throughout the geological time.

"*The task of discovering the lines formed from homogeneous elements, meaning all in direct kinship and of making them available to biological researchers is that of the taxonomists. Taxonomy, the science of classifying the beings, therefore becomes the genealogical history of beings, namely a synthetic science of the greatest importance"*[15].

We cannot include here the vastness of Emil Racoviță's thinking, although some elements of his thinking unveil the influence of the school that formed him.

Emil Racoviță fascinates you in his work by the beauty of the language and by the power of persuasion. Although he is a convinced Lamarckist, he does not accept the aphorism "**the function creates the organ**", which was in vogue at that time in Romania, in France and all over the world; and even nowadays it is used by "experts" in order to impress the ones who are less styled.

To convince ourselves of the statements above, let's follow Emil Racoviță in his arguments:

"*Out of the cause-effect relation that exists between the function and the organ, out of the fact that it was proven the existence of a large number of very different organs at the present lines, out of all these causes, I say, was created the "atmosphere" favourable to the idea that the function, like in the old creational concept, maybe all, could even create organs out of nothing, maybe it even had action upon what it does not even exist nowadays, as if this is not the case, which may be the explanation of the statement sustaining that: The function generates the organ (La function crée l'organe)"*[16].

In order to be convincing that a function can't create an organ that does not exist under no circumstances he brings strong arguments:

"*But how can you imagine a function that may exist before its organ? How can you believe that the sight created the eyes when there must be an eye so that you could see? How can you say that respiration created the lungs when before being a lung, there would not have been other organs occasionally respiratory in which the modifier drive of extracting the oxygen out of gas mixtures would be performed and which would offer the material support for the subsequent transformations?"*[17].

Having fought for a long time against this aphorism, Emil Racoviță realized that he could not be successful if he did not explain so that everybody understood. To this regard, he brings the following arguments:

"*The transformation of beings and of organs does not occur through additions and conceptions of new organs near or instead of the old ones; it results from the mere modification of pre-existent organs and small organs more or less different. Therefore, the new function is accomplished by organs that were once adapted to other activity; and these original organs derived from pre-existent organs corresponding to other needs, and so on. The function does not create the organ like it is wrongly believed nowadays:* ***The function readapts the pre-existent organ****"*[18].

In this work we wanted to present the topical revolutionary thinking of Emil Racoviță. In order to appreciate Emil Racoviță you have to read his work or at least to read the book *Evolution and Its Problems.* Only in this way we can accede to the theme and to the secrets of evolution. Nowadays so many commentaries about evolution and evolutionism appear (many of them do not even make the distinction between the two notions) and verdicts are given by people that pretend to be well-informed and of high intelligence that you tend to believe that they are actually right, that they know the problems better. Not acknowledging evolution as a cosmic reality, as a phenomenon that characterizes materiality proves the existence of genuine blanks in the general culture, and putting an equivalent between evolution and evolutionism that means an entire sum of theories that tries to explain some mechanisms of evolution means superficiality, lack of logics and bad will. Believing that even nowadays the fight between the evolutionists and creationist continues, like in the time of Darwin, demonstrates lack of understanding and naivety.

Emil Racoviță lived the same disillusions that we live nowadays and he clearly expressed his position towards this controversy:

"But crisis does not regard the notion of evolution that has never been questioned by competent people, but only some modalities of transformation, some of the ways "in which" the lines evolved. There have always been discussions on interpreting the facts and will undoubtedly

[14] Emil Racoviță, 1929, Evolution and Its Problems, Cluj, Ed. de Subsecția Eugenică și biopolitică a "Astrei", p. 67
[15] Ibidem, p.69-70
[16] Ibidem, p.103-104
[17] Ibidem, p.104
[18] Ibidem, p.104-105

continue to exist in science: nowadays in the transformation matters they are very numerous and I have explained why.

Such controversies represent the "daily bread" of the science man: they are not so fatal and so useful that they are part of the scientific method. Because the evolutionist doctrine has so much to do with the lines of human household, o bunch of specialists interfered in this controversy, they believed it as an exceptional deed, they did not understand it, or often they "did not want" to understand it, the evolutionist principles hitting their interests, situation, or the inaction of their thinking. These profane missionaries, philosophers, interpreters, literates, journalists and even politicians, interfered in this technical discussion with such pathos, a rage and with so much unskillfulness, that they completely disorientated the cultivated public.

Out of a simple controversy on the modalities of evolution, these improvised biologists, in many cases talented writers, deducted the "non-truth of the evolution theory", meaning of the evolutionist doctrine….

We must take these word abuses for granted, meaning gossips and projects of journalistic polemical fights"[19].

If we did not know who the writer of these lines was, we could say that they were written nowadays and it is a chronicle of present-day events. There is nothing new and nothing was gained in understanding evolution as a cosmic phenomenon not only after eighty years passed.

It would be inappropriate to select only the viable ideas from Emil Racoviță's evolutionist thinking, only the capacity to enter the subtle understanding of the biological structures and processes and to convince the reader of the reality of transformation, and we have not mentioned yet the position of what he called "**transformational polemics**".

Emil Racoviță's position towards Neo-Darwinism (Weismannism) and mendelism seems to be that of rejecting from the beginning the new elements that started to manifest at the end of the 19th century and the beginning of the 20th century.

The position to Weismannism seems easily to understand because Weismann did not support his theory regarding the structure of hereditary material on strong arguments. The hierarchy of hereditary structures conceived by Weismann (bioforideterminant, ide and idante) did not enter the circuit of modern genetics. Being a convinced Lamarckist Emil Racoviță could not accept the rough separation between germs and soma (idioplasme and trofoplasme) and the denial of the role of the environment in transformation of the organisms.

Emil Racoviță formed a transformational conception based on facts and on experimental deeds and structured a well-organized thinking that can be noticed throughout his work. Having a very developed capacity of self-evaluation he became aware of the reliableness of his training and of the acuity of his scientific thinking. In his book he mentioned: "*In any case this is my opinion, as I am part of the category of the naturalists that have come to peace by convincing themselves that they guide their thought and work on the path that leads to understanding the phenomena, namely towards the truth that is accessible to the human mind"*[20].

His belief that he is on the right path in understanding and interpreting the biological structures and processes assured his inner peace that he needed to continue his scientific work in the direction that had already been drawn. We could thus state that the great evolutionist locked himself in the ivory tower and started, somewhere, to be disturbed by the actual needs of biology. We can not understand otherwise his writings:

"*But not all the biologists enjoy themselves of this inner state, as some "**theoretical cataclysms**" emerged and they seemed to severely shake the transformational doctrine that was elaborated by Lamarck, Darwin and a part of their ancestors"*[21].

Emil Racoviță is annoyed by the fact that Weismann considered that the influence of the environment does not give birth but only to variations that can not be transmitted, to fluctuant variations, not accepting the transmission of acquired characters. He also considered that the independence of the germ from the soma represents the essence of the Weismannist doctrine and at the same time its major mistake. Racoviță could not accept the distinct separation between germ and soma, as the genetic information can be found in all the types of cells with nuclei:

"*Of course the parents' heritage can't be transmitted to children in the case of sexual reproduction but only through the microscopical living drop that represents the fecundated egg, but this egg is formed by the same substances like the soma and it is not possible that the influences suffered by the soma should not be transmitted more or less intensely. It is one fact that they are somatic*

[19] Ibidem, p.167-168

[20] Ibidem, p. 144.

[21] Ibidem, p. 144

transformations that do not infiltrate up to the germ so easily and it is another fact that they are those that infiltrate up to it"[22].

Emil Racoviță was repugnant to the ideas of Hugo de Vries, ideas launched in his mutational theory. Not making a distinct difference between germs and soma he could not accept that only the genetic structure ("representative particles" would be decisive in transmitting the characters and in forming the new species:

"*Here we are being given as pray to the "representative particles" and to the more or less competent architects that with the help of these particles as bricks, last the most beautiful "castles in Spain", namely palaces in the imaginary world of metaphysics"*[23].

A fierce sustainer of slow evolutionism, Racoviță could not accept the evolutive skip, the direct appearance of species through sudden variations, through mutations, as Hugo de Vries tried to prove:

"*These new species that appear that are different from their relatives, thus the evolution of beings doe not follow the course in time twisting and turning like a snake but sliding like it, but hopping like a flea. It is still obvious (?), the mutationists say, that these skipping variations can't (?) generate under the influence of external factors, we must thus look for the necessary drive from inside the organism, in the intimate structure of the hereditary substance"*[24].

More than that, mutationists considered that the genetic transformations (mutations) are not provoked directly by the environment, like it was sustained by the Synthetic Theory of Evolution, too. All these seemed to be heresies in relation to the classical transformational thinking.

Although he studied profoundly the works of Mendel and he got informed of the mendelien laws, Racoviță did not allow being convinced either by the statistic data offered neither in transmitting hereditary characters nor by the game of combinations of the hereditary factors.

Not trusting the "representative particles" or the hereditary factors envisaged by Mendel, Emil Racoviță considered that: "*Out of these groups of positive, real and demonstrable facts, theoretical consequences were drawn that I, as well as many other naturalists, regard as completely unjustified"*[25].

Although he did not trust the mendelien, biotypical, genetypical and genetical research, Racoviță accepts the fact that natural hybrids must have played a more important role in the appearance of the beings:

"*Through this research it was proven that crossings could have played a significant role in appearance of the beings. Natural hybrids between species, varieties and wild races had been known for a long time; it is likely that in the case of the plants with flowers and of superior animals these crossings played a much more important role that it has ever been thought"*[26].

I must admit that I have once been more intrigued by Emil Racoviță's position towards the Neo-Darwinist trends and more critical. The recent genetic research tries to highlight the role of the epigenetical role in the appearance of the organisms (evolution) and even the influence that environment can have in adaptation. Although the Lamarckist factors of transformation were questioned by T.S.E. more plausible arguments are brought that triggers a re-examination.

We will end with some of his thoughts regarding the human species and its future that seem strictly topical.

"Ever since the grey times, when the human line from which we come started to organize itself on earth and until nowadays, race after race, family after family adjusted better and better to the external environment, created a more and more different internal medium, and they lasted a more and more perfected artificial medium. The factors of the external medium were defeated and used, the secrets of the internal medium were revealed and subjected, the compositions of the artificial mediums ere gradually perfected. And it happened what it happened with all the lines of the adapted beings from this earth: they bred and conquered the earth. This happened on a large scale to the species of man, which the anthropologists called ***Homo sapiens****; We can't read in the old chronicle of the earth another history greater than the one of this line of people who, beginning their living in the Quaternary epoch, with their little packs of unarmed beasts, completely managed to conquer the air, the water, the ground and with its numerous crowds packed all the surface that can be populated nowadays.*

The consequences of this progressively accelerated conception are overwhelming in the history of mankind and they will be the decisive factor of future human evolution.

[22] Ibidem, p.147
[23] Ibidem, p.160
[24] Ibidem, p.160
[25] Ibidem, p. 153
[26] Ibidem, p. 157

Nowadays I can't insist on this passionate problem of our becoming as time lacks. I will only quote some of these effects:

The absolute necessity of increasing the work productivity and of the fertility of exploiting the natural resources, with the use of all the sub produces of fabrications and avoiding the not-used remains.

The need to increase the speed and efficiency of communications.

The complete interdependence of the nations; mankind does not form but a ***single economic nation****, a single household.*

The destruction of the biological balance by people getting crowded on small surfaces and by the immeasurable multiplication of some types of domestic animals and cultivated plants.

And many others which are very concerning for our future fate.

Those who do not have the ability, the knowledge to reflect on these things and who, measuring the time with their personal watch, do not realize that yesterday was not the same as today as they have to expect that tomorrow will be different, those, I say, are not aware of the change; unfortunately, particularly these blind people are numerous. Nevertheless, under the pressure of the day of tomorrow that germinates, the form of today emerged.

It has already been implemented the idea that, so that the natural richness and human work could be enough for all of us, their use must be complete, without hauls and non-usable remains.

Consequently this richness and this work have to be studied and scientifically exploited; the procedures of their exploitation, currently empirical, must be sieved out through the bolt of the scientific method, so that the most absurd should be abandoned, the most insufficient improved and that new methods should be established. The scientific method must be applied to all the human problems, and I invite you to take part in this evolution of our leading ideas" [27]

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[27] Ibidem, p.175-178

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PROFESSOR MIHAI MITITIUC AT THE 70TH ANNIVERSARY

CĂTĂLIN TĂNASE[1], VASILICĂ CHINAN[1], ANA COJOCARIU[2], CIPRIAN BÎRSAN[2]

Professor Mihai MITITIUC was born on March 16, 1937 in a family of hardworking peasants with great love of land, known and respected in the village Mihăileni from Botoşani County. He started primary school in his village and continues at the high school "Grigore Ghica" Dorohoi which he graduated in 1955. After graduation he continued his studies at the Faculty of Natural Sciences-Geography, "Alexandru Ioan Cuza" University in Iaşi which he graduated as head of the class in 1960.

During the faculty he was noticed by serious, perseverance, determination and willingness organizational, qualities that were noted during the teaching career. The outstanding results during the faculty recommended him, after graduation, for the position of assistant at the Department of Botany of the Faculty of Biology from Iaşi.

The exceptional professional and teaching qualities have attracted the esteem and consideration of many generations of students and teachers allowing him to promote along the university hierarchy, covering all the steps to the one of professor.

He debuted in academic career by leading the practical work of plant morphology, and then organized some laboratories: Biogeography, Systematic botany, Plant protection, Plant parasite biology, Mycology and Phytopathology. During teaching career has developed and taught various courses, but excelled in disciplines Mycology and Phytopathology to which he have devoted all the experience gained in scientific research.

The six university courses developed and printed remain as reference, standing out is the clarity, dense and concise scientific content, systematization and timeliness of information.

The experience and teaching performance recommended him as an demanding and impartial teacher, but fair and very understanding to students, which brought him in the faculty elite of the "Alexandru Ioan Cuza" University, Iaşi.

His teaching activity is doubled by a prodigious scientific activity, implemented in 9 books and monographs and over 250 articles and studies published in prestigious journals in the country and abroad. The most significant and consistent contributions he brought in the field of mycology - micromycetes, where he discovered 35 species new to science, 500 species new to Romania, numerous new species for Moldova, plus over 900 species quoted on new host plants species.

Research results were inserted in various monographs appeared in Romania, but also in foreign journals (*Sydowia*, *Boletim da Sociedade Broteriana*, *Nowa Hediawig*, *Feddes Repertorium*). He also published numerous articles in the Romanian Academy journals, different revues of the universities along the country or in volumes of national and international symposia and conferences. Many of the published works were reviewed in the *Bulletin signalectique* and *Referativnîi journal*.

Professor Mihai Mititiuc is concerned about the training of young specialists, coordinating numerous doctoral dissertations, of which 9 have been completed to date, thus contributing to the development of mycology in Romania.

Special training and exceptional organizational capacity have recommended Professor Mihai Mititiuc as director of the oldest and most prestigious botanical gardens in the country, which led during the period 1990 – 2007 when this institution developed by the construction of 3 greenhouses, restoring full heating system, boilers and other spaces. In a period with many social and economic problems he managed to preserve the integrity of the largest botanical garden in the country. In the same measure he was always

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interested in enrichment plant collections, collaborations with institutions in the country and abroad and holding of exhibitions and events with national and international scientific participation. We also mention in this sense the effort he made for the anniversary in 1996 of 140 years since the opening of the first botanical gardens in Romania. In 2006 he organized the 150 anniversary, on this occasion he offered medals and diploma of excellence to some personalities both form Romania and abroad.

Organizational capacity coupled with a strong work, enabling him to be present in the management of many committees, commissions, editorial collective and scientific societies, including that of the president of Mycology Society of Romania and of Association of Botanical Gardens in Romania.

As president of the Romanian Society of Mycology was concerned about the organization of the headquarters at the Botanical Gardens of Iaşi, to attract sponsors to achieve popularization materials (posters, leaflets and booklets for awareness of edible, toxic and poisonous mushrooms) or support programs inventory of wild mushrooms considered rare and endangered in Romania.

Annually, he organized mycology symposia in cooperation with different institutions, in various cities along the country. On the occasion of the editions held in Iaşi (1995), Vatra Dornei (1997), Bacău (1999), Topliţa (2001), Cluj-Napoca (2003) and Suceava (2005) he invited specialists from abroad.

Also, during these meetings he coordinated the organization of exhibitions with edible, inedible and poisonous mushrooms appreciated by specialists, but also by amateur in different regions of the country.

The 70th anniversary is a special moment in the life of Professor Mihai Mititiuc, but the entire academic community in Iasi University center, which he dedicated his attention and work without reservation.

Strong character, which is endowed with health, spirit of initiative calls the Professor Mihai Mititiuc to contribute to the formation of new mycology specialists.

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DR. AUREL GAVRIL NEGREAN: A LIFE DEDICATED WITH PASSION AND PROFESSIONALISM FOR BOTANY AND MYCOLOGY

TATIANA EUGENIA ŞESAN[1], CĂTĂLIN TĂNASE[2]

The botanist Gavril Aurel C. Negrean was born in the village of Dindeşti, Satu – Mare County, on August 30, 1932. In the native village he graduated the primary school and then continued his studies in high school “Gojdu” in Oradea and “Vasile Lucaciu” in Carei, where he had Paul Pteancu as botany teacher who was the best student of Alexandru Borza, which taught him the first plant species and then he started to make a his first Herbarium.

In 1964 he graduated from the Faculty of Biology, University of Bucharest, and in 1969, after graduation took a position as a biologist at the Institute “Louis Pasteur” in Bucharest. Since 1970 until 1999, at the recommendation of the botanist Constantin Zahariade, he worked at the Institute of Biology of Romanian Academy in Bucharest.

Provisionally was employed at the Mycology Herbarium of the Institute, where was curator Dr. Ovidiu Constantinescu, with which he was formed in the field of mycology. In this institution was first biologist, and since 1981 has been the Herbarium custodian. Due to a recognized scientific activity both in the country and abroad, he took a position as principal researcher.

Dr. Gavril Aurel Negrean brought significant contributions to Romanian flora and micobiota, publishing, alone or in collaboration, several taxa new for science, many taxa new for Romania and countless “*matrix nova*”.

We appreciate the important contribution to enriching the Mycology Herbarium from the Institute of Biology of Bucharest with over 100,000 sheets. This is largest collection of its kind in the SE of Central Europe and one of the best organized in Europe. The enrichment of the Herbarium was due both to national and international trade, but especially on his own collected material.

Mr. Dr. Negrean made countless field trips around the country, aiming to investigate especially the “white spots” of Romania botanical map. In the Herbarium are many materials collected from different countries in Europe, a result of collaboration projects.

We, also, remark the outstanding contribution that he brought to publishing the exicata from *Herbarium Mycologicum Romanicum*, begun in 1928 by Traian Savulescu. Thanks to the work conducted by Ph. D. Negrean the exicata from the herbarium arose from no. 1851 to 3150, most numbers being edited together with Dr. Ovidiu Constantinescu.

As custodian of the Commission of Natural Monuments since 1964, he also had concerns in this area. Thus, he proposed the location of over 20 nature reserves and participated in the scientific validation of some national parks. We appreciate the contribution to the establishing of the first two mycological reserves in Romania.

Scientific activity is embodied in more than 160 scientific papers published and over the past 5 years he was part of research teams in the national and international projects and completed in collaboration, reference paper works in the field of botany: *Sibiu County Mycobiota* (in 2005), *Special areas for protection and conservation of plants in Romania* (2007), *Invading plant in Romania* (2007). He also published numerous articles in *Plant health* journal, but also in other journals.

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