TRANSYLVANIAN REVIEW OF SYSTEMATICAL AND ECOLOGICAL RESEARCH

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The Maramureş Mountains Nature Park

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Angela Curtean-Bănăduc, Doru Bănăduc & Ioan Sîrbu

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Maramureş Mountains Nature Park

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IN MEMORIAM

Artemiu Alexandru Artur Coman
(1881 - 1972)

Artemiu Alexandru Artur Coman was born on 15 April 1881 in Borşa, on the banks of the Vişeu River, bordered by the Maramureş, Rodnei and Tibleş Mountains, a corner of Romanian heaven of rare beauty, which certainly from a young age gave him a love for Nature, to which he dedicated his whole life with a generosity that has remained in our collective memory as a wonderful example.

He went to primary and high school successively in Botiza, Sighetul-Marmaţiei and Iglo (Slovakia), and then began university studies also in Slovakia - after which experience he remained strongly attached to Slovakian colleagues, nature and culture. He was an industrious and talented student who held his teachers' attention, creating for himself the opportunity to occupy the post of assistant at the Geobotany Department and later that of Botany (1908-1912), at the Institute of Forestry and Mines of Banská Štiavnica. At that time he studied the flora of the mountains of Eastern Beskids, Tatra, Rodnei, Bârgăului, Ciucaş, etc.

World War I meant that he returned home, but also marked the destruction of the herbarium of Slovakia, which made him to bury Romania's herbarium much deeper into the Romanian soil during the Second World War, thus saving this one for posterity. Love for his birthplace, and his wish to work for nature which had so delighted his childhood and adolescence, made him decide not to accept to return to Slovakia as a lecturer, staying home as an outstanding forest engineer and topographer in the area of Vişeu.

His years of school studies and later of work in an area of which he became a master were born a great volume of research works and papers. Artemiu Alexandru Artur Coman put his name to 25 specialized studies which stand at over 500 pages, most of which have as object of study the flora of the higher plants (vascular plants) of Maramureş. Issues addressed in these studies relate to: taxonomy, systematics, ecology, chorology, phytogeography, geobotany, teratology, ethnobotany, toponymy and environmental protection. To all these are added three major seed catalogues (1964, 1969, 1970) offered to the Botanic Garden of Iaşi, and herbaria with tens of thousands of examples of plants currently found in the major institutions in Bucharest, Vienna, Braşov, Cluj-Napoca, Iaşi, Sighetul-Marmaţiei, etc. Of particular importance is the Flora Romania Exsiccata in which are included hundreds of phytotaxonomic units of Maramureş, and the Inventory of Vascular Plants of Maramureş (1946), prestigious works including 1,270 vascular plant species. Through his research, the general vascular flora of Maramureş was enriched by 600 species. It should be noted that the herbarium of Artemiu Alexandru Artur Coman was used in drafting the monumental work "Flora R. S. R.".

Two of his major scientific contributions were named as special homages: namely *Dianthus carthusianorum* ssp. *Florae-andercoianum*, dedicated to his mother, and *Cochlearia pyrenaica* var. *borzae* dedicated to the eminent Romanian botanist Alexandru Borza.

Not being a scientist imprisoned in the world scientific concerns, he consistently fought against the destruction of the spruce forests of the Romanian Carpathians by irrational cutting, fires and abusive grazing, and fought for the protection of forests and rare plants. He was one of the main protectors of the Pietrosul Mare Reservation. These were meritorious and exemplary acts as much then and they would be today ….

His last explorations in the Maramureş area he loved so much, and which from the geobotanic point of view he said "indisputably belongs to the geographic space of Romania" (A. Coman, manuscript) were made at the venerable age of 90. The most representative botanical personality of Maramureş died aged 91, after 70 years of uninterrupted work, leaving behind more than anything, a worthy example to follow.

The Editors

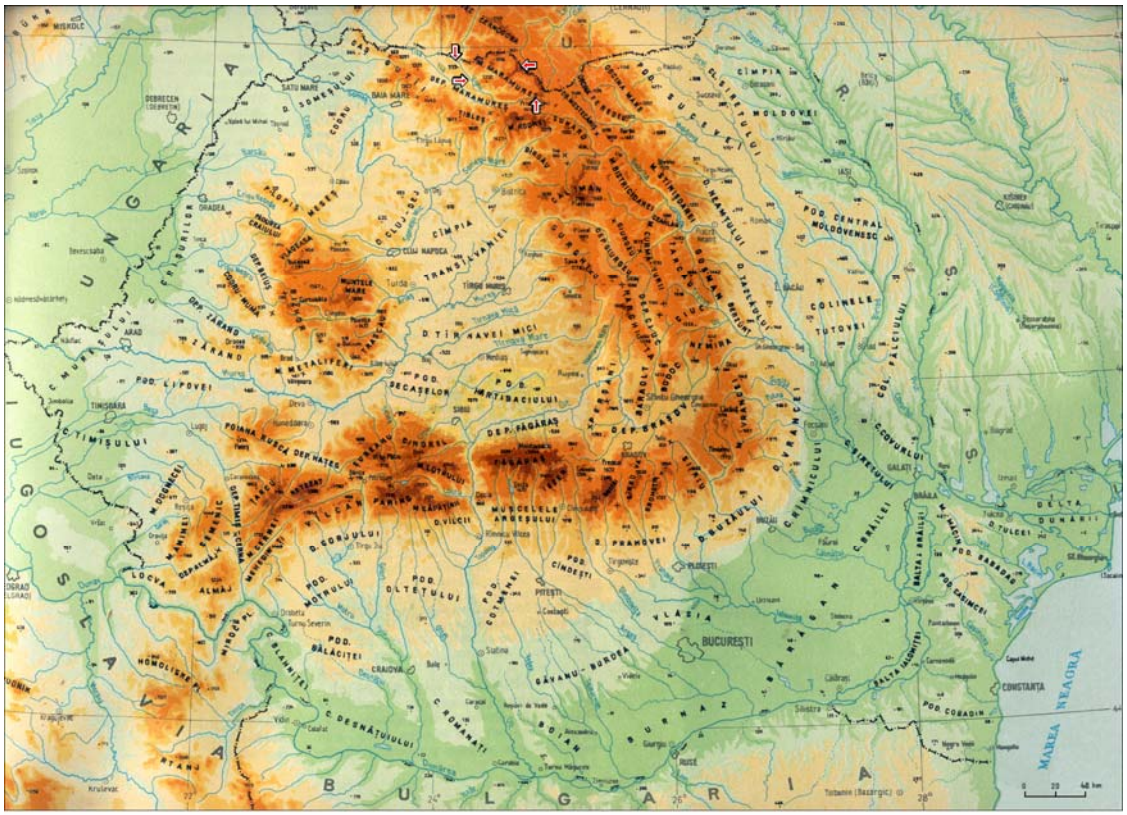
CONTENTS

Preface

A legendary place the Maramureş area, in the north of Transylvania, is one of the special areas among the remote zones of Romania. Emblematical from the geological, geographical, biological and ecological point of view for this area are, the Maramureş Mountains.

This accepted genuine symbol of the northern part of the Romanian nature benefit recently (since 12 January 2005) by the creation of a new protected area, the Maramureş Moutains Nature Park/Parcul Natural Munţii Maramureşului.

The Maramureş Mountains Nature Park is situated in the north part of the Maramureş County, including the localities (or parts of them) Borşa, Moisei, Vişeu de Sus, Vişeu de Jos, Leordina, Ruscova, Repedea, Poienile de sub Munte, Petrova and Bistra, and the Maramureş Mountains Massif. The Maramureş Mountains are situated on the northern border of the country between the 47°35'5" and 47°58'20" north latitude and between the 24°8'12" and 25°2'38" west longitude.



The Maramureş Moutains Nature Park localization (Badea et al., 1983 - modified).

This area lay towards the north of the Vişeu and Bistra Aurie valleys on a length of over 100 km, with a surface of around 1500 km^2 and is included in the Romanian Carpathians.

The park administration members together with a group of specialists developed a very needed research plan, in the context of an United Nations Development Project (no. 41462). Based on this project scientific studies results at which were added other independent studies caried on in the last ten yers, the *Transylvanian Review of Systematical and Ecological Research* editors, dedicated this volume, to the Maramureş Moutains Nature Park.

Acknowledgements

The editors of this volume would like to express their gratitude to the authors and the scientific reviewers whose work made the appearance of this publication possible, and to the Maramureş Moutains Nature Park Administration members, which supported the field work on which a part of the necessary research was based.

This volume came in to being also based on the suport on the field through the Global Environmental Facility - United Nations Development Programme 41462 “Strengthening Romania's Protected Area System by Demonstrating Public-Private Partnership in Romania's Maramureş Mountains Nature Park” project.

The Editors

GEOGRAPHICAL BACKGROUND ELEMENTS OF THE VIŞEU RIVER BASIN (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, Vişeu River basin, position, delimitation, geomorphology, hydrography.

ABSTRACT

The main goal of this paper is to bring forth an overall description of the Vişeu River basin from the Maramureş Depression, in Romania.

The hereby paper stands for a geographical, geomorphologic and hydrological presentation of the area.

RÉSUMÉ: Éléments géographiques du fond, du bassin de la rivière Vişeu (Maramureş, Roumanie)

Le but de ce travail est de présenter une description générale du bassin de la rivière de Vişeu, de la Dépression du Maramureş, en Roumanie.

Ce travail fait une description de cette zone de point de vue géographique, géomorphologique et hydrologique.

REZUMAT: Elemente geografice de fond a bazinului râului Vişeu (Maramureş, România).

Scopul acestei lucrări este de a prezenta o descriere generală a bazinului Vişeu din Depresiunea Maramureş, în România.

Lucrarea de față reprezintă o descriere a zonei din punct de vedere geografic, geomorfologic şi hidrologic.

Position and delimitation

The Vişeu River basin is situated in Romania, in the north of Transylvania, in the Maramureş Depression, at the present border with the Ukraine and from the administrative point of view belongs to the Maramureş County.

With a 1606 km² surface is delimited in the north and east by Maramureş Mountains, in the south by the Rodnei Mountains, and in the southwest and west by the Maramureş Hills.

The lowest altitude of the Vişeu River basin is 303 meters at the confluence between Vişeu River and Tisa River, and the highest altitude is 2303 m in the Pietrosul Rodnei Peak (Rodnei Mountains).

Geomorphology

This area due to its geologic, tectonic and climatic complexity, exhibit a high diversity of the relief forms, fact which created optimum biotopes for a high variety of wildlife.

The Rodnei Mountains are lying in the Vişeu Basin area, between the Prislop Pass (1416 m) and Bătrâna Peak (1710 m), in this area are present north slopes with short ridges and important abrupt determined by the Dragoş Vodă Fault.

In this area are present the highest peaks like: Pietrosul Rodnei - 2303 m, Buhăiescul Mare - 2268 m, Buhăiescul Mic - 2221 m, Rebra - 2119 m, Cormaia - 2033 m, Repede - 2084 m, Negoiasca Mare - 2041 m, Puzdrele - 2189 m, Laptelui Mare - 2172 m, Galaţiului - 2048 m.

The glacial relief is well highlighted on the high slopes where are hollows, valleys, circuses and moraines, under Pietrosul Rodnei Peak, Puzdrele Peak, Galaţiului Peak and at the springs of the Pietroasa, Repedea, Buhăiescul, Negoiescul, Cimpoieşul and Fântâna streams.

The mountains is formed of crystalline schist, and in the Piatra Rea, Turnul Roşu area the limestone is present.

The karst: the karst type rocks appear in Piatra Rea (crystalline limestone), but cavities appear also in not karst type rocks (grit stone and schist). Are known around 30 cavities of which the most important are the Podul Cailor Cave and Şura Cailor Cave.

The Maramureş Mountains are lying in the area of the Vişeu Basin between the Prislop Pass (1416 m) and Tisa River, on the area which came down from the Muncelu Peak (1318 m), in the Valea Vişeului locality.

These mountains are formed of a large and fragmented valleys area, fact for which the mountains are divided in many parts:

- Pop Ivan is delimited among the valleys Vişeu, Tisa, Ruscova and Repedea. This area comprise the following peaks: Muncelu (1318 m), Poloninca (1622 m), Şerban (1793 m), Pop Ivan (1937 m), Holovaciu (1546 m), Micu Mare (1817 m), Tomnatic (1618 m), etc. Here are present quartz and metamorphic schist (Şerban), hard metamorphic rocks - gneiss (Şerban and Pop Ivan), limestone (Şenderschi).
- Farcău is delimited by the valleys Repedea, Ruscova and Rica. This area include the Farcău (1957 m), Mihailec (1918 m), Pietriceaua (1555 m), Corbu (1696 m), Stogu (1651 m), Copilaşu (1611 m), etc. peaks. Here are present Mesosoic basalt with limestone intercalations (Farcău, Mihailec), limestone and Mesozoic dolomites (Petriceaua) and grit stones (Stogu and Corbu).
- Pietrosul Bardăului is lying among the valleys Ruscova, Rica and Vaser. This area include the following peaks: Pietrosul Bardăului (1850 m), Bucovinca (1763 m), Pecealu (1725 m), Băiţa (1670 m), Muncelul Popii (11429 m), Maximul (1220 m), Budescu Mare (1679 m), Cristina (1658 m), etc. Here are present the grit stones (Pietrosul Bardăului and Maximul).
- Şuligu-Ignăteasa is lying between the valley Vaser and the ridge which separate the present border between Romania and Ukraine. This area includes the following peaks: Ignăteasa (1767 m), Comanu (11731 m), Şuligu (1688 m), etc. Here are present: the grit stones (Ignăteasa).
- Toroioaga-Jupania Massif is lying between the valleys Vaser and Ţâşla. This area include the following peaks: Jupania (1853 m), Piciorul Cataramei (1644 m), Piciorul Caprei (1804 m), Toroiaga (1930 m), Ţiganului (1736 m), Greabăn (1594 m), etc. Here are present the Neogene intrusive rocks (Toroiaga), tough metamorphic rocks - gneisses (Greabăn), micaceous crystalline schist (Jupania).
- Cearcănul-Prislop is lying between the valley Ţâşla and Vişeu. This area include the following peaks: Fântâna Stanchii (1726 m), Cornul Nedeii (1763 m), Cearcănul (1847 m), Măgura (1601 m) and Prislop Pass (1416 m). Here are present the quartzite and metamorphic schist (Piatra Băiţei), crystalline schist (Cearcănul), rocky limestone slopes (Piatra Scrisă and Stâna Sasului), Eocene limestone (Podul Cearcănului).

The glacial relief in the Maramureş Mountains a little marked out, there are present glacial cauldrons, abrupts and moraines under the Farcău Peak, Mihailec Peak, Jupania Peak, Pietrosul Bardăului Peak, Bucovinca Peak and glacial-nival caldrons (Stânişoara and Mihailec).

The karst: the karst type rocks appear in limited surfaces and have different ages (metamorphic limestone, Mesozoic and Eocene limestone), but appear also cavities in not karst type of rocks like (grit stones, metamorphic quartzite, eruptive rocks). There are known 31 cavities, the most important being: Izdocini in Pietriceaua, Peştera Mare in Piatra Moloşnaia, Peştera Tunelului in Piatra Scrisă, Peştera lui Coreniuc in Cariera Şenderschi, etc.

The exokarst is present through doline in Podul Cearcănului, Dealul Frumos and Fântâna Stanchii.

The Borşei Piedmont is developed under the Rodnei Mountains abrupt and pass up to the altitude of 1000 m, from the geologic point of view the piedmont is formed of Borşa grit stones.

The Maramureş Hills*,* are situated between the Moisei area and Tisa River, and are divided in three subunits:

- Bocicoiel Hill, is positioned between the Moisei area and the Spinului area, here is the highest peak of the Maramureş Hills, the Dan's Peak (1038 m);

- Plăiuţului Hills, are situated between the Spinului Valley and Hera Hill, the highest peaks are Mare Peak (785 m), Osoiu Peak (723 m);

- Judeleva Hill, is positioned between the Hera Hill and the Tisa River, and has the following main heights: Măgura Judeleva Peak (939 m), Măgura Voloşeanca Peak (929 m).

The karst: the karst type rocks appear on limited surfaces in the Tocarnea Hill and are formed in Eocene limestone where are five caves, also one in grit stones.

The Vişeu Glacis**,** represent slightly inclined slopes of the Maramureş Mountains toward the Vişeu Valley, has altitudes between 450 m and 750 m.

The Vişeu corridor, includes many depressions, separated by narrow areas (Rădeasa Gorge, Oblaz Gorge and Vişeului Gorge), and formed in grit stones: Borşa Depression, Vişeu Depression, Ruscova Depression, Petrovei Basin, Bistrei Basin, Vişeu Basin. In this area terraces are present, with heights of: 150 m, 110 m, 75 m, 50 m, 35 m, 20-25 m, 10 m and the meadow terraces of 2-3 m.

Hidrography

The Vişeu River spring in the Prislop Pass (1416 m altitude) which cleave the Maramureş Mountains by the Rodnei Mountains. The river is flowing in the Tisa River, near the Valea Vişeului locality, at the altitude of 330 m.

The Vişeu River collects its water from the Maramureş Mountains, Rodnei Mountains and Maramureş Hills, the surface of the hydrographical basin being of 1606 km^2 and the river length of 80 km.

In the upper part, from the spring and to the Moisei locality, the riverbed has high slopes (20-50 m/km) and the river name on this sector is called Borşa or Vişeuţ.

From the Moisei locality, the Vişeu River enter in the Maramureş Depression where the valley became large, and in some areas become narrow forming gorges like Rădeasa Gorge (between Moisei and Vişeu de Sus), Oblaz Gorge (between Vişeu de Jos and Leordina) an Vişeu Gorge (between Bistra and Valea Vişeului localities).

The Vişeu River hydrographical regime belongs to the Charpatian-orienthal-moldavian type in the upper course and to the Charpatian-orienthal-transyilvanian type in the lower course.

The Vişeu River water are high in the spring (39.4%) then start to decrease till the summer when reach (27%) of the annual total flow, in the autumn (18.6%), the lowest flow being registered in winter (15%). In January the measurements prove the fact that at Bistra is flowing only 4.5% of the annual volume, in comparison with the neighbour Iza River where the minimum is registered in September (2.9%).

The Vişeu River basin is developed mainly in the mountainous area (67%), fact which induces a high density of the hydrographical net (0.7-1 km/km^2) and one of the highest specific flows in the country, due to the quantities of precipitations of over 1100 mm/year.

In the upper part, the tributaries which spring in the Rodnei Mountains, have their origin in the glacial relief and have a high flow, the approximate flow being of 5 m^3/s. The main tributaries in the Rodnei Mountains are: Valea Fântânilor (Length = 7 km), Valea Negoiasa (L = 6 km), Valea Repedea (L = 10 km), Valea Pietroasa (L = 7 km), Vremeşu, Pârâul Hotarului, Valea lui Dragoş (L = 11 km) and Izvorul Negru (L = 7 km).

From the Maramureş Mountains the right side tributaries are: Hăşmarul Mic, Cercănel (L = 11 km), Ţâşla (L = 20 km), Vaser (Surface = 422 km^2, L = 52 km) which have a flow of 9 m^3/s and contribute with 27% at the total debit of the Vişeu River, Ruscova (S = 435 km^3; L = 39 km) have a flow of 11.3 m^3/s, Frumuşeaua (L = 14 km) and Bistra (L = 9 km).

From the Maramureş Hills the left side tributaries are small and have insignificant flows: Drăguiasa, Bocicoi, Spinului, Plăiuţ, Neagră and Luhei.

In the Rodnei and Maramureş mountains are many abrupts and falls: Cailor Cascade, Cimpoiasa Valley falls, Repedea Valley falls, Izvorul Verde (Rodnei Mountains) Valley and Criva Valley falls, Tomnatic Valley Cascade, Bardău area falls (Maramureş Mountains).

The mineral springs in the Vişeu River basin have a varied composition (bicarbonate, ferrous, sulphurous and salty) and are present in the Maramureş Mountains around 150, in the Rodnei Mountains around six and in the Maramureş Hills around five.

The glacial lakes in the Rodnei Mountains are situated at 1900-1950 m and are very interesting concerning the biodiversity. These lakes were formed behind some deposits like: Iezer Lake, Gropi Lake, Buhăiescului lakes, Rebra Lake, Negoiescului and Cimpoieşului lakes.

The Maramureş Mountains swamps are oligotrophic and eutrophic: Strungi Swamp, Tăul Obcioarei, the wetland situated under the Ihoasa Peak, Jneapănul Hânchii, the wetland situated under the Pietrosul Bardăului Peak (Tăul Roşu), Tăul Băiţii, Preluca Meşghii, the Vârtopul Mare wetland, the wetlands under the Pietrosul Bardăului Peak, Tăul cu Muşchi, the wetland situated under the Bendreasca Peak.

The Maramureş Mountains lakes are: Lutoasa, Bârsănescul, Budescul Mare, Măgurii and Vinderel.

On the Vişeu River corridor is a pond area, near the Petrova locality.

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ANALYSIS OF LEVELLED SURFACES IN MARAMUREŞ MOUNTAINS (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş Mountains, levelled surfaces.

ABSTRACT

The problem of the levelled surfaces in the Maramureş Mountains it was approached in many anterior studies. In this paper work I have tried to elucidate the aspects which remained unclear and to clarify some controversies, based on the relief morphology analyse in the frame of some GIS programmes and detailed field studies. The arguments obtained in the field do not confirm the existence of the superior surface or of the Carpathic peneplene described by some authors which studied the region. There is confirmed the presence of two erosion levelled surfaces: the surface Cerbul, situated at 1600-1800 m altitude, with a Miocene (lower Pontian) age; the surface Mestecăniş, which is inclined from the east (1400-1200 m) to the west (1200-1000 m) and was formed in the Pontian.

ZUSAMMENFASSUNG: Analyse der Einebnungsflächen in den Gebirgen der Maramuresch (Maramuresch, Rumänien).

Das Problem der Einebnungsflächen wurde in einer Reihe vorangegangener Studien behandelt. In vorliegender Arbeit wird versucht die noch offenen Fragen zu beantworten und einige Kontroversen zu klären, wobei eine morphologische Analyse unter Anwendung eines GIS Programms und genaue Geländeuntersuchungen durchgeführt wurden. Die Geländeuntersuchungen können das Vorhandensein der von einigen Autoren beschriebenen obersten Fläche oder der Karpaten-Rumpffläche nicht bestätigen. Es bestätigt sich das Vorhandensein von zwei Erosionsflächen und zwar der zwischen 1600-1800 m Höhe gelegenen Cerbul-Fläche, die dem Unteren Miocän bis Pont zugeschrieben wird sowie die von Osten (1400-1200 m) nach Westen (1200-1000 m) geneigte Fläche genannt Mestecăniş, die im Pont entstanden ist.

REZUMAT: Analiza suprafeţelor de nivelare în Munţii Maramureşului (Maramureş, România).

Problema suprafeţelor de nivelare din Munţii Maramureşului a fost abordată în cadrul a mai multor studii anterioare. În această lucrare, am încercat să elucidăm aspectele rămase neclare şi să clarificăm unele controverse, bazându-ne pe analiza morfologică a reliefului, în cadrul unor programe GIS şi pe cercetări amănunţite de teren. Argumentele din teren nu confirmă existenţa suprafeţei superioare sau a peneplenei carpatice, descrise de unii dintre autorii care au studiat regiunea. Se confirmă prezenţa a două nivele de eroziune: suprafaţa Cerbul, situată la 1600-1800 m altitudine, de vârstă Miocenă (Ponţian inferior); suprafaţa Mestecăniş, care este înclinată de la est (1400-1200 m) spre vest (1200-1000 m) şi s-a format în Ponţian.

INTRODUCTION

The existence of levelled surfaces in northern part of the Eastern Carpathians was recorded for the first time by Emmanuel de Martonne, during his scientific trip in 1921. His scientific study was followed by other studies of Nordon in 1931, Mayer in 1936 and Morariu in 1936. In the second half of the XX century the researches of Sîrcu (1960, 1978) elucidated to a great extent the problem of levelled surfaces both in Rodna and Maramureş mountains.

MATERIAL AND METHODS

For the identification of levelled surfaces we use the GIS (Geographic Information System) techniques. In the framework of our research, first we built a geographical database which allows us to make many thematically maps (slope maps, slope orientation maps, relief energy maps, landform curvature maps, etc.), vertical profiles and 3D visualisation of the terrain. Then, the other important part of the research was made in the field by many trips in the Maramureş Mountains and by visual identification and photographic records of the levelled surfaces characteristics.

RESULTS AND DISCUTIONS

The Problem of "Upper Levelled Surface" or "Carpathian Peneplain"

Its existence in Maramureş Mountains was noted for the first time by Posea et al., (1980), after having writing in 1973 that, in the Eastern Carpathians, such surface exists only in the Rodnei Mountains where it was called *Nedeia* surface. The age of peneplain is considered Pre-Tortonian. In 2003 (Mac et al., 2001), asserted the existence of upper levelled surface considering its creation interval between Danian and Eocene.

Analyzing the paleogeography of Maramureş Mountains, we can draw the conclusion that in the period suggested by the authors mentioned above there were propitious conditions for Carpathian Peneplain formation.

Between early Cretaceous and early Eocene, the Maramureş Mountains have a relative high position. The presence of Senonian transgressive deposits in western and southern part of the crystalline zone confirms this hypothesis. At the end of Senonian, in the Laramic orogenesis, the folding of Rahov and Corbu flysch occurs. This event rise even more the mountain unit and therefore stop the sedimentation in Borşa's and Ruscova's sedimentary basins and in eastern part of the Prislop Pass, these regions become emerged. The sedimentation continues toward west in Pienides area, where Aroldi (2001) mentions that the Dumbrava formation with Senonian - Paleocene age has the probable source area in Median Dacides.

Beginning with Eocene, we find the Maramureş Mountains as submerged mountains. This fact is proved by transgressive deposition of Prislop sandstones and conglomerates, either on Cenomanian deposits or directly on the crystalline unit. The transgression goes on until Oligocene, when in our studied region there are some islands delivering the materials identified by Jipa (1962), in Borşa sandstones, situated in southwestern part of Novăţ drainage basin and by Aroldi (2001), in Petrova Nape, near Bârsana.

Regarding the facts above-mentioned, the development of a levelled surface in Danian-Eocene interval is plausible. But a question still remains. Could we identify any fragment of it in our days?

If the surface ever existed, the Eocen-Oligocene transgression should have fossilized most of them, and in the time being it should exist as an exhumated surface. Such a surface is mentioned by Sîrcu (1978) in the western part of Pietrosu Rodnei, in the region of Bătrâna Mountain. Researching the terrain, what we observe and regard as pure fact does not indicate the presence of such a surface, and even though it existed in upper parts of massifs, it was destroyed by the later geomorphologic modelling processes.

Authors who claim that Carpathian Peneplain exists in Maramureş Mountain use to place it in upper part of the highest massifs (Cearcănul-Prislop, Jupania, Pietrosul Bardăului, Farcău-Mihailec, Pop Ivan). This location meets the Cerbul levelled surface from Sarmatian in Rodna Mountains (Sîrcu, 1978). If we consider that in Cearcănu-Prislop region, where all authors sustain the widest extension of upper levelled surface, this cut the Eocene and Oligocene deposits, it is obvious that its age is post Oligocene. Above Cerbul levelled surface, situated at 1600-1800 m, it is impossible to identify other levels. Regarding these arguments, we can hold that in Maramureş Mountains, the existence of *Upper Levelled Surface* or *Carpathian Peneplain* does not confirm itself.

Cerbul levelled surface

It is situated at an altitude between 1600 m and 1800 m. Although in Maramureş Mountains have a wide extend, the component fragments are small. In many situations we can talk about the crests level rather than levelled surface.

The place where the Cerbul level looks like a levelled surface is in the Prislop Pass area, where it exists in the Rodnei Mountains a continuity between this and Bătrâna levelled surface. In this part of the Maramureş Mountains the surface is situated between 1600 m and 1700 m, in the southern part of Fântâna Stanchi Peak, in the southern part of Cornu Nedei Peak, near the Hăşmarul Peak, and in the southern part of Picioru Vulpii Peak, where take down even below 1600 m in the region of Sălăşinurile (Figs. 1, 2 and 3).

Figure 1: The extent of Cerbul levelled surface in Cearcănu-Prislop region.

Beside this sector, a wide extent of Cerbul levelled surface is observed in the region of Paleniţa Mountain, where it could reach those heights of Ciungii Bălăsânei and Stănişoara Mountain situated near the Jupania Massif. Except for the two earlier mentioned areas, the presence of Cerbul levelled surface is revealed by crest lines which have an altitude between 1550 m and 1650 m (Fig. 3).

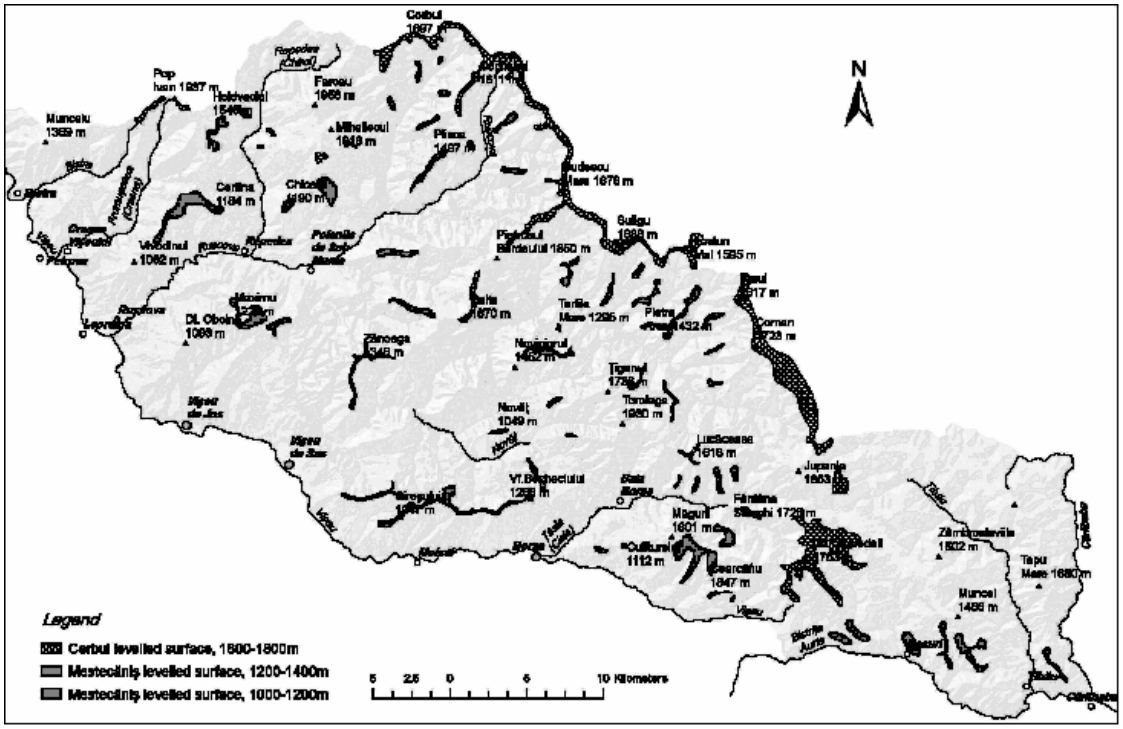

Figure 2: The extend of levelled surfaces
in the Maramureş Mountains area.

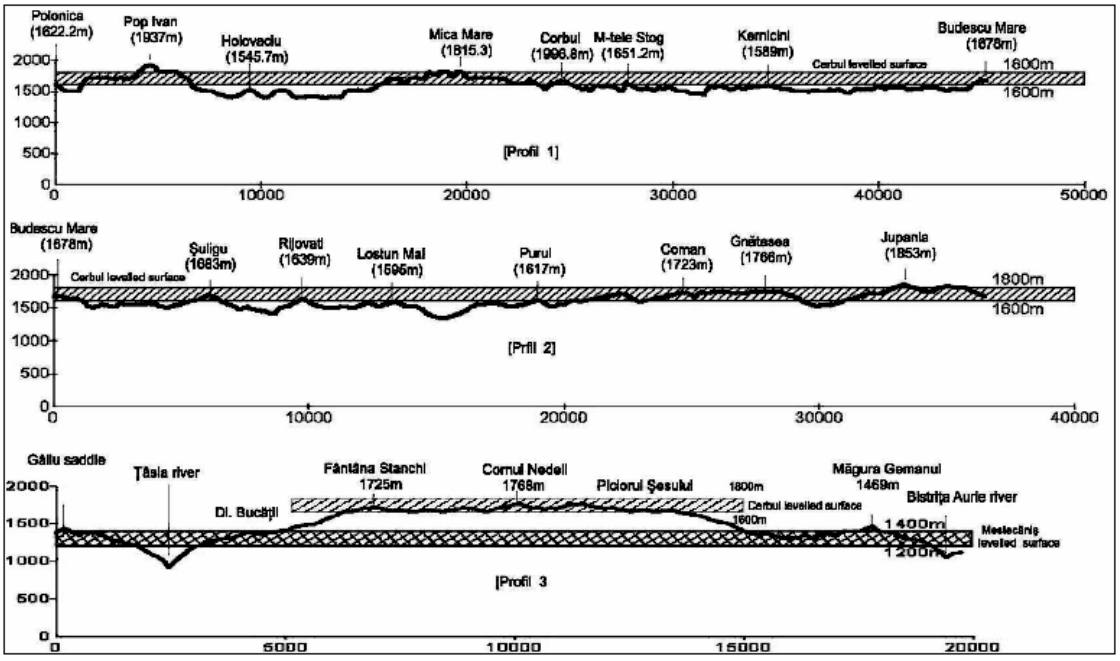

Figure 3: The vertical profiles of Cerbul levelled surface (profile 1 and 2)
and Mestecăniş levelled surface (profile 3).

In the Pop Ivan and Farcău massifs the levelled surface seems to be like marginal levels. In Pop Ivan there is a level at approximate 1700 m at the crest between Pop Ivan and Şerban Mountain peaks, and another one lies in the southeastern part of Pop Ivan Peak, towards Capul Groşilor. In the Farcău Massif we find a fragment situated in southeastern part of Mihailec Peak, on other fragment in southern part of Mihailecului Crest and a last fragment in Rugaşu Mountain, all situated on the sedimentary structure of black flysch nape.

In Pietrosu Bardăului Massif to this levelled surface may be assigned the crest between Budescu Mare and Pietrosu Bardăului peaks and that situated in the south of Pietrosu Bardăului Peak, which is cut in crystalline schysts.

Another area with extend of Cerbul levelled surface is situated in Lucăceasa area (Toroiaga-Jupania Massif) on Eocene deposits formed of sandstones, shale and limestones.

The analysis of the profiles 1 and 2 (Fig. 3) reveal the presence of a levelled surface in the region of national borders between Romania and Ukraine or the interfluves between Vişeu and Ceremuş rivers drainage basins. The level is situated both on Colbu and Rahov flysch and the crystalline rocks from northeast part of Vaser River drainage basin. The average altitude of interfluves is below 1600 m, probably because of the later erosion. Above the 1600 m level are situated just some peaks which represent some erosion outliers. The levelled surface is extended also towards north in Ukraine where is situated on interfluves between the Black Ceremuş and White Ceremuş.

The age of Cerbul levelled surface was considered to be Sarmatian (Sîrcu, 1978; Barbu, 1976), formed between Moldavic and Attic orogenesis. The levelled surface was cut in the crystalline rocks of Central-East-Carpathians Napes, in sedimentary rocks of Ceahlău Nape and in Post-Tectogenetic covers rocks of Oligocene age situated in Piciorul Vulpii region.

In the southern part of the Toroiaga sub volcanic massif, around the Lucăciasa Peak, Sîrcu (1961) assert the fact that the levelled surface is cut in the local volcanic rocks and therefore there are younger than the volcanic eruptions age. The analysis of the geological maps (Bleahu et al., 1968) and the latest field researches had lead us to the conclusion that the Cerbul levelled surface was cut in Eocene sedimentary rocks not in volcanic apophysis situated towards south in Netedu din Faţă Crest. The age of the volcanic rocks is Pontian, therefore the Cerbul levelled surface was formed in Early Miocene-Pontian time interval.

Mestecăniş levelled surface

There exist as valley shoulders on secondary interfluves. Its altitude get down from 1400-1200 m, in crystalline zone or in Ceahlău Nape Region, both situated in the eastern part of Maramureş Mountains, reaching 1200-1000 m, in Munceii Vişeului zone in western part. At east of Prislop Pass, there are obvious marks of existence of levelled surface just near Bistriţa River, although Sîrcu (1961) sustains that in eastern part of Maramureş Mountains the Mestecăniş levelled surface reaches the widest extend.

The largest development of Mestecăniş levelled surface is on metamorphic rocks, in the upper part of Vaser and Ţâşla drainage basins (Figs. 4 and 5). In Vaser drainage basin are situated in Piciorul Lostun, Piatra Făinii, Culmea Mocilnei, Podul Măgurii, Piciorul Lung and Creasta Făget (the profiles 5 and 6; Fig. 6). In Ţâşla drainage basin are situated on the interfluves situated between Catarama and Colbu rivers on right side, where is cut in volcanic apophysis of Toroiaga Massif, on Dealu Bucţii (profile 3, Fig. 3), on interfluves situated between Bălăsâna and Ţâşlişoara rivers and in Frumos Mountain on Eocene limestone where appears to be like a structural surface.

The levelled surface has also a wide extent in the Novăț drainage basin (Piciorul Țiganului, Piciorul Gradului, Novăț Peak and Novăț-Vişeu interfluves), in upper part of Ruscova drainage basin on sedimentary rocks of Ceahlău Nape and in the lower part of this basin (Capul Groşilor, Muncelaşu, Rugaşu, Culmea Chicera) (profile 4, Fig. 6).

In the western part of the Maramureş Mountains it is very difficult to identify the levelled surface because there it is composed just of crests lines which reach an altitude oscillating between 900 m and 1200 m. However, these altitudes occur frequently, and this fact demonstrates the existence of levelled surface even when its past level is preserved by erosion outliers (the peaks Maximu, 1219 m; Obcina, 1169.4 m; Lazului, 1179.5 m; Becheciului, 1288 m; Custurelor, 1112 m) (profile 5, Fig. 6).

The age of Mestecăniş levelled surface is Pontian; it is cut, in some places, in volcanic rocs of Toroiaga sub volcanic massif. It was formed in period between Attic and Rhodanic orogenesis.

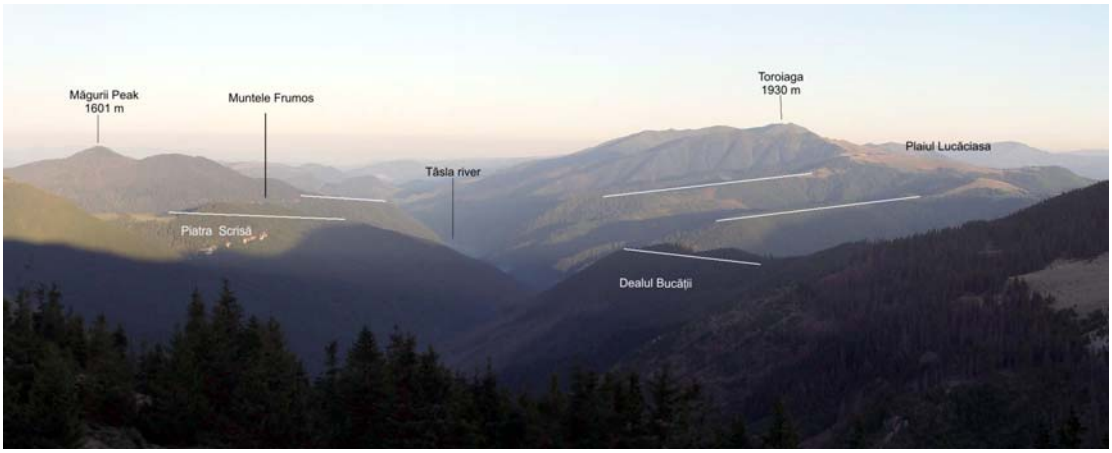

Figure 4: The Mestecăniş levelled surface from upper part of the Țâşla drainage basin.
The white lines represent the remains of levelled surface.

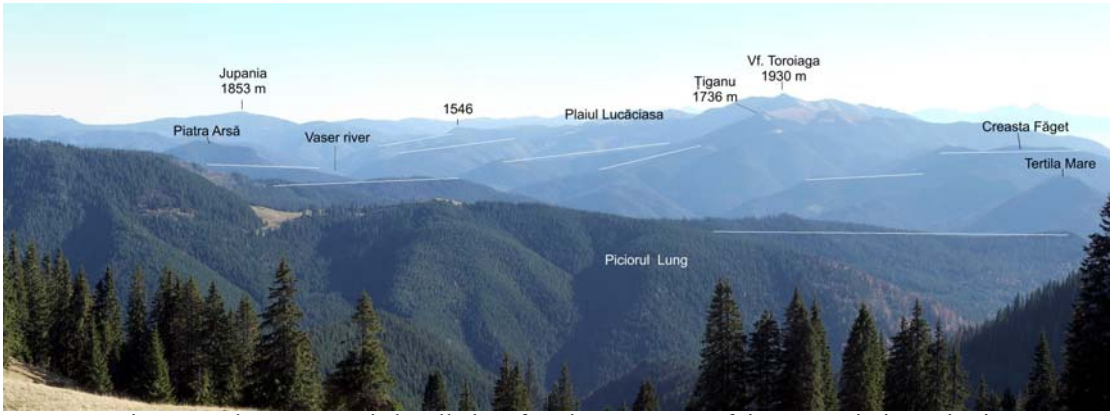

Figure 5: The Mestecăniş levelled surface in upper part of the Vaser drainage basin.
The white lines represent the remains of levelled surface.

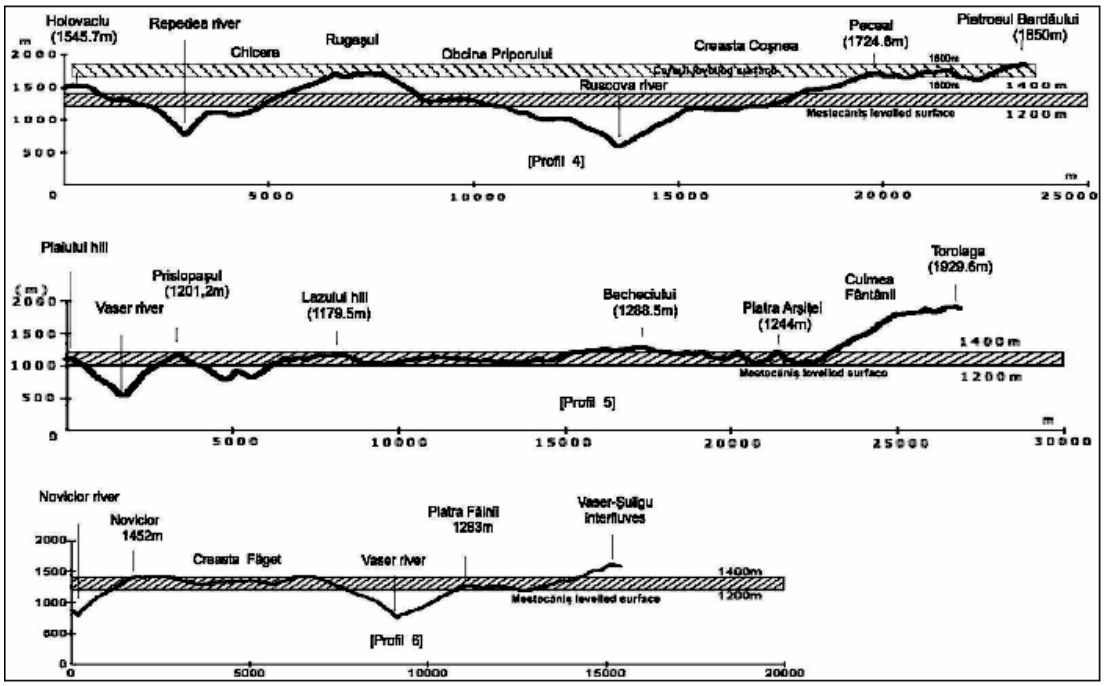

Figure 6: The vertical profiles of Cerbul levelled surface (profile 4) and Mestecăniş levelled surface (profiles 4, 5 and 6).

CONCLUSIONS

Among all levelled surfaces, the widest extent has Cerbul levelled surface which is situated at 1600-1800 m altitude, and was formed in the Early Miocene - Pontian interval. The largest fragment of it is located, as the earlier researchers assert, in Cearcănul-Prislop region and the levelled surface extend beyond the national border in Ukraine, where is situated on the Black Ceremuş and White Ceremuş interfluves. This surface is the upper leveled surface; an "*Upper leveled surface*" or "*Carpathian Peneplain*" does not exist in Maramureş Mountains.

The Mestecăniş levelled surface, which indicates a Pontian age, is inclined from east (1200-1400 m) to west (1000-1200 m), knowing a great development in upper part of Vaser and Ţibău drainage basins. At the east of the Prislop Pass the extent of surface is more limited than Sîrcu (1961) sustain. It is situated only near Bistriţa River on Măgura Geamănul, Fluturica and Piciorul Bardului. In other parts of the region the heights reach frequently over 1400 m altitude, even 1500 m (Sâlhoiul Mare, 1563 m; Zânbroslăviile, 1602 m, Obcina Bătrână, 1486; Măgura, 1559 m; Ţapul Mare, 1660 m; Muncel, 1466 m, etc.). And this pure fact demonstrate that this part of Maramureş Mountains, situated at east of Prislop Pass, is rather derived from Cerbul levelled surface than from Mestecăniş levelled surface.

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THE CHARACTERISTICS OF THE HYDROGRAPHICAL BASINS OF THE MARAMUREŞ MOUNTAINS (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romania, Maramureş, hydrographical basins, systemical complexity, corelative associations.

ABSTRACT

The goal of this paper is to create an overview on the hydrographical basins of the Maramureş Mountains, on their morphological and evolutive individualities and peculiarities in the actual regional evolutive and phisico-geographical context of the North Groupe of the Orienthal Carpathians. The analyse will be realise based on the corelations and interdependence among the internal and external factors, but also on the base of the actual conditionings of the environmental components. In the hydrographical basins of these mountains apear elements of differentiation expressed through qualitative and quantitative morphological and hydrological parameters.

ZUSAMMENFASSUNG: Die Kennzeichen der autochtonen Einzugsgebiete der Maramurescher Gebirge (Maramuresch, Rumänien).

Die Arbeit hat zum Ziel einen Gesamtüberblick über die autochtonen Einzugsgebiete der Maramurescher Gebirge zu vermitteln und ihre Eigenständigkeit, die morphologischen Kennzeichen sowie ihre Entwicklung im Lichte derzeitiger Erkenntnisse zu Evolution und physisch-geographischem Charakter der Nord-Gebirgsgruppe der Ostkarpaten darzustellen. Die Analyse lässt sich anhand der Korelationen und Wechselwirkung interner und externer Faktoren durchführen, aber auch unter Berücksichtigung aktueller Gegebenheiten der Umwelt. Im Rahmen der autochtonen Einzugsgebiete dieser Gebirge treten differenzierende Elemente auf, die sich in qualitativen und quantitativen morphometrischen und hydrologischen Parametern ausdrücken lassen.

REZUMAT: Caracteristicile bazinelor hidrografice autohtone Munților Maramureşului (Maramureş, România).

Scopul lucrării este de a crea o imagine de ansamblu asupra bazinelor hidrografice autohtone Munților Maramureşului, asupra individualității şi particularităților morfologice şi evolutive ale acestora în contextul evolutiv şi fizico-geografic actual, regional al Grupei Nordice a Carpaților Orientali. Analiza se realizează pe baza corelațiilor şi interdependenței dintre factorii interni şi externi, dar şi pe baza condiționărilor actuale ale componentelor de mediu. În cadrul bazinelor hidrografice autohtone a acestor munți apar elemente de diferențiere exprimate prin parametri calitativi şi cantitativi, morfometrici sau hidrologici.

THE REGIONAL CONDITIONS OF THE GENESIS AND EVOLUTION

In the Carpathian lanscape structure we differentiate sectors with a high geographical individuality - the hydrographical basins - open systems characterised by reception and transfer of matter and energy. The display in semicircle and the central position of the Carpathian Mountains in the Romanian territory, the presence of numerous orographical nodal points, conditioned the radial divergent configuration of the valleys net. Through the watersheds sinuosity which are always identical with the line of the highest relief, through the accelerated rhithm of the evolution in relation with the two base levels: the exterior and the interior of the Carpathin arch, through the influence of the structre and of the rock, the Carpathian hydrographical net is diverse as typology: dendritic, radial, paralel, ring and in twin shapes.

A unit of high teritorial diversity, the Maramureş Mountains through their position and genetic and evolutive characteristics, constitute a landmark in the teritorial geographical analise and especialy in the corelation of the morphohydrographical evolution and the ranking of the geographical phenomenons of any type. Situated at the present highest latitudes of the Romanian territories, the Mamureş Mountains are extended in an semiarch form on a length of about 70 km between the Tisei Valley at north, Prislop Gorge (1416 m) at south, Maramureş Depression at west and Bistriţei Valley at east (Fig. 1).

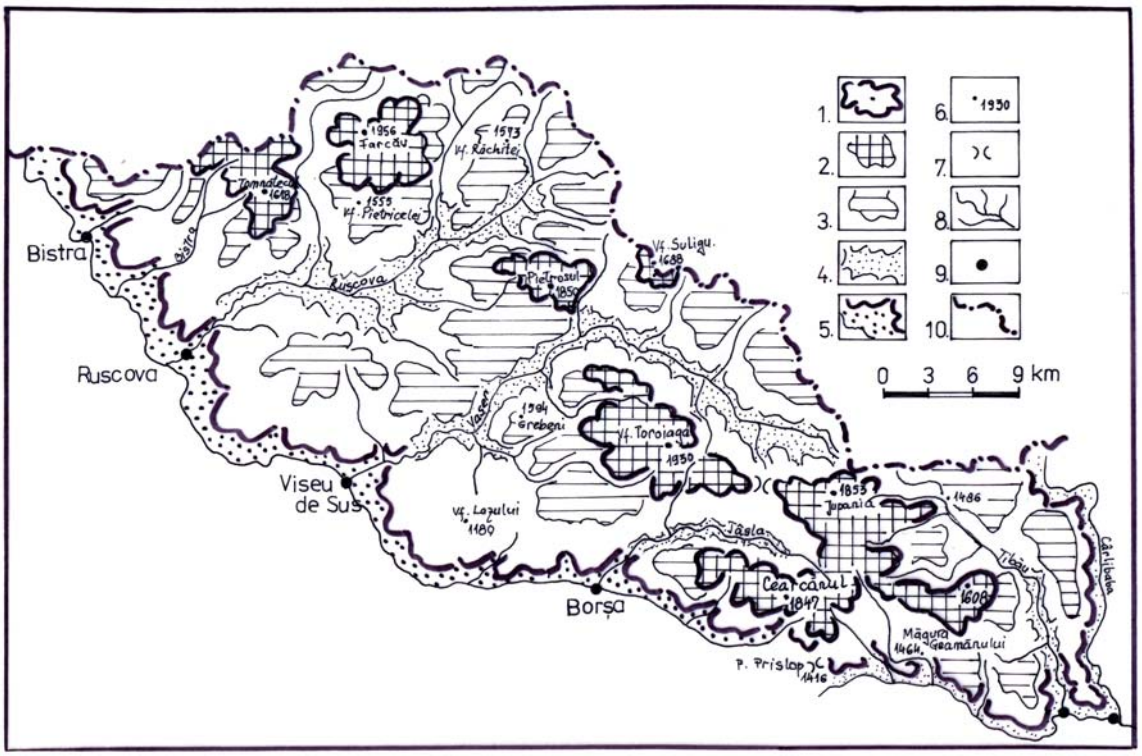

Figure 1: Maramureş Mountains - 1. High isolated massifs; 2. Levelled surface Cerbu (1600-1800 m); 3. Mestecăniş levelled surface (1400-1600 m); 4. Mountainous valley corridors and suspended depressions; 5. Vişeu corridor in Maramureş Depression; 6. Peaks; 7. Saddle type relief; 8. Hydrographical net; 9. Human settlements; 10. Romanian national border.

This mountainous unit is characterised through an accelerated rythm of evolution, in which the internal dynamic factors and the high weight of the external factors leaded to a continuous transformation of the mountainous relief, implicit of the valleys net, dynamic reflected especialy in the configuration of the watersheeds. The quasi-central position in the northern groupe of the Orienthal Carpathians is consonant with the growth of the mountain on the tough rocks of the cristaline-mesosoic median zone. The massivity of these mountains is diminished by the est, southeast penetration of the Carpathian valleys of the Vaser and Ruscova rivers and of their tributaries. Due to the induced high fragmention by the local valleys net, Maramureş Mountains consist of isolated areas: Cearcănu Mountains betwen Vişeu and Tâşla, Toroiaga Mountains between Tâşla and Vaser, Pietrosul Bardăului Mountains beween Vaser and Ruscova, Farcău Mountains between Ruscova and Vişeu rivers. The regressive erosion displayed at the provenience of the Vişeului, Vaser and Ruscova tributaries - press to the east the watershed between Tisa and Siret rivers, respectively between Vişeu and Bistriţa, beyond the line of the high elevations. The Vaser River penetrated the morphological boundary between Pietrosul Maramureşului Mountains and Toroiaga Mountaines broken through the tectonic longitudinal depression of the Maramureş Mountains (Ujvari, 1972).

The evolution of the valleys net of this mountainous unit is tight connected with the Carpathian paleogeographic evolution, with the tectonical events and erosion phases. In this way it is delineate the levels surfaces, result of the policiclic modeling started in Danian-Eocene (superior surface) and continuated in Pliocene (inferior surface). The Neogene puted its impress on the nortern Orienthal Carpathians, and implicit on the Maramureş Mountains through the big volcanic eruptions, which reach their paroxysm in the Valach orogenesis. Subsequently, in the Cuaternary, were hapened the most important changes in the Carpathic lanscape as a result of the subaerian modelling due the external agents, which let their impress especialy on the reception basins and on the valleys configuration. Based on this information we can say that the actual valleys net is in majority a Cuaternar one, in discordance from the structure, the actual configuration beeing the result of a long evolution (***, 1983).

The rich valleys net which form the two local hydrographical basins of the Maramureş Mountains - Vaser and Ruscova - afferent to Vişeu, evolved in relation with the different base level offered by the marine gulf which was functional in Sarmatian on the actual territory of the Maramureş Depression, and with the progresive back track of it toward north at one time with the filing of the depression with paleogene and neogene deposits. Also, the tectonic accidents and the lithology were influenced the hidrographical net evolution, the erosion being different in relation with the rocks structure, the rocks behaviour facig the external agents, the thickness of the lithological formations.

Thus, in the Maramureş Mountains the cristaline schists and granites with a median orientation are predominant, rocks on which the highest peaks were developed: Pop Ivan (1936 m), Pietrosu (1850 m), Cearcănu (1847 m). The vulcanic rocks form the nucleus of the peaks Farcău (1957 m) and Toroiaga (1930 m). The mesosoic sedimentary layer which cover the cristaline is formed by Cretacic and Paleogen fliss formations (sand stones, shales, clays). This petrographic and structural mosaic determined in the Maramureş Mountains a differential erosion through the ineqal deepening of the valleys, through the creation of a longitudinal profile with frequent slope distruptions and of a transversal profile with a cotinuous deepning. There where the valleys section the sedimentary layer, these has a splayed transversal profile, of which configuration is depedent by the rocks toughness and the flow of the hydrographical system.

The diferentiated erosion has as an effect the putting forvard of a positive relief formes. Thus, the Toroiaga Peak is avoided by the Valea Vaserului River, which enter deep in the mountain and which constitute a true longitudinal corridor (Mihăilescu, 1963). The chemical alteration of the hard rocks in the conditions of the cold and wet climate specific for this mountainous favour the feldspat formation which keep wetlands on the surface, through their impermeability.

The specific petrographic diversity of these mountains was reflected in the morphology and in the relief evolution. The inter-streams rounded and plane areas belong to the two well represented and conserved levels of the Maramureş Mountains: Cerbu (1600-1800 m) and Mestecăniş (1200-1400 m) surfaces. On the basins morphology is also the impress of the external agents modeling. This, active throug erosion, transport and accumulation is still present today.

The subaerian modelling marked out at the level of these surfaces erosional controls developed on cristaline schists or vulcanic doms (Toroiaga).

The glacial modelling, active in Cuaternar let its impress on the Maramureş Mountains, with a lower intensity in comparison with other mountainous units (Rodna, Făgăraş, Parâng, Retezat), generating together with the preglacial modelling, which is still active in the present at high altitudes through crio-nival action, a specific relief. These are altitudes over 1800 m, where exist the conditions for snow acumulation and glaciers formation. An essential role has the climate and also the slopes orientation. The slopes with north and northeast exposition of the Farcău and Pietrosu mountains, kep the impresses of the glacial and crio-nivals modelling, through the glacial cuvetes under the the Farcău and Pietrosu Bardăului peaks. On the slopes with south orientation these forms of detail are missing, them being more sunny and with no such accentuated slopes.

Next to the Cuaternary glaciations was active the fossil periglaciar modeling sistem, which let its impress on the watersheeds and on the reception basins of the hydrographical sistems through the creation o some specfic relief forms: breadown abrupts, detrituous layers and cones, which constitute new directions for gelivation and gelifraction.

In the Maramureş Mountains area the actual modelling is active through a range of natural agents (flowing water, snow) and processes (frost-defrost, damp-dry, surface erosion, torentiality, fluviatille erosion, transport and accumulation), of which effects induce the appearance of some microrelief forms and of a continue dinamic of the riverbeds and slopes.

The torential modeling, the most obvious one, is acting diferentiate in the montaneous unit in relation with the rocks hardness and the degree of coverage with vegetation. These erosions has seasonly episodes and high intensity, in relation with the climatic conditions, respectively with the precipitations quantity and the degree of covering with vegetation. The intensity is maximum when the vegetal layer (forest) is mising and in the mining areas (exploaitation and depositation). The torentiality apear in the sources areas, through regresive erosion in the higher basins, under the form of some torentiall sources, and also on the valleys line, on the slopes inducing sometimes lack of balance due to some destructive liquid and solid high floods. The solid matter depositation transported by the torrents at the base of the slopes in dejection cones formes has as an effect on the riverbed mobility, the riverbed migrations under the dejection cones pressure and lateral erosion on these sectors. These chaotic acumulations, not uniform in time and space, are posible reasons for the formation of some collecting areas of water (small basins), to suspending on some sectors of the Vaser and Ruscova riverbeds, especialy in the longitudinal depressions and the modification of the longitudinal and tranversal profiles of the collecting valleys.

The fluviatile modelling, through the erosion, transport and accumulation is the dominant one. It act in the minor riverbeds and on the banks, and at high flows, in the depression areas or in the confluence basins. The rivers riverbed of the Maramureş Mountains has an accentuated degree of stabilty, due to the geologic substrate in which them are flowing. The alternantion of the small basins with low slopes with narow sectors with accentuated slopes and the recent modifications of the land use due to the forests cut and mining activities, induce the apearance of some lack of balances generated by the hydric flux transit loaded with solid matter (rock and especialy wood debries). In this way, in the convergence torential areas are unload torential cones in which the chaotic deposited materials block the colector river bed and has a high destructive power. The riverbeds alluvial processes became very active in the case of the hydrographic confluence zones, especialy in the intramontane depressions and in the lower sectors of the Vaser and Ruscova rivers, at their confluence with Vişeu.

THE MORPHOMETRIC AND HYDROLOGIC CHARACTERISTIC OF THE HYDROGRAPHICAL BASINS

The geologic and geomorphologic content of the hydrographical basins of the Maramureş Mountains is taking over and modeling by the external agents in the actual conditions in which the climatic fators are asociated with the degree of covering with vegetation, land use, etc. Their interaction in time and space generate morphometrical aspects of the basin and the hydrologic characteristics of the hydrological net, which is still in a full dynamic due to the human intervention and the acceleration of the natural modeling processes on this background.

Vişeu River is the main collector of the hydrographical net of the Maramureş Mountains. It have a basin surface of 1606 km^2, a length of 80 km and an multianual average flow at Bistra of 29.4 m^3/s. Vaser River have a length of 42 km and drain a surface of 422 km^2, its multiannual average flow in the confluence with Vişeu River is 9 m^3/s. It can be seen an obvious asymmetry between the left and right tributaries, of which the most important ones are Novăţul (with a basinal surface of 88 km^2 and a length of 16 km) and Valea Peştilor (with a basinal surface of 24 km^2 and a length of 8 km).

Ruscova River have a hydrographical basin with a surface of 435 km^2 and a length of 39 km. In comparison with the Vaser River, it can be seen a simetry of the afluences but with biger dimnsions of that of the right side. At the outlet of the mountain Ruscova transit the large contact depression with the same name and it flow in Vişeu with a flow of 11 m^3/s. The most important tributaries are Socolău (with a basin surface of 72 km^2 and a length of 13 km), Repedea (with a basin surface of 87 km^2 and a length of 19 km), Bardi (with a basin surface of 32 km^2 and a length of 11 km) and Covaşniţa (with a basin surface of 34 km^2 and a length of 11 km).

The morphometrical aspects can be correlated with the phisico-geographical conditions of the water resources forming (Tab. 1). Thus, the Carpathic areal of the Maramureş Mountains is under effect of the latitudinal zoning, of tiering and of slopes orientation, includig to the air masses circulation, west dominant (oceanic) and scandinavian-baltic. The climate is temperate continental cool, with annual average temperatures of 0-2 ^oC at altitudes of over 1800 m, with an accetuated humidity and quantities of precipitations of 1000-1400 mm. The winters are long and frosty, with heavy snow fall, and the summer are short and cool.

Table 1: Elements of morphometry and the flow of the Maramureş Mountains rivers (Ujvari, 1972; with completions.)

River	Station	F basin (km^2)	H med (m)	Q med (m^3/s)	Qmed(l/skm^2)
Vişeu	Poiana Borşa	122	1262	3.25	26.64
Ţâşla	Baia Borşa	73	1204	1.55	21.23
Vişeu	Borşa Moisei	261	1225	5.78	22.14
Vaser	Făini	135	1242	3.20	23.70
Vaser	Vişeu de Sus	421	1085	7.68	18.24
Vişeu	Leordina	964	1026	16.2	16.80
Ruscova	Poienile de Sub Munte	289	1100	6.5	22.49
Ruscova	Ruscova	434	1059	10.2	23.5
Vişeu	Bistra	1586	1008	29.4	18.53

The brown acids soils in the above-mentioned climatic conditions, favour the development of very wel represented forests. We mention the high degree of forestation (about 90% of the surface), the slopes being very well forested, in an obvious tiering of the vegetation, with the extension of the bech forests to the 1300 m altitude, and of the coniferous forests (spruce), to the 1800 m. The high ridges are covered with alpine pastures, with species resistant to the climatic stress generate by the temperature and moist.

These climatic conditions, together with the morphometric and morphographic ones, lead to the delineation of an oriental carpathic hydrological regime type for the upper basins of Vaser, Ruscova and Tâşla rivers, and of a Trasylvanian Carpathic hydrological regime type for the middle and lower river basins. The accentuated pluviosity, the late meltings of snow and the high spring-summer flows constitute reference displayes of this hydrologic type. The corelation between the specific average outflow and the surface of the hydrographical basins and also that one between the specific average outflow and the altitude confirm the influence of the tiering and of the diferent exposition (Figs. 2 and 3).

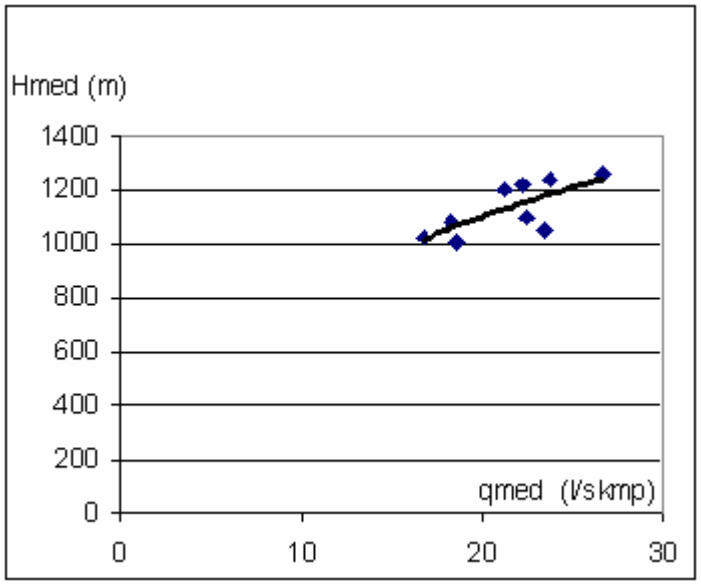

Figure 2: Corelation $q_{med} = f(H_{med})$; Maramureş Mountains.

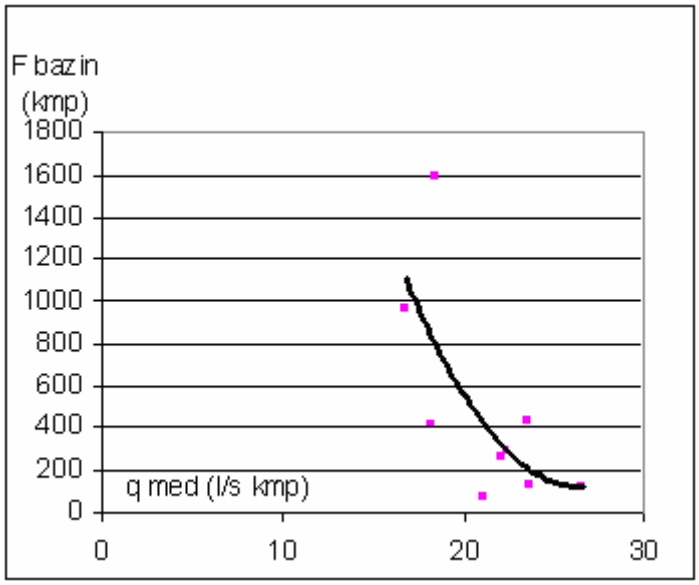

Figure 3: Corelation $\mathbf{q_{med}} = f(F_{bazin})$; Maramureş Mountains.

The specific average outflow values decrease with the altitude for Vişeu and Vaser, the highest outflow being put in the effect in the upper Vişeu Basin and in the middle Vaser Basin. For Ruscova, the specific average outflow is lower in the sources area of the basin as a consecuence of the more abundant orienthal regime and higher in the western part of the basin.

The corelation between the basins surface and the specific average outflow is also a high, but inverse, namely at an icrease of the basin surface it is to point out the decreasing of the specific outflow. An important characteristic of the hidrographic net of the Maramureş Mountains is the variation of the seasonal outflows, with a doubling outflow in spring. The rivers of this mountains has in general higher and stable flows, with a more abundant flow on the western macro-versant than in the provenence depressions.

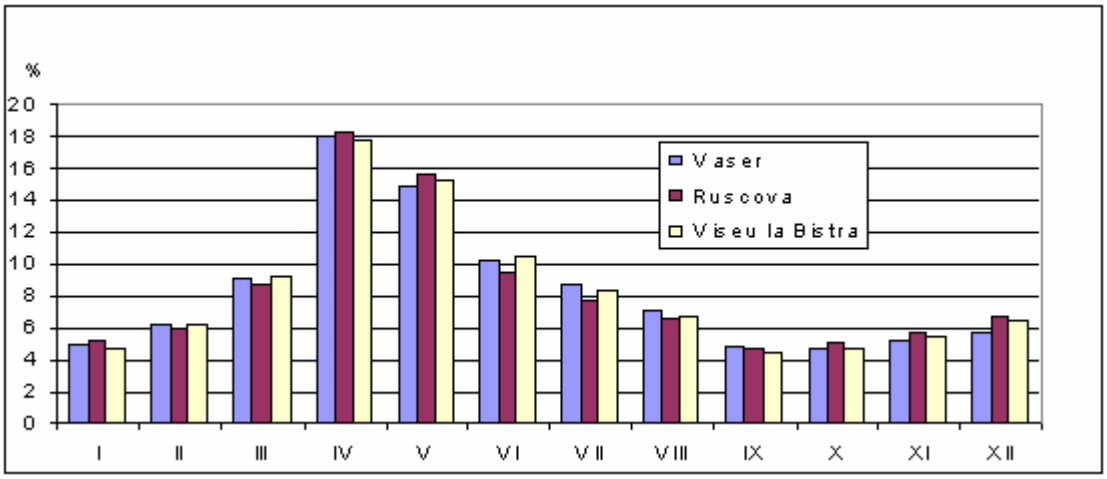

Figure 4: The annual variation of the monthly average flow
on the rivers of the Maramureş Mountains.

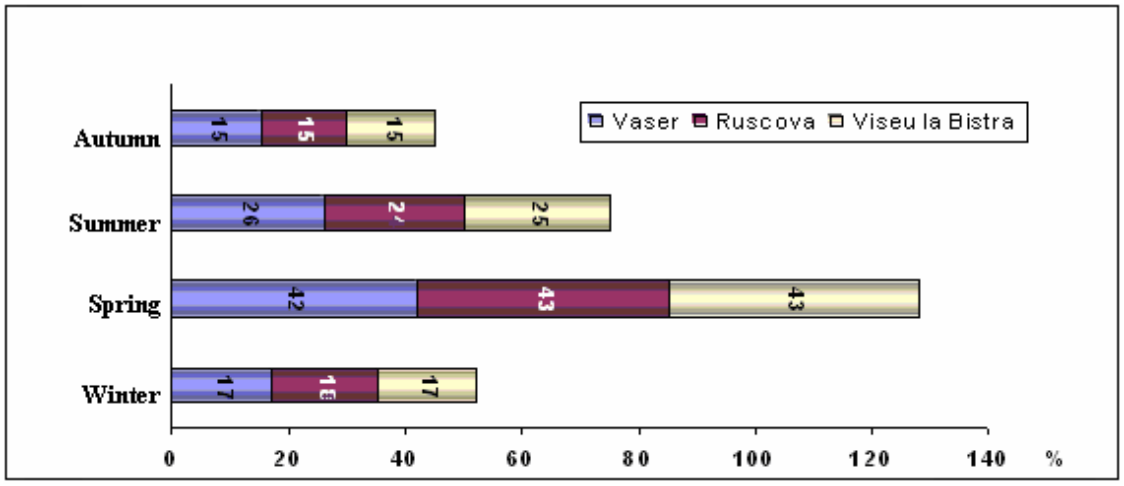

Figure 5: The seasonal average flow (%) on the rivers of the Maramureş Mountains.

The characteristic Carpathian region water supply conditions, induce a varation of the liquid and solid outflow regime from one period to another, with maximum spring flow, when the rains are asociated with the snow melt.

The precipitations repartition, their periodical character and their high quantities, explain the superficial water supply in proportion of 50-70% and it is transposed in the hydrological balance and in the average monthly and seasonal outflow values (Figs. 4 and 5).

CONCLUSIONS

The autochthonous river basins of the Maramureş Mountains have an asymmetrical development. The petrographic zonality and particularities of the climate imposed by geographical position are reflected on the current shape of watersheds, which are situated to east of the morphological alignment, as a result of regressive erosion exercised at the spring areas of the Vaser, Ruscova, Ţâşla and Ţibău rivers, on the erosion forms of the isolated massifs, on the existence of the longitudinal valley corridors, but especially in the territorial distribution of flow. All the hydrographical basins, and therefore those of Maramureş Mountains, can be considered as standard units in the geographical and geo-ecological analyse, but mainly in the hydrological analyse, thinking about the fact that this cumulate and synthesise in it a series of geological, hydrological, vegetation, etc., characteristics, impossible to be deal separately. The Maramureş Mountains environmental conditions offer different individuality to each basin. Each morphohydrographical entity (Ruscova, Vaser, Ţâşla or Ţibău) is lend oneself to a global analyse through correlative researches which endorse alike all the geographical factors, tracking permanently the practice-applicative side through a connection at the sustainable development requirements of the geographic space content in the basin limits.

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POLLEN ANALYSIS OF THE SEQUENCE FROM THE PEAT BOG TĂUL MARE - BARDĂU (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureşului Mountains, Natura 2000 site, glacial cirque, Bardău peat bog, Palynology, Holocene.

ABSTRACT

This paper present the results of the pollen analysis carried on the sequence Tăul Mare - Bardău (1850 m altitude) from the Northern Maramureş Mountains. The peat bog lies on an ancient glacial cirque. The history of the Holocene vegetation in the region, beginning with the Atlantic period (C14: 6090 ± 40 B. P. at 378 cm depth), is described. Within the pollen diagrams there were separated nine pollen zones, which are partially superposed on the last tree classical forest phases - known in the history of the late - and postglacial forests in Romania as *Picea - Quercetum mixtum - Corylus*, *Picea - Carpinus* and *Picea - Fagus - Abies* phases.

RÉSUMÉ: L'analyse palynologique de la séquence du marais Tăul Mare - Bardău (Maramureş, Roumanie).

Dans le papier il sont présentés les résultats de l'analyse palynologique effectuée dans la séquence Tăul Mare - Bardău (1850 m altitude) de Monts Maramureş de Nord. Le marais est situé dans un ancien cirque glaciaire. On décrit l'histoire de la végétation holocène de la région, à partir de l'Atlantique (C14: 6090 ± 40 B. P. à 378 cm de profondeur). Dans les diagrammes obtenus on a séparé neuf zones polliniques, superposées partiellement sur les dernières trois phases silvestres classiques; elles sont connues dans l'histoire des forêts tardi- et postglaciaires de Roumanie sous le nom de *Picea - Quercetum mixtum - Corylus*, *Picea - Carpinus* et *Picea - Fagus - Abies*.

REZUMAT: Analiza palinologică a secvenței din tinovul Tăul Mare - Bardău (Maramureş, România).

În lucrare sunt prezentate rezultatele analizei palinologice, efectuate în secvența Tăul Mare - Bardău (1850 m altitudine), din Munții Maramureşului de Nord. Tinovul este situat într-un fost circ glaciar. Este descrisă istoria vegetației holocene din regiune, începând cu Atlanticul (C14: 6090 ± 40 B. P. la 378 cm adâncime). În diagramele polinice obținute, au fost separate un număr de nouă zone polinice, ce se suprapun parțial peste ultimele trei faze silvestre clasice; acestea sunt cunoscute pentru istoria pădurilor tardi- şi postglaciare din România, sub numele de *Picea - Quercetum mixtum - Corylus*, *Picea - Carpinus* şi *Picea - Fagus - Abies*.

INTRODUCTION

The Maramureş Mountains are, by their location at the northern border of Romania, their large surface, their complex geomorphology with traces of glaciation and their biodiversity, an extremely interesting area from the scientific point of view, which resulted in their recent inclusion in the Natura 2000 sites list.

More or less recent studies have revealed the current biodiversity of flora and fauna of the Maramureş Mountains, but their paleobiodiversity and development towards the current situation is still insufficiently studied. This is one of the reasons for the selection of some peat bogs and ponds, partially or completely choked for pollen studies, during the field campaigns in Maramureş Mountains.

In this paper we refer to the results of the pollen analysis performed in Tăul Mare - Bardău, located below Pietrosul Bardău Peak (1850 m) in the northern Maramureş Mountains. The peat bog Tăul Mare - Bardău (latitudine - 47°50'09"; longitudine - 24°36'01")[1] is located on the top terrace of the glacial cirque Bardău, at an altitude of 1615 m (Figs. 1 and 3).

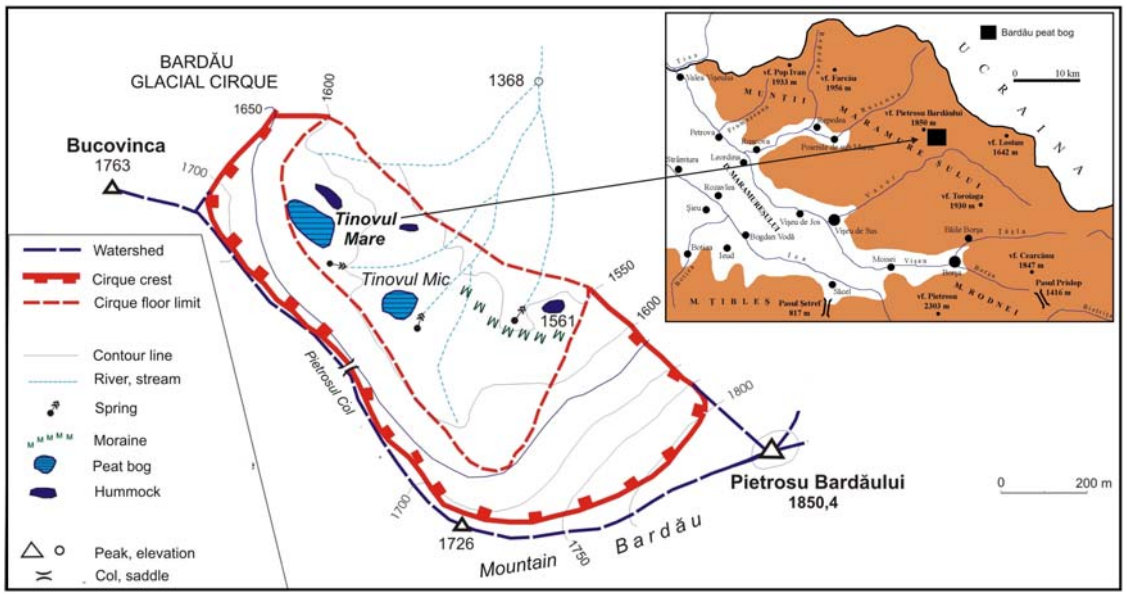

Figure 1: Peat bog location within the glacial cirque, in the northern Maramureş Mountains.

GEOGRAPHICAL AND GEOMORPHOLOGICAL ASPECTS OF THE STUDIED ZONE

Morphometrical data and water analysis. The peat bog has a rectangular shape, with a surface of 8410 m^2 and 375 m perimeter (size that matches a soccer field). As result of the field measurements performed on 20 June 2008, the following values concerning the water chemistry in the central part of the peat bog have been obtained: pH - 3.40, solved oxigen - 8.70 mg/L, electric conductivity - 39 µS/cm. These values, typical to high altitude peat bogs, are a result of climatic conditions and the supplying of the peat bog only from the rainfall water, poor in nutrients.

[1] The measurements were carried out at the emergence of the emissary from the peat bog Tăul Mare - Bardău.

Lithology. The glacial cirque where the peat bog lies is carved in well cemented cenomanian conglomerates, similar to those from Ceahlău Mountains. The hardness of these rocks facilitated the preservation of these barrier basins where peat deposits stored up subsequently (Fig. 2).

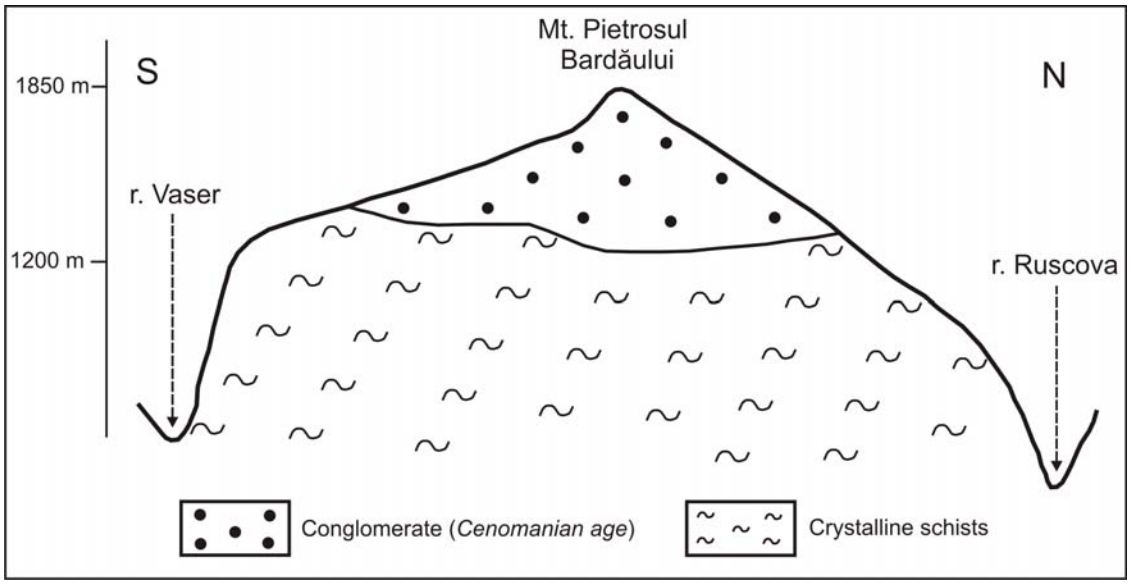

Figure 2: Geological profile through Pietrosul Bardăului Mountain (Mîndrescu).

Relief. At the beginning, the microdepression where the peat bog lies was a glacial barrier basin, carved by the glacier cirque developed there. Its placement on the upper glacial terrace, in the very proximity of the cirque headwall (the side of the cirque) facilitated, by soil erosion at the headwall level, the premature choking of the former glacial barrier basin. Thus, it gradually turned into a high mountain peat bog. Beside the peat bog Tăul Mare, there are another two bogs of smaller size. The second peat bog, known as Tăul Mic and placed on the lower terrace (Fig. 1), is also conspicuous having quite large dimensions (a surface of nearly 5000 m^2). Both of them have glacial origin, which is proven by evidence as the presence of cirque moraine (Sîrcu, 1963), and recently the occurrence of the glacial striation found on a block from the bed of the Tăul Mare peat bog emissary (Mîndrescu, 2006).

Climate. Using climatic data (with the required corrections) from the nearest meteorological station Iezer (Rodnei Mountains, 1785 m altitude), located on the northern slope, the same slope on which Tăul Mare peat bog is located, it seems that the studied site belongs to the *subalpine climate*; it is characterized by low temperatures ($t_{\text{average annual}} = 0.6\ ^{o}C$)[2] during almost the entire year, and rich rainfalls ($Pp_{\text{average annual}} = 1100$ mm), mostly as snow. The climatic conditions, as well as the supplying of the peat bog almost exclusively from rainfalls, led to the building-up of the peat deposits. Thus, after death, instead of decomposition or mineralization the plants enter the process of peat formation.

[2] Annual temperature calculated for the period 1996 - 2006, after the application of the vertical gradient adjustements.

MATERIALS AND METHODS

Cores of peat sediment were taken with a modified Russian corer, up to 380 cm depth, for pollen analysis. These cores were equidistantly sampled in the laboratory, both for chemical preparation in order to obtain the microscopic slides, and for C^{14} dating.

The amount of sediment taken for a sample was, usually, of about 1 cm^3. Chemical preparations were done after Erdtman method (1954), modified according to Goeury and Beaulieu, 1979. Concerning the moss samples from surface or other samples containing various vegetal fibers and coarse rests, the procedure of filtration by bolt of 200 μ caliber was applied.

Figure 3: Tăul Mare - Bardău.

The residues containing pollen grains and spores, obtained as result of chemical preparations, were preserved in pure anhydrous glycerol in Eppendorf microtubes, being subsequently used for the microscopic slides.

Sampling for C^{14} dating was done after a brief preliminary examination of microscopic slides, to assess the most significant levels for vegetation dynamics.

Determinations were done at family, genus or species level. Reading of the microscopic slides was performed on average for 250 pollen grains, regarding tree pollen (A. P. = "arborum pollen") of each slide, plus the corresponding pollen of herbs (N. A. P. = "non arborum pollen") and spores.

Identification of pollen grains was performed using various handbooks and determination keys (Hyde and Williams, 1944; Faegri and Iversen, 1964, 1989; Moore et al., 1991; Punt et al., 1994), but especially after Reille's pollen atlases (1990, 1992, 1995 a, b, 1998, 1999). Nomenclature used for vascular plants is that of Flora Europaea (Tutin et al., 1964-1980).

The database was created with the special pollen software GpalWin (Goeury, 1997) and includes the taxa list (and families, respectively) corresponding to the analyzed sequence, the number of samples and the numerical values obtained for each taxa, and family respectively, of each level in part. For the interpretation of the sporo-pollen results, we followed the method of pollen zones (Birks 1974, 1986), without using numerical methods for zoning. Empirical zoning of diagrams was based on vegetation dynamics, especially according to changes in the frequencies of major pollen taxa.

RESULTS

The stratigraphical study of the cores was accomplished before the laboratory sampling. Its results are presented in the table 1.

Table 1: The stratigraphical aspects of the analyzed cores from Bardău sequence.

Depth (cm)	Microstratigraphical characteristics
0-9	Lacuna in peat sedimentation, only not decomposed *Sphagnum*.
9-30	Light brown peat, very lax, lacunary, slightly decomposed, with many macrorests.
30-60	More compact peat, similar to the one from the above layer.
60-100	Brown, lax peat, lacunary in some parts, with plenty of macrorests.
100-120	Brown peat, more compact, more decomposed, with few macrorests.
120-153	Brown peat, more compact, very unctuous, decomposed, with macrorests.
153-180	Light brown, lax peat, slightly decomposed, with dark intercalations and many macrorests.
180-240	Brown-darkish peat, lax, humid, slightly decomposed, with light intercalations and many macrorests.
240-270	Humid, lax, light brown peat, slightly decomposed, with dark intercalations and many macrorests.
270-300	Humid, dark brown peat, compact, unctuous, with intercalations and few macrorests.
300-332	Brown peat with dark intercalations, ± decomposed, unctuous, semicompact, with fibers and macrorests.
332-338	Brown, compact peat, with dark intercalations and macrorests.
338-360	Brown-darkish peat, unctuous, compact, with microcrystals and macrorests.
360-380	Brown-grayish peat, unctuous, with microcrystals, macrorests and pebbles.

The samples for C14 dating were sent to Poznan Radiocarbon Laboratory (Poland), for their absolute dating using AMS method. C14 dating results can be seen in the table 2.

Table 2: The chronologic aspects of the analyzed cores in the sequence from Bardău - C14 datings; * B. P. = Before Present.

Site and depth (cm)	Laboratory code	Uncalibrated C^{14} Age	Period
Bardău B 260	Poz-26635	2905 ± 30 B. P.*	Subboreal
Bardău B 300	Poz-26636	3285 ± 35 B. P.	Subboreal
Bardău B 340	Poz-26637	5930 ± 40 B. P.	Atlantic
Bardău B 378	Poz-26568	6090 ± 40 B. P.	Atlantic

In the microscopic slides obtained, the following categories of pollen taxa (including families) were identified using the optical microscope:

- tree pollen: a) conifers; b) deciduous;
- shrub pollen;
- herbaceous plants pollen: a) families; b) taxa;
- moss and ferns spores.

Unidentified pollen grains or spores were framed in the category "indeterminable".

By graphical representation of pollen spectra within the data bank sporo-pollen diagrams were obtained, in which each taxon and family are related to the total A. P. + N. A. P. (Figs. 4 and 5). The ratio of A. P. and N. A. P. is also represented in the diagrams, to better illustrate the type of dominant ecosystem, depending on the climatic period.

A number of nine pollen zones were established from base to surface, partially superposed over the last three classical forest phases described by Pop (1929, 1932):

1. The phase of spruce fir with mixed oak and hazel (*Picea - Quercetum mixtum - Corylus*) (9000-5000 B. P.);

2. The phase of spruce fir with hornbeam (*Picea - Carpinus*) (5000-2700 B. P.);

3. The phase of spruce fir - beech - fir tree (*Picea - Fagus - Abies*) (2700 B. P. - present).

The continuous curve of hazel, with high values, suggests the Atlantic age for the beginning of peat storage in the analyzed sequence. As it can be seen in the diagram of tree and shrub pollen (A. P.), the presence of *Picea* in the region is substantial and consistent, higher in value than that of *Corylus*, but lower than that of *Alnus viridis*, which is favoured by both edafic factors and the high altitude of the site, located above the upper limit of spruce forests in the area.

The first pollen zone corresponds to the phase of spruce fir with mixed oak and hazel, also characterized by significant percentages of pollen of *Ulmus* and *Tilia,* among mixed oak, still under-represented because of altitude.

Pine, alder, birch, ash, oak and willow trees are also present in the first pollen zone, still with low percentages. The continuous curve of hornbeam has small values at first, than, towards the end of the interval, exceeds 5%. We also notice the first, constant, occurrences of beech in the pollen spectra of this pollen zone, with low percentages, while fir pollen is absent.

The sudden increase of fern spores in the pollen diagram, as well as the herbaceous pollen with significance of anthropic indicator (*Poaceae, Cyperaceae, Urticaceae, Artemisia, Plantago* and *Cannabis* type), suggests the existence of some clearings, forest cuts, human pressure being still low at the time in the region.

The sub boreal period, and the phase of spruce fir with hornbeam described above, respectively, correspond to the following two pollen zones, while all the other six pollen zones belong to the Subatlantic period and to the phase of spruce fir - beech - fir tree, respectively.

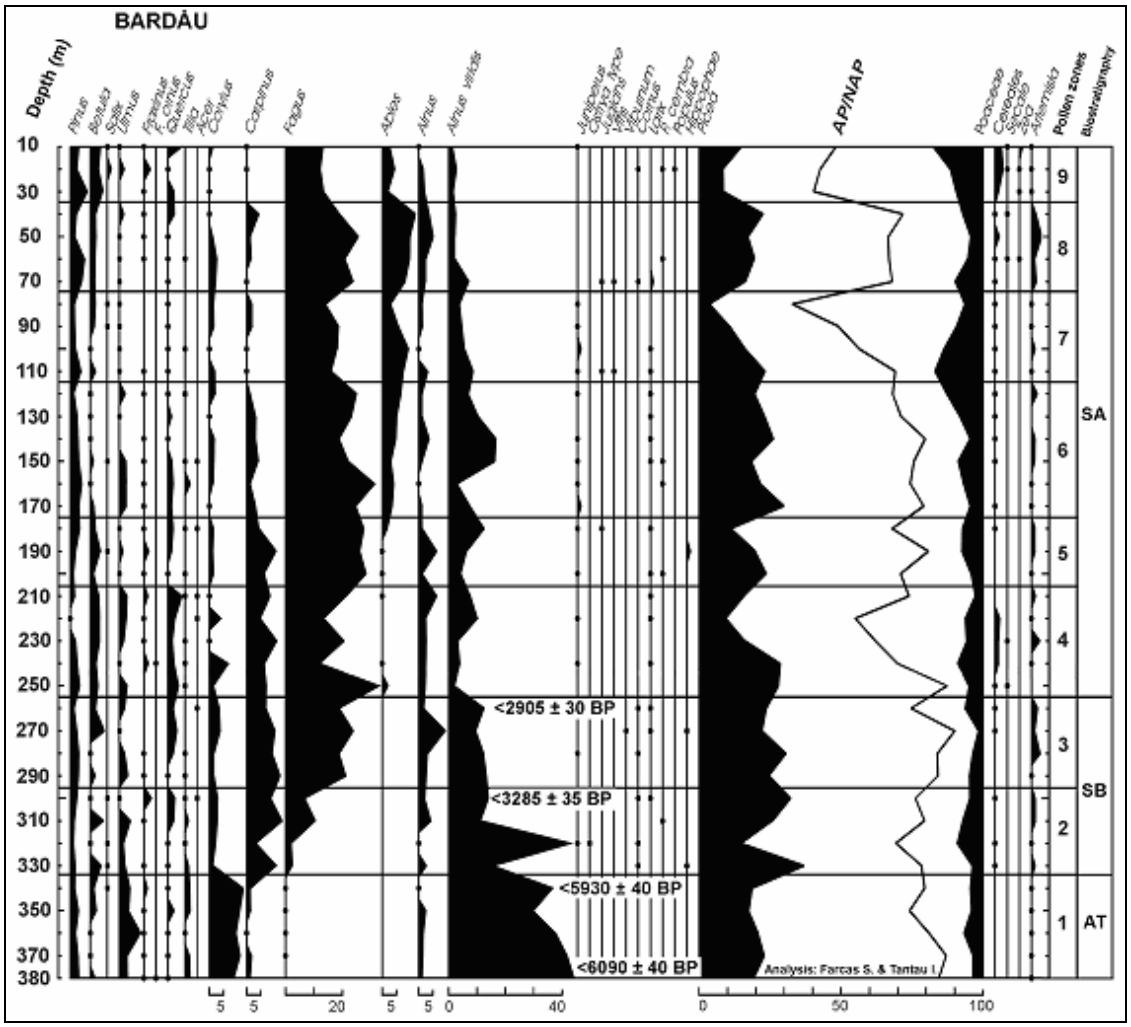

Figure 4: Pollen diagram of tree taxa and the main herbaceous taxa of Tăul Mare - Bardău sequence in Maramureş Mountains.

The main characteristics of the pollen zone two are: the absolute maximum percentage of *Carpinus*, specific to its own phase, the bimaximal curve of *Picea*, a new maximum of *Alnus viridis* percentages, the first maximum, more moderate, of *Fagus* and a dramatic reduction of *Corylus*.

For the rest, the same tree taxa mentioned in the first pollen zone are present with small fluctuations, induced by climate and to a lesser extent by human impact.

Among the herbaceous plants we notice the first appearance of *Cerealia* pollen, and the absolute maximum of fern spores in the sequence.

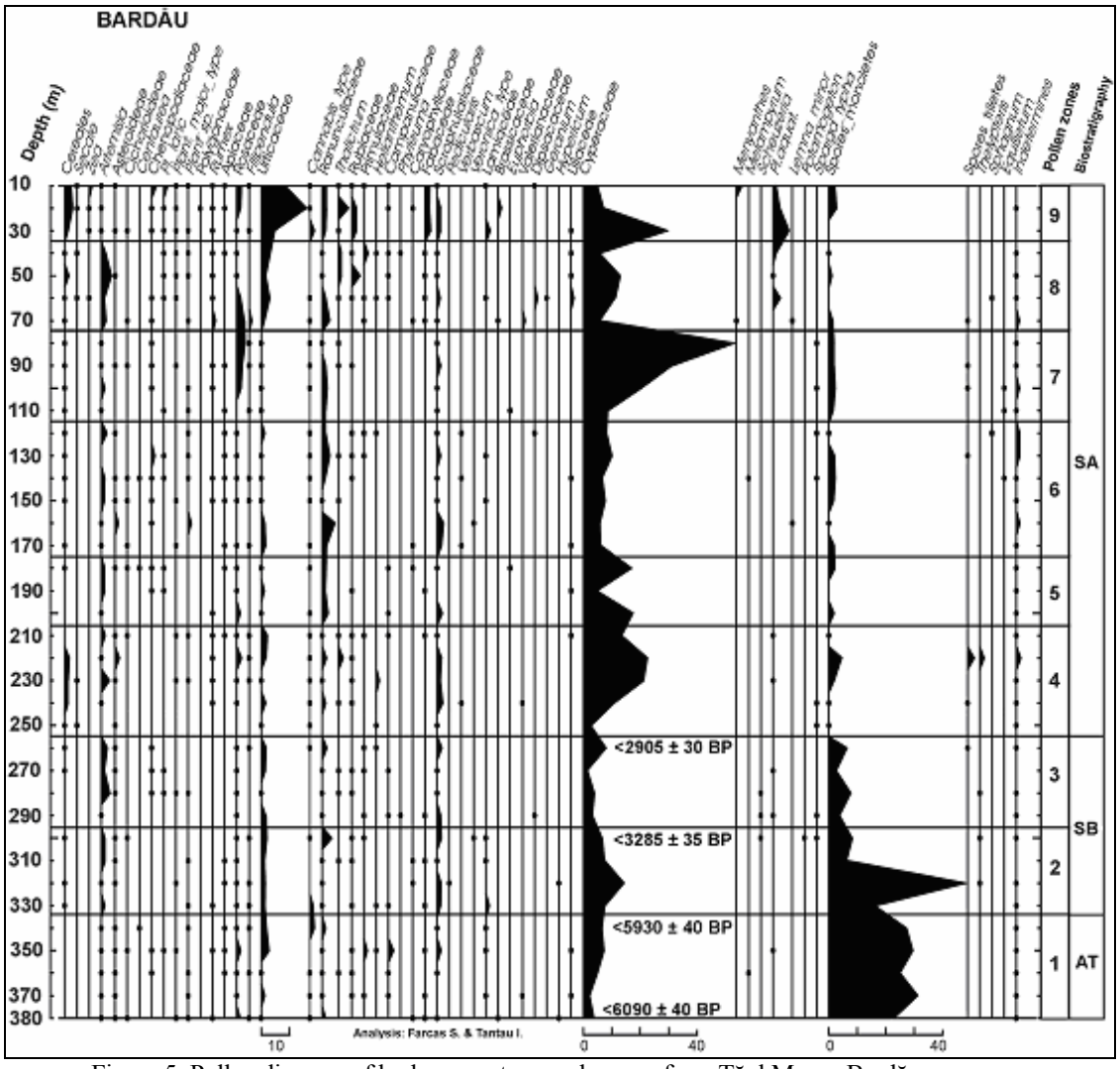

Figure 5: Pollen diagram of herbaceous taxa and spores from Tăul Mare - Bardău sequence.

In pollen zone three the accelerated growth of *Fagus* curve is conspicuous, and contrasts the decreasing one of *Alnus viridis* which, while *Carpinus* and *Picea* are maintaining percentages similar to the previous zone. The decrease in the curves of *Cyperaceae* pollen and fern spores, respectively is also noticeable.

The pollen zone four already belongs to Subatlantic age, the last climatic period of the Holocene, which started around 2700 years B. P. At the beginning of this zone the *Fagus* curve reaches its absolute maximum for this sequence, and also the first appearance of *Abies* pollen, still sporadic and with low values. The curves of hornbeam and spruce fir are maintaining high values in this pollen zone. *Pinus, Betula, Ulmus, Fraxinus, Quercus, Tilia, Corylus, Alnus, A. viridis* are the other tree taxa with constant presence in pollen spectra of this pollen zone, while *Juniperus* and *Larix* appear only sporadically, with very small values. Concerning pollen of herbaceous plants, an increase of the *Cyperaceae* curve is visible, and there is also the first appearance of *Secale* pollen, proving the increase of agricultural activities in the region.

The pollen zone five records the start of the continuous curve of *Abies*. *Fagus* maintain high values, while *Carpinus*, after a new maximum, decreases towards the zone end.

In pollen zone six the ascending curve of *Abies* can be noticed, also the maintenance of *Fagus* at high values with a bimaximal curve, and the decrease of *Carpinus* curve to units. The pollen of herbaceous plants as human impact indicator vary (*Cerealia, Cannabis* type*, Artemisia, Chenopodiaceae, Plantago, Rumex, Apiaceae, Urticacaeae*), even if it doesn't reach high values, except the *Poaceae* and *Cyperaceae* pollen, which is very well represented.

In pollen zone seven, *Abies* reaches a first maximum percentage, while *Fagus* pollen remains relativelly constant, with high values, in the pollen spectra. Towards the end of the interval, a sharp maximum of the *Cyperaceae* pollen can be observed, reflected in the reduction of the curves of the main tree taxa characteristic to this phase, i. e. beech, spruce fir and fir tree. It is the first pollen zone in which the ratio A.P./N.A.P. is favoring the herbaceous plants pollen.

The delimitation of the next pollen zone was based on the increase of *Abies* (that reaches the absolute maximum of the sequence), *Fagus* and *Picea* curves. The phenomenon of "Subatlantic recovery of hornbeam", found in almost all the pollen diagrams from Transylvania and Romanian Carpathians, though much reduced in amplitude because of the site's high altitude, can still be observed. In this pollen zone, like in the next one, "the recovery" of birch and pine cand be noticed, phenomenon induced by human impact. An absolute maximum of the *Artemisia* curve for the entire sequence, also induced by human intervention, is well visible.

In the last pollen zone the reduction of the pollen values of *Fagus, Abies* and *Carpinus,* can be noticed along with the increase of the pollen values of herbaceous plants, indicators of the human impact, like *Cerealia, Urticaceae, Poaceaea, Cyperaceae, Chenopodiaceae, Plantago, Cannabis* type*, Thalictrum, Fabaceae, Brassicaceae* etc.

CONCLUSIONS

In what concerns the dynamic of the main tree taxa in the sequence from Tăul Mare - Bardău, some basic aspects, confirmed by the pollen analysis carried out in the glacial cirque Cristina, situated nearby (Fărcaş et al., 2009 - oral presentation), can be emphasized.

Regarding spruce fir (*Picea*), since the age of the sequence is not old enough, its presence in Lateglacial or at the beginning of the Holocene could not be verified. At maximum depth, 380 cm, the spruce fir values prove its already significant presence in the region, which continues with some oscillations, through the entire sequence.

Mixed oak elements (Quercetum mixtum) appear under-represented in the sequence because of the high altitude of the site. Elm curve (*Ulmus*) is more visible in the base of the sequence. The continuous curve, with substantial percentage values of hazel (*Corylus*), suggest an Atlantic age for the beginning of peat storage in the analyzed sequence.

The absolute maximum of hornbeam (*Carpinus*) percentages, specific to its own phase, is modest, because of the high altitude of the site and of its considerable distance from the hornbeam forests in the region. Beech (*Fagus*) is reported from the base of the sequence, with constant but low percentage appearances. Its curve maintains high values on almost the entire interval, certifying its substantial and not very far presence in the region.

With respect to fir tree (*Abies*) pollen, in the sequence of Bardău the exact date of its first occurrence is not known but it is approximated at about 3000 years ago, close in range with the certification of fir tree in the sequence of Cristina, or from Căpăţâna in the Apuseni Mountains (Fărcaş et al., 2005). C14 dating at the base of the sequence from Tăul Mare - Bardău (6090 ± 40 B. P.) attest its Atlantic age.

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CONSERVATION AND MANAGEMENT OF THE MOUNTAIN PINE HABITAT IN THE MARAMUREŞ MOUNTAINS NATURE PARK (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, Maramureş Mountains Nature Park, *Pinus mugo,* mountain pine, habitat reconstruction.

ABSTRACT

Along the time, mountain pine habitat 4070***** bushes with *Pinus mugo* and *Rhododendron myrtifolium* had a sinuous evolution between the afforestation and nature reserve. One of the oldest protected areas in Maramureş County, and now core area in Maramureş Mountains Nature Park, was set up at county level in 1971 for the protection of *Lyrurus tetrix* and *Pinus mugo* in Cornu Nedeii Ciungii Bălăsînei, after decades of national policy of decreasing the mountain pine surface in favour of subalpine pastures. In this framework, the purpose of this paper is to identify, describe the mountain pine habitats and their evolution till now in the Maramureş Mountain Nature Park and also to draw up some management directions and recommendations.

RÉSUMÉ: Conservation et préservation du biotope du pin de montagne dans le Parc Naturel des Monts du Maramureş (Maramureş, Roumanie).

Au fil du temps, les fourrés à *Pinus mugo* et *Rhododendron myrtifolium* (définis comme l'habitat 4070 dans la liste Natura 2000 - nomenclature EUR 15) ont eu une évolution sinueuse entre des actions de déforestations et un statut de réserve naturelle. Dès 1971 cette zone a été enregistrée parmi les premières zones protégées du département du Maramureş afin de protéger le tétras-lyre (*Lyrurus tetrix*) et le pin mugho (*Pinus mugo*), après des années de déforestations qui avaient pour but d'augmenter la surface des alpages. Cette zone est désormais incluse dans la protection intégrale du Parc Naturel des Monts du Maramureş. Dans ce contexte, l'objectif de ce document est d'identifier et de décrire les tendances du biotope du mugo dans ce Parc Naturel du Maramureş et d'élaborer des recommandations et des orientations de gestion.

REZUMAT: Conservarea şi managementul habitatului jneapănului din Parcul Natural Munţii Maramureşului (Maramureş, Romania).

De-a lungul timpului, habitatul 4070***** tufărişuri cu *Pinus mugo* şi *Rhododendron myrtifolium* a avut o evoluţie sinuoasă între acţiunile de defrişare şi statutul de rezervaţie naturală. Una dintre primele arii protejate din judeţul Maramureş, acum inclusă în zona de protecţie integrală a Parcului Natural Munţii Maramureşului, a fost declarată la nivel judeţean în 1971 pentru protecţia cocoşului de mesteacăn (*Lyrurus tetrix)* şi a jneapănului (*Pinus mugo),* după zeci de ani de defrişare a jnepenişurilor, în scopul creşterii suprafeţei păşunilor alpine. În acest context, scopul acestei lucrări este de a identifica şi descrie evoluţia habitatului jneapănului în Parcul Natural Munţii Maramureşului şi de a elabora recomandări şi direcţii de management.

INTRODUCTION

Mountain pine (*Pinus mugo),* a shrubby procumbent species, endemic on the European continent, has its optimum development in the Carpathians and in the Balkans. It is hard to restructure the full complexity of its evolution and biogeographic implications. There is however, the certainty of the fact that during the last glaciations there was an uninterrupted continuity of mountain pine cover, confirmed by palinological analysis from the Park's eastern peat bogs (Lupşa, 1978).

The area covered today by mountain pine represents only a small part of the range covered a few centuries ago; the main reason for its deforestation was to increase subalpine pastures. In Maramureş County, 80 years ago over 3,500 ha were covered by mountain pine, of which approximately 1,525 ha (43.6%) was set on fire and cleared by 1975 (Plămadă et al., 1977). The clear cuts effects on soils and also on structure and secondary vegetation dynamics have been presented by different naturalist studies (Boşcaiu, 1975; Coldea, 1980; Pânzariu, 1983; Schreiber et al., 1978).

The research on the ecology of the European black grouse (*Lyrurus tetrix*) was the very first which was conducted in the earliest measures in Maramureş County related to the protection of mountain pine habitats (representative habitat for this bird). As a result there was the County Council Decision 127/1971 for the protection of some important natural areas, from which the reserve of Cornu Nedeii Ciungii Bălăsînii (with an initial surface of 800 ha) was set up for the European black grouse.

Later (from 1974 till 1977) the mountain pine habitats from Maramureş Mountains (Gărgălău-Prislop-Cearcănu-Cornu Nedeii area) and Rodna Mountains were the subject of some interdisciplinary research developed by the Centre of Biological Research in Cluj-Napoca and the Laboratory of Physical Geography in Babeş-Bolyai University Cluj-Napoca.

After this research the Executive Committee of Maramureş County Council decided to forbid mountain pine cutting in the entire county and also to extend the reserve area to 2,400 ha. This reserve is recognised by the Law 5/2000, but it is limited only to the initial area of 800 ha.

Following the project Phare Credo no. 98-RO/UA-25-S-04, whose main objective was to create the transboundary Romanian-Ukrainian biosphere reserve Maramureş Mountains, the fauna reserve Cornu-Nedeii-Ciungii Bălăsînii was included as a core area (Moisei, 2000) and then by the Government Decision 2151/2004 it was included as a core area in the Maramureş Mountains Nature Park.

By the Order of Ministry of Environment and Sustainable Development no. 1964/2007 about 70% percent of the Maramureş Mountains Nature Park is designated as a site of community interest, having the code RO SCI 0124 - Maramureş Mountains.

In the declaration process an important role was played by the existence of priority habitat *4070** - bushes with *Pinus mugo* and *Rhododendron myrtifolium,* on which the structure and management this paper will insist, as a first contribution to a study begun as the Phd. thesis of the author.

MATERIALS AND METHODS

Focusing on the habitat *4070*,* we used the speciality literature for a synthetic description of it's structure and of the management measures applied till now for reconstruction and improvement of mountain pine habitats conservation status in the studied area.

Then, by field identification and correlation with Corine Landcover Habitats map, the entirely mapping of this habitat in the Maramureş Mountains Nature Park was realised. For this purpose we also used satellite images and forest management plans for realising a mountain pine map for the Park which includes about 2,400 ha.

In order to monitor the evolution of the conservation status of this habitat, two monitoring protocols were elaborated whose main purpose was to identify the large scale changes of the habitat. For assuring the coherence of data collection, standard sheets for data collection were elaborated which complete the instructions from the protocols. The first *4070** habitat monitoring protocol regards the evolution of mountain pine areas using the satellite images and the second one is based on comparing fix point photos using the same camera and objective.

RESULTS AND DISCUSSIONS

From a phytosociological point of view, the following cenotaxa correspond to this habitat type: *Rhododendron myrtifolii-Pinetum mugi* Borza 1959, em. Coldea 1995 (syn.: *Pinetum mugi carpaticum* auct. rom., *Calamagrostio villosae-Pinetum mugo* Sanda and Popescu 2002 in Doniță et al., 2005), for most of the areas in the Carpathian Mountains, and for the situations when the first species is missing *Vaccinio myrtilli-Pinetum mugo* Hadač, 1956 (Gafta and Mountford, 2008).

According to Coldea (Coldea et al., 1978), in the cenotic structure of mountain pine habitats in Maramureş there are three well defined layers: shrub layer, herb and moss layer. The shrub layer is dominated almost exclusively by *Pinus mugo.* In the herb layer there are: *Vaccinium myrtillus*, *V. vitis-idaea*, *Empetrum nigrum*, *Calamagostris arundinacea*, *Deschampsia caespitosa*, *D. flexuosa* and *Listera cordata.* The moss layer is mostly formed by: *Sphagnum nemoreum*, *S. rusowii*, *S. quinquefarium*, *Hylocomium splendens*, *Dicranum scoparium*, *Pleurozium schreberi*, *Polytrichum strictum*, *Pholia sphagnicola.*

This habitat fragmentation is increased due to human interventions. Inside Maramureş Mountains Nature Park boundaries are lots of mountain pine islands, especially distributed on high slope mountains, where accessibility is reduced. The biggest compact area of mountain pine from this area is situated on Jupania massif where we estimate there are about 470 hectares.

Regarding natural regeneration from seed, that is happens only haphazardly in the shelter of mountain pine massifs, being very low in areas affected by deforestation (Zeriu et al, 1978).

Studies regarding vegetative regeneration (using branches) showed that regeneration is possible but with a low speed of advancement that would require at least one century for expansion of the mountain pine by about 100 m (Pânzariu, 1983).

The solution is artificial regeneration, by planting saplings grown in seed beds. At Borşa Forest District, artificial regeneration of mountain pine was studied: cone harvesting, seed storage, determination of seed qualitative indicators, germination stimulation, sowing technique and sapling removal continued by plantation showed that mountain pine saplings became viable after five years and that in experimental house lots at Pietrosu Mare, the rate of success was 76%.

In Cornu Nedeii area, with direct coordination of Mr. eng. Pînzaru, a pilot mountain pine plantation was established, which is now more than 20 years old, where mountain pine and arolla pine saplings (*Pinus cembra)* were planted on 0.2 ha.

At the international seminar regarding Natura 2000 sites management (October 2006, Galway, Ireland), recommendations were made regarding 4070* habitat management, with the main purpose to keep the habitats in a favourable conservation status (Pop and Florescu, 2008).

Another recommendation was regarded the reconstruction of areas formerly covered by mountain pine and now with high erosion risk. Such an area in the Maramureş Mountains Nature Park is the torrential Vinderel Basin, part of Repedea River basin. In the past in this torrential basin the wooden vegetation was cut for increasing alpine pasture and nowadays the surface and depth erosion has amplified and has an important impact on the entire landscape.

To reduce the torrentiallity in the area, the park administration, within the project GEF-UNDP no. 41462, realised a pilot project on ecological reconstruction of *4070** priority habitat. In the autumn of 2008 a plantation on 1.2 ha was created in Production Unit 3 Repedea, Forest District Ruscova (at 1,800 m altitude). 3,000 mountain pine saplings with soil pack were planted in irregular hollows. The saplings were seven years old and were obtained by seeds from Cornu Nedeii Ciungii Bălăsînii nature reserve and grown in Borşa Forest District nursery. After a first evaluation (May 2009) the rate of success is only of 40%.

Once the reconstruction project for the habitat 4070* is finished, a monitoring protocol is need in order to measure the success of regeneration and of herb and moss layers installed in the phytocenosis. This monitoring protocol, with information regarding the structure and area covered by mountain pine, will be part of the 4070* habitat conservation plan.

It is necessary to apply at the park scale some methods for the protection of the habitat presented here, methods destined to improve the conservation status. Common and specific methods will be elaborated in future related to habitat extension, endangered species, topology, amplitude and aggressively of potentially destructive activities, land owners, resources valorization, expenses etc., according to the scheme proposed by Stăncioiu et al. (2008). Some general measures will also be taken into account, as follow: enclosure of experimental house lots, strict control of cattle grazing, control of wild hoofed animals, permanent guard, control of tourism in the area, strictly control of any new building in the area, etc.

In order to assure a relevant assessment of habitats status we developed two monitoring protocols. Once elaborated and tested, the monitoring protocols can be used for a long period of time, and can offer a time scale evolution of habitats related to management activities. It will also create an additional database containing field data as: surface, composition in species, changes in time on different parameters.

The protocols will offer the most sensitive feed-back of the activities developed in the park area and about their influence on mountain pine habitat. The habitat monitoring main purpose is to assess how the conservation objective was achieved. Also the monitoring results can provide the park management direction to follow in order to assure a good conservation status of habitats. The two protocols designed for mountain pine monitoring are briefly presented in the table 1.

Table 1: The monitoring protocols for mountain pine.

Protocol no.	1	2
Title	Mountain pine monitoring protocol 1	Mountain pine monitoring protocol 2
Priority	1	1
Monitoring questions addressed		
Indicator	Mountain pine surface	
Justifications	European priority habitat with diverse functions as: water regime control, anti-erosion role, fixation and stabilization of the snow layer, conservation role of the genetic fond of some Carpathian ecosystems and habitat of some fauna species, such as Black Grouse. Decreasing of mountain pine surface can be use like an indicator of habitat deterioration.	
Attribute	Changes in the mountain pine surface.	
Sampling protocols		
Number of plots/sites for monitoring	20 fix points.	Equal with number of mountain pine islands.

Distribution and selection of plots/ sites for monitoring	Randomised.	Every surface will be considered as a plot.
Size of plots/sites for monitoring	Size of the plots will be according to objective wideness.	Equal with the size of mountain pine islands
Location/marking of specific plots	Will be fixed in the field and on the map all 20 points. In the field will be used metal support for fixing the photo camera, as permanent marker.	Every plot will be marked only on the map. The limits will be drawing in G. I. S.
Data collection protocols		
Detailed information on what data is collected, and how	Population surfaces and coverage degree. Species composition. Invasion of spruce and junipers.	The limits of every island of mountain pine will be drawing up using G. I. S. programmes and having as base the satellite images.
Data collection formats	Pictures will be compared, considering data of taking them.	Data will be collected in electronic data base, as polygons.
Quality assurance and standardization mechanisms	The pictures will be taken periodically by the same person from the same fix point.	The analyse will be made for all satellite images by the same person and using the same accuracy level.
Frequency and timing of repeat monitoring	The survey will be completed once at every three years.	Once at 10 years the park will achieved the satellite images.
Data management and analysis protocols		
Data storage and management information	The pictures will be managed by the park administration personal. Also it will be done electronic backup copies hold in safe places.	Data will be stored in electronic format and a backup copy will be hold in a safe place.
Data analysis procedures and details of statistical methods to be used	Changed in surface and coverage will be marked onto the picture.	The satellite images will be analysed using spectral analyse tool and mountain pine limits will be stored as a polygon.
Report format and process for communicating results to management	Reports will be made every three years. They will be short and clear showing the changes appeared and also will include some short time management recommendations.	Reports will be made once at ten years. It will include a map showing evolution of mountain pine limits in time and a brief analysis and some management recommendations.
Resource allocation protocols		
Human resources	The park biologist or a ranger will complete the survey.	The park IT stuff and biologist.
Time resources	Field activities about 5 days at every 3 years. Another 2 days are needed for data analyse and reporting.	Office activities for 10 days.
Resources/equipment required	Maps, GPS, camera, monopod, etc.	Satellite images, computer, soft for analyse.
Equipment maintenance or calibration	Camera maintenance will be done by the person who applies the protocol.	The computer will be maintained by the park stuff responsible with this.

CONCLUSIONS

As at national level, the area covered by mountain pine in Maramureş Mountains Nature Park decreasing significantly due to anthropic reasons, now being about 2,400 ha.

Due to its conservative value and to multiple functions of the habitat 4070*, attention related to protection and regeneration on mountain pine areas existed before 1989. Lately this attention increased in national and international projects or as a result of setting up the park.

Management measures, mapping the areas covered by mountain pine, ecological reconstruction (on 1.2 hectares in the torrential Vinderel Basin) and elaboration of the two conservation status monitoring protocols are unique elements but based on previous studies and correlated with the actual status of the Maramureş Mountains Nature Park.

The main argument for the efforts made in the conservation of this habitat type could be its Tardiglacial origin and the fact that its regeneration will need a new Tardiglacial, as said three decades ago the academician Nicolae Boşcaiu.

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RARE, ENDANGERED AND ENDEMIC SPECIES OF PLANTS OF THE CHYVCHYNY/CIVCIN MOUNTAINS (CARPATHIANS)

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KEYWORDS: Carpathians, Chyvchyny/Civcin Mountains, sozological lists, endemic taxons, protection.

ABSTRACT

Information about studying of taxonomical structure of rare and endemic species of the Chyvchyny/Civcin Mountains is given. It was determinate, that there are 16 species and subspecies, which were included in the international sozological lists: IUCN Red List of Threatened Plants, European Red List, Bern Convention, Habitat Directive; 57 species included to the Red Data Book of Ukraine (1996); 50 species and subspecies included to Red Data Book of Romania (Dihoru and Dihoru, 1994) and 36 endemic taxons. It was proposed to create an Ukrainian-Romanian nature reserve to organize the monitoring of the phytodiversity in the region.

RÉSUMÉ: Espèces de plantes rares, périclitées et endémiques des Montagnes de Chyvchyny/Civcin (Carpathes).

On a présenté les résultats des recherches de la composition taksonomyque des espèces des plantes rares, disparaissantes et endémiques des montagnes Chyvchyny/Civcin. Il est constaté que 16 espèces et variétés sont portées aux registres officiels internationaux sozologiques (IUCN Red List of Threatened Plants, ERL, Bern Convention, Habitat Directive), 57 espèces - au livre Rouge de l'Ukraine (1996); 50 espèces et variétés - au registre Rouge de la Roumanie (Dihoru and Dihoru, 1994), et aussi 36 taksones endémiques. On a proposé de créer le réservât naturel ukrainien - roumain pour organiser l'observation de l'état de phytovariation dans la région.

REZUMAT: Specii de plante rare, periclitate şi endemice din Munții Civcin (Carpați).

Sunt prezentate rezultatele cercetărilor compoziției taxonomice plantelor rare, periclitate şi endemice ale Munților Civcin. Sa stabilit că în regiune se află 16 specii şi subspecii, care sunt incluse în listele oficiale internaționale sozologice: Lista Roşie a Plantelor Amenințate UICN, Lista Roşie Europeană, Convenția de la Berna, Directiva Habitate, 57 de specii sunt incluse în Cartea Roşie a Ucrainei (1996), 50 de specii şi subspecii, care sunt incluse în Lista Roşie a României (Dihoru and Dihoru, 1994), şi 36 de taxoni endemici. Au fost făcute propuneri pentru crearea unei rezervații naturale bilaterale Ucrainene - Române pentru organizarea monitoringului stării fitodiversității în această regiune.

INTRODUCTION

The Chyvchyny/Civcin Mountains are situated on the north of Marmarosky/Maramureş crystalline mountains, their main part is in Romania. They are situated near the sources of Bilyi Cheremosh/Ceremuşul Alb, Chornyi Cheremosh/Ceremuşul Negru and Wasser/Vaser rivers. It is one of the Ukrainian Carpathian's floristic richest areas due to the presence of a high number of the limestone areas. A large part of the Chyvchyny/Civcin Mountains acquaint with temperate heights, which accordance with forest belt, and only some tops (of the north of mountain range and the tract of land Komanova-Palenytsa-Gnetesa and the mountain Preluki/Preluca on its southeastern edge) belongs to subalpine belt.

Botanical investigation were started on this region in the XIX century and is related with names of Austrian, Polish and Ukrainian botanists (Rheman, 1868; Woloszczak, 1888; Zapalowicz, 1889), the name Chyvchyny Mountains was introduced by the last one in literature. In 20-30 years of the XX century the Polish botanists B. Pawlowski, J. Walas, J. Madalski and some others were working there. The results were a great number of herbarium materials and two fundamental publications with the analysis of the flora and vegetation: “Ogólna charakterystyka geobotaniczna gór Czywczyńskich” (Pawlowski, 1948) and “Les associations des plantes vasculairies des Monts de Czywczyn” (Pawlowski and Walas, 1949).

The Ukrainian-Romanian boundary crosses the Chyvchyny/Civcin Mountains range and according to this during the soviet times the investigation of this region was stopped. Because of economical character reasons the household activity was stopped, and vegetation suffered the remutation processes. Instead of this it was intensified scientific activity in this region. Partly connected with the planning of two national nature parks “Cheremoskyi” (on the Chernivtsy region) and “Verchovynskyi” (on the Ivano-Frankivsk region). After their creation it can be created in the region a bilateral Ukrainian-Romanian nature reserve. During the last years it was investigated rare components of the Chyvchyny/Civcin Mountains flora. The ideas of these researches were the preparing of the substantiation for creating of these parks. The results of these investigations are given in this article.

MATERIALS AND METHODS

Proposed in this article is the list of species resulted as floristic researches, which was realized by the authors using the route and half stationary methods, analyzing of herbarium materials (CHER, KW, LW, LWS) and literature sources. To the number of sozophytes were included species and subspecies recorded from the World Red List (Walter, 1998), the European Red List (1991), Bern Convention (Appendix I, 1999), Habitat Directive (Appendix II and IV), the Red Data Book of Ukraine (1996), Red List (Dihoru and Dihoru, 1994), Red List of Vascular Plants of the Carpathian Mountains (Tasenkevich, 2002), the list of ranged plant species of the Ukrainian Carpathians (Malinovski et al., 2002) and the Carpathians endemics. The nomenclatures of taxons are according to Tasenkevich (1998).

RESULTS

The list complied by us consists of 134 species and subspecies of rare, endangered and endemic species of vascular plants (Tab. l), which belong to 37 families. 13 taxons were found on the Ukrainian part of the Chyvchyny/Civcin Mountains at first by us: *Ophioglossum vulgatum, Aster alpinus, Cirsium helenioides, Crepis jacquinii, Ligularia sibirica, Gentiana utriculosa, Polemonium caeruleum, Colchicum autumnale, Dactylorhiza saccifera, Microstilis monophyllos, Orchis ustulata, Typha schuttleworthii.* Three of these species are new taxa of the Ukrainian flora (*Crepis jacquinii, Gentiana utriculosa* and *Dactylorhiza saccifera*) and two new to the flora of the Ukrainian Carpathians (*Ligularia sibirica* and *Polemonium caeruleum*).

Table 1: Sozophytes of the Chyvchyny/Civcin Mountains' flora.

No.	Taxa	IUCN	ERL	B. C.	H. D.	RDBU 1996	List 1994	Tasenkevich	Malinovski	endemic
1	2	3	4	5	6	7	8	9	10	11
	1. Lycopodiaceae									
1.	*Diphasiastrum alpinum* (Linnaeus) Holub	-	-	-	-	-	-	-	+	-
2.	*Huperzia selago* (L.) Bernh. ex. Schrank and C. Mart.	-	-	-	-	+	-	-	+	-
3.	*Lycopodium annotinum* L.	-	-	-	-	+	-	-	+	-
	2. Selaginellaceae									
4.	*Selaginella selaginoides* (L.) C. Mart.	-	-	-	-	+	-	-	+	-
	3. Ophioglossaceae									
5.	*Botrychium lunaria* (L.) Sw.	-	-	-	-	+	-	-	+	-
6.	*B. matricariifolium* (A. Braun ex Doll) W. D. J. Koch	-	-	+	-	-	+	+	+	-
7.	*B. multifidum* (S. G. Gmel.) Rupr.	-	-	+	-	-	+	+	+	-
8.	*Ophioglossum vulgatum* L.	-	-	-	-	-	-	-	+	-
	4. Woodsicaceae									
9.	*Athyrium distentifolium* Tausch ex Opiz	-	-	-	-	-	+	-	-	-
10.	*Cystopteris alpina* (Lam.) Desv.	-	-	-	-	-	-	-	+	-
11.	*C. montana* (Lam.) Bernh. ex Desv.	-	-	-	-	-	-	-	+	-
12.	*C. sudetica* A. Braun and Milde	-	-	-	-	-	+	-	+	-
	5. Pinaceae									
13.	*Pinus cembra* L.	-	-	-	-	+	+	-	-	-
	6. Apiaceae									
14.	*Conioselinum tataricum* Hoffm.	-	-	-	-	-	+	+	-	-
15.	*Heracleum carpaticum* Porcius	+	+	-	-	-	+	+	+	+
16.	*H. sphondilium* L. subsp. *transsilvanicum* (Schur) Brummitt	-	-	-	-	-	-	-	+	+
	7. Asteraceae									
17.	*Achillea oxyloba* (D. C.) Schultz Bip. subsp. *schurii* Schultz Bip. Heimerl (*Ptarmica tenuifolia* (Schur) Schur)	+	-	-	-	+	+	+	+	+
18.	*Arnica montana* L.	-	-	-	+	+	-	-	+	-
19.	*Aster alpinus* L.	-	-	-	-	+	-	-	+	-
20.	*Carduus glaucinus* Holub (*C. defloratus* L. subsp. *glaucus* (Baumg.) Nyman)	-	-	-	-	-	-	-	+	-
21.	*C. kerneri* Simonkai subsp. *kerneri*	-	-	-	-	-	-	-	+	+
22.	*Centaurea kotschyana* Heuff.	-	-	-	-	-	+	-	+	-
23.	*C. marmarosiensis* (Jav.) Czerep.	-	-	-	-	-	+	-	+	+
24.	*C. phrygia* L. subsp. *carpatica* (Porc.) Dostál	-	-	-	-	+	+	-	+	+
25.	*Cirsium helenioides* (L.) Hill. (*C. heterophyllum* (L.) All.)	-	-	-	-	-	-	-	-	-
26.	*Crepis jacquinii* Tausch.	-	-	-	-	-	-	-	+	-
27.	*Leontodon repens* Schur.	-	-	-	-	-	-	-	+	+
28.	*Leontopodium alpinum* Cass.	-	-	-	-	+	+	+	-	-
29.	*Ligularia sibirica* Cass.	-	-	+	+	+	+	+	+	-
30.	*Saussurea discolor* (Willd) D. C.	-	-	-	-	+	-	+	+	-
31.	*S. porcii* Degen	-	+	-	-	+	+	+	+	+

1	2	3	4	5	6	7	8	9	10	11
	8. Boraginaceae									
32.	*Pulmonaria filarszkiana* Jáv.	-	+	-	-	-	+	-	+	+
	9. Brassicaceae									
33.	*Cardaminopsis neglecta* (Schult.) Hayek	-	-	-	-	-	+	-	+	-
34.	*Erysimum wittmannii* Zawadski subsp. *transsilvanicum* (Schur) P. W. Ball	-	-	-	-	-	-	-	+	+
35.	*Thlaspi pawlowskii* Dvoracova	-	-	-	-	-	-	-	+	+
	10. Campanulaceae									
36.	*Campanula patula* L. subsp. *Abietina* (Griseb.) Simonkai	-	-	+	-	-	-	-	+	-
37.	*C. serrata* (Kit. ex Schult.) Hendrych	-	-	-	+	-	-	-	-	-
38.	*Phyteuma spicatum* L.	-	-	-	-	-	+	-	-	-
39.	*Ph. tetramerum* Schur	-	-	-	-	-	-	-	+	+
40.	*Ph. vagneri* A. Kern.	-	-	-	-	-	-	-	+	+
	11. Caryophyllaceae									
41.	*Dianthus superbus* L. subsp. *speciosus* (Rchb.) Pawl.	-	-	-	-	-	-	-	+	-
42.	*D. tenuifolius* Schur	-	-	-	-	-	+	-	+	-
43.	*Minuartia verna* (L.) Hiern. subsp. *oxypetala* (Wol.) Hall.	-	-	-	-	-	-	-	+	+
44.	*Silene nutans* L. subsp. *dubia* (Herbich) Zapal.	-	-	-	-	-	-	-	+	+
45.	*Silene zawadskii* Herbich	+	+	-	-	+	+	+	+	+
	12. Crassulaceae									
46.	*Jovibarba hirta* (L.) Opiz subsp. *Glabrescens* (Sabr.) J. Holub	-	-	-	-	-	+	-	+	-
	13. Dipsacaceae									
47.	*Scabiosa lucida* Vill. subsp. *barbata* E. I. Nyárády	-	-	-	-	-	+	-	+	+
	14. Empetraceae									
48.	*Empetrum nigrum* L. subsp. *hermaphroditum* Hagerup (Bőher)	-	-	-	-	-	+	-	-	-
	15. Ericaceae									
49.	*Andromeda polyfolia* L.	-	-	-	-	-	+	+	-	-
50.	*Ledum palustre* L.	-	-	-	-	-	+	+	-	-
51.	*Vaccinium microcarpus* (Turcz. ex Rupr.) Schmalh. (*Oxycoccus microcarpus* Turcz. ex Rupr.)	-	-	-	-	+	+	+	+	-
52.	*Vaccinium oxycoccus* L. (*Oxycoccus palustris* Pers.)	-	-	-	-	-	+	+	-	-
53.	*Rhododendron myrtifolium* Schott and Kotschy	-	-	-	-	+	-	-	+	-
	16. Euphorbiaceae									
54.	*Euphorbia carpatica* Wol.	-	-	-	-	-	+	+	+	+
55.	*E. sojakii* (Chrtek and Krisa) Dubovik (*E. austriaca* A. Kerner)	-	-	-	-	-	-	-	+	+
	17. Gentianaceae									
56.	*Gentiana acaulis* L.	-	-	-	-	+	-	-	+	-
57.	*G. punctata* L.	-	-	-	-	+	-	-	+	-
58.	*G. urticulosa* L.	-	-	-	-	-	-	-	+	-
59.	*Swertia alpestris* Baumg.	-	-	-	-	+	-	-	+	-
60.	*S. perennis* L.	-	-	-	-	+	-	-	+	-
	18. Lamiaceae									
61.	*Thymus pulcherrimus* Schur subsp. *pulcherrimus*	-	-	-	-	-	-	-	-	+
	19. Lentibulariaceae									
62.	*Pinguicula alpina* L.	-	-	-	-	+	-	-	+	-
	20. Menyanthaceae									
63.	*Menyanthes trifoliata* L.	-	-	-	-	-	+	-	-	-

1	2	3	4	5	6	7	8	9	10	11
	21. Polemoniaceae									
64.	*Polemonium caeruleum* L.	-	-	-	-	-	+	-	-	-
	22. Primulaceae									
65.	*Lysimachia nemorum* L.	-	-	-	-	-	+	-	-	-
66.	*Primula elatior* (L.) Hill subsp. *poloninensis* (Domin) Dostál	-	+	-	-	-	-	-	+	+
	23. Ranunculaceae									
67.	*Aconitum anthora* L. subsp. *jacquinii* (Rchb. ex Beck) Domin	-	-	-	-	+	-	+	+	-
68.	*Aconitum bucovinense* Zapal.	-	-	-	-	-	-	-	+	+
69.	*A. degenii* Gayer subsp. *degenii*	-	-	-	-	-	-	-	+	-
70.	*A. napellus* L. subsp. *firmum* (Rchb.) Gáyer	+	-	-	-	-	-	-	+	-
71.	*A. moldavicum* Hacq. ex Rchb. subsp. *hosteanum* (Schur) Asch. et Graebn.	-	-	-	-	-	-	-	+	+
72.	*Anemone narcissiflora* L.	-	-	-	-	+	-	-	+	-
73.	*Aquilegia nigricans* Baumg. subsp. *nigricans*	-	-	-	-	+	-	-	+	-
74.	*Cimicifuga europaea* Schipcz.	-	-	-	-	-	-	+	-	-
75.	*Delphinium elatum* L. subsp. *elatum*	-	-	-	-	+	-	-	+	-
76.	*D. elatum* L. subsp. *nacladense* (Zapal.) J. Holub	-	-	-	-	-	-	-	+	+
77.	*Pulsatilla alba* Rchb.	-	-	-	-	+	-	-	+	-
78.	*Ranunculus carpaticus* Herbich	-	-	-	-	-	-	-	+	+
79.	*Trollius europaeusi* L. *transsilvaticus* (Schur) Domin	-	-	-	-	-	-	-	+	+
	24. Rubiaceae									
80.	*Galium anisophyllon* Vill.	-	-	-	-	-	-	-	+	-
81.	*G. pawlowskii* Kukova	-	-	-	-	-	-	-	+	+
82.	*G. transcarpaticum* Stojko and Tasenkevich	-	-	-	-	-	-	-	+	+
	25. Saxifragaceae									
83.	*Chrysosplenium alpinum* Schur	-	-	-	-	-	+	-	+	+
84.	*Saxifraga androsacea* L.	-	-	-	-	+	-	-	+	-
85.	*S. corymbosa* Boiss (*luteoviridis* Schott and Kotschy)	-	-	-	-	+	-	-	+	-
	26. Scrophulariaceae									
86.	*Euphrasia kerneri* Wettst.	-	-	-	-	-	+	-	-	-
87.	*Melampyrum saxosum* Baumg.	-	-	-	-	-	-	-	+	+
88.	*Tozzia alpina* L. *carpatica* (Wol.) Pawl. et Jas.	-	-	-	+	-	-	-	+	-
89.	*Veronica baumgartenii* Roem. and Schult.	-	-	-	-	-	+	-	+	-
	27. Solanaceae									
90.	*Scopolia carniolica* Jacq.	-	-	-	-	+	-	-	+	-
	28. Violaceae									
91.	*Viola declinata* Waldst. and Kit.	-	-	-	-	-	-	-	+	+
	29. Alliaceae									
92.	*Allium victorialis* L.	-	-	-	-	-	+	-	+	-
	30. Amaryllidaceae									
93.	*Galanthus nivalis* L.	-	-	-	-	-	-	-	+	-
	31. Cyperaceae									
94.	*Carex bigelowii* Torr. ex Schwein.	-	-	-	-	-	+	-	+	-
95.	*C. buxbaumii* Wahlenb.	-	-	-	-	+	+	+	+	-
96.	*C. capillaris* L.	-	-	-	-	-	+	-	-	-
97.	*C. limosa* L.	-	-	-	+	-	+	+	-	-
98.	*C. pauciflora* Lightf.	-	-	-	-	+	-	-	+	-
99.	*C. rupestris* All.	-	-	-	-	+	+	+	+	-
100.	*C. umbrosa* Host	-	-	-	-	+	-	-	+	-

1	2	3	4	5	6	7	8	9	10	11
	32. Iridaceae									
101.	*Crocus heuffelianus* Herb.	-	-	-	-	+	-	-	+	-
102.	*Gladiolus imbricatus* L.	-	-	-	-	-	+	-	+	-
103.	*Iris sibirica* L.	-	-	-	-	-	+	-	+	-
	33. Juncaceae									
104.	*Juncus castaneus* Smith.	-	-	-	-	-	+	-	+	-
	34. Liliaceae									
105.	*Colchicum autumnale* L.	-	-	-	-	+	-	-	+	-
106.	*Lilium martagon* L.	-	-	-	-	+	-	-	+	-
107.	*Streptopus amplexifolius* (L.) D. C.	-	-	-	-	-	+	-	-	-
	35. Orchidaceae									
108.	*Corallorhiza trifida* Chatel.	-	-	-	-	+	-	-	+	-
109.	*Coeloglossum viride* (L.) C. Hartm.	-	-	-	-	+	-	-	+	-
110.	*Dactylorhiza cordigera* (Fr.) Soó subsp. *cordigera*	-	-	-	-	+	-	-	+	-
111.	*D. fuchsii* (Druce) Soó subsp. *fuchsii*	-	-	-	-	+	-	-	+	-
112.	*D. incarnata* (L.) Soó	-	-	-	-	+	-	-	-	-
113.	*D. majalis* (Rchb.) P. F. Hunt and Summerhayes	-	-	-	-	+	-	-	+	-
114.	*D. saccifera* (Brongs) Soó	-	-	-	-	+	-	-	-	-
115.	*D. sambucina* (L.) Soó	-	-	-	-	+	-	-	+	-
116.	*Epipactis atrorubens* (Hoffm. ex Bernh.) Besser	-	-	-	-	+	-	-	+	-
117.	*E. helleborine* (L.) Crantz	-	-	-	-	+	-	-	+	-
118.	*E. palustris* (L.) Crantz	-	-	-	-	+	-	-	+	-
119.	*Goodyera repens* (L.) R. Br.	-	-	-	-	+	+	-	+	-
120.	*Gymnadenia conopsea* (L.) R. Br.	-	-	-	-	+	-	-	+	-
121.	*Listera cordata* (L.) R. Br.	-	-	-	-	+	-	-	+	-
122.	*L. ovata* (L.) R. Br.	-	-	-	-	+	-	-	+	-
123.	*Microstylis monophyllos* (L.) Lindey	-	-	-	-	+	+	-	+	-
124.	*Nigritella carpatica* (Zapal.) Teppner, Klein and Zagulskij	-	-	-	-	+	-	-	+	+
125.	*Orchis mascula* (L.) L. subsp. *signifera* (Vest) Soó	-	-	-	-	+	-	-	+	-
126.	*O. ustulata* L.	-	-	-	-	+	-	-	+	-
127.	*Pseudorchis albida* (L.) A. Love and D. Love	-	-	-	-	+	-	-	+	-
128.	*Platanthera bifolia* (L.) Rich.	-	-	-	-	+	-	-	+	-
129.	*Traunsteinera globosa* (L.) Rchb.	-	-	-	-	+	-	-	+	-
	36. Poaceae									
130.	*Alopecurus pratensis* L. subsp. *laguriformis* (Schur) Tzvelev	-	-	-	-	-	+	-	+	+
131.	*Festuca carpatica* F. G. Dietr.	-	-	-	-	-	-	-	+	+
132.	*Poa rehmannii* (Asch. and Graebn.) Wol.	-	+	-	-	-	+	-	+	+
133.	*P. remota* Forselles	-	-	-	-	-	+	-	-	-
	37. Typhaceae									
134.	*Typha schuttleworthii* W. D. J. Koch and Sond.	-	-	+	-	-	+	-	+	-
	Total	4	6	4	6	57	50	20	112	36

16 taxons included to official international sozological lists, three of them (*Silene zawadskii, Heracleum carpaticum* and *Ligularia sibirica*) simultaneously included to two. But only four from the number of these species included to the both national sozological lists Ukrainian (The Red Data Book of Ukraine, 1996) and Romanian (Dihoru and Dihoru, 1994), seven species included to Romanian, one to Ukrainian, and four of them don't included to some of them.

Totally the national sozological lists included 95 taxons, but only 12 of them were included at the same time to the both lists - Romanian and Ukrainian. 20 species from the territory of the Chyvchyny/Civcin Mountains were included to the Red list of the Carpathians Mountains (Tasenkevich, 1998), which doesn't have official sozological status.

The high interest represents endemic species, the destruction of which is a very special loss to the science. The Chyvchyny/Civcin Mountains is one of the reachest region regarding the endemic species of the mountain ranges of the Ukrainian Carpathians (Malinovski et al., 2002; Kricsfalusy and Budnikov, 2007). 36 endemic taxons were revealed by us in this region. Three from them are Pancarpathian, 18 - South-East Carpathian and 15 - East Carpathian. It's need to determine, that there are a typical and own endemic species to the Chyvchyny/Civcin Mountains - *Galium pawlowskii* (the Chyvchyn/Civcin Mountain), *Nigritella carpatica* (the mountain ranges Chornyi Dil and Preluki/Preluca). We must to pay a special attention to narrow local endemic species: *Erysimum witmannii* subsp. *transsilvanicum, Minuartia verna* subsp. *oxypetala, Delphinium elatum* subsp. *nacladense, Galium transcarpaticum***,** *Alopecurus pratensis* subsp. *laguriformis, Poa rehmannii* and *Saussurea porcii*. The last species on the territory of Romania belong to the category of a disappearing species - extinct (Dihoru and Dihoru, 1994).

It's need to be a bright to light, that the most of localities of rare and endemic species of plants belong to limestone substratum, which can be find as on the "Ukrainian" part, so on the territory of "Romanian" part of the Chyvchyny/Civcin Mountains. According to this for the more detail and full sozological characteristic of the region it needs to combine the efforts of the Ukrainian and Romanian botanists in the future

CONCLUSIONS

The proposed data displays, that the Chyvchyny/Civcin Mountains is one of the most valuable regions of the Ukrainian Carpathians. According to the location of the region near the boundary this territory is a perspective proving ground for the Ukrainian-Romanian scientific collaboration for the creation of an international nature reserve. The creation of bilaterally reserved objects on the territory of the Chyvchyny/Civcin Mountains will be assist by the organization of monitoring to the condition of rare phytodiversity on the territory of the region and the determination of priority will be need during the development of methods of preservation of phytobiota of this unique part of the Carpathian Mountains.

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DATA ON AQUATIC AND HYGROPHILOUS MOLLUSCS FROM THE MARAMUREŞ MOUNTAINS NATURE PARK (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, Gastropods, Bivalves, chorology, wetlands, bioindication, human impact.

ABSTRACT

Despite their ecological importance, sozology and biological indication value, to count only three of their functions, the Molluscs were not considered as a main topic of the research and development grant run by the Maramureş Mountains Nature Park Administration during 2007, no malacologist being hired in this respect. However, the authors volunteer for an exploratory investigation of the gastropods and bivalves from these mountains. Among the 56 species of molluscs identified up to the present in this park, most of them representing the contribution of our team and some students who helped this enterprise, 15 are aquatic and hygrophilous taxa (12 species of Gastropods and three of Bivalves). The present paper deals with the latter systematical and ecological group, handling its systematic catalogue, chorology, some ecological features and the main environmental issues of this area.

RÉSUMÉ: Donnes concernant les mollusques aquatiques et hygrophiles du Parc Naturel Maramureş Monts (Maramureş, Roumanie).

Même si les Mollusques ont une considérable valeur écologique, sozologique et de bioindication, elles n'ont pas été considérées comme un thème important dans le projet de recherche et développement conduit par l'Administration du Parc Naturel Maramureş Monts en 2007. Même si aucun malacologue n'est pas inclus dans le projet, les auteurs participer comme volontaires á une investigation exploratoire de la faune des mollusques de ces montagnes. Parmi les 56 espèces des mollusques identifiées jusqu'au présent dans le parc, la plupart représentant la contribution de notre équipe comprenant aussi quelques étudiants, 15 sont des taxons aquatiques et hygrophiles (12 espèces des Gastropodes et troix des Bivalves). Ce papier présent le catalogue systématique et chorologique de ce dernier group écologique, quelques considérations écologiques et une discussion sur les principaux problèmes environnementaux constatés durant les campagnes de terrain.

REZUMAT: Date privind moluştele acvatice şi higrofile din Parcul Natural Munţii Maramureşului (Maramureş, România).

În pofida importanţei ecologice, a sozologiei şi a valorii de bioindicaţie pe care le prezintă, pentru a număra numai trei dintre calităţile acestora, studiul moluştelor nu a fost inclus ca obiectiv semnificativ în obiectivele grantului de cercetare şi dezvoltare, condus de Administraţia Parcului Natural Munţii Maramureşului, în anul 2007, nici un malacolog, nefiind angajat în echipa de lucru a specialiştilor. Totuşi, autorii au participat ca voluntari pentru a realiza o investigaţie a acestei faune. Dintre cele 56 de specii de moluşte, identificate până în prezent, în acest parc, majoritatea fiind rezultatul muncii echipei la care s-au adăugat şi câţiva studenţi, 15 sunt taxoni acvatici sau higrofili (12 specii de gastropode şi trei de bivalve). Lucrarea de faţă tratează acest grup ecologic, prezentând catalogul sistematic şi chorologic, câteva consideraţii ecologice, precum şi discuţii asupra principalelor probleme de mediu constatate în decursul campaniilor de teren.

INTRODUCTION

The Molluscan fauna of the Maramureş Mountains was scarcely studied up to the present, especially the aquatic and paludal species are almost without any quotation. Some data about terrestrial species were first published by J. Frivaldszki (1871), especially regarding Clausilidae and Helicidae, which are not the aim of the present paper. Some few information can be found also in the M. v. Kimakowicz collection from the Natural History Museum of Sibiu, sadly without specific locations. One more ellaborate work concerning terrestrial gastropds belongs to O. P. Popa, L. O. Popa and E. I. Pisică (2006), containing also a first record of a hygrophilous species, namely *Oxyloma elegans* Risso 1826. Some data were obtained by I. Sîrbu and M. Sîrbu during a field research along the valleys of Iza, Mara and Vişeu (the last bordering westwards the Nature Park) in 1999. Other works regarding the issue treated in this pages are virtually inexistent. All the other papers concerning this subject, confined to Maramureş Region, are referred to other mountains and rivers. New data about an aquatic gastropod *Ancylus fluviatilis* are given by the courtesy of A. Bănăduc, who lead a hidrobiology research in the area of interest in 2007. All the rest of information is given hereby as premier work, and were obtained during some field investigatons made in the same year.

This study aims to establish a first systematical and chorological catalogue of the aquatic and hygrophilous mollusca from this area, considering also some ecological remarks.

MATERIALS AND METHODS

Being only regarded as volunteers in the frame of a research project (i. e. no malacologist was actually invited to join the specialist researchers groups hired by the Nature Park Administration), the malacological study was accomplished, due to several limitations, only in a certain part of the nature park, especially in its central-northern part, as well as along the Vişeu River. The field researches were done during several days in July and August 2007, by means of a "screening-type" method.

The molluscs were sampled directly, by hand, by sieves, using bottom Surber or dredges. The systematic is given in accordance to the latest catalogue concerning the freshwater molluscs from the Romanian Inner Carpathians Basin (Glöer and Sîrbu, 2006). The sampling sites were selected from the mountain areas down to hills and valleys, according to geomorphologic and hydrologic features, and to the presence of human impact sources. Thus a wide variety of habitats were investigated, like riverbeds, rivulets, brooks, permanent or temporary ponds and pools, springs, high altitude lakes, etc.

The main investigated areas were the brooks towards the Prislop Pass, the Vişeu River valley at Borşa, than at Vişeu, Leordina and Bistra localities; rivers' valleys tributaries of different orders to Vişeu River, like: Vaser, Ruscova, Repedea, Cvaşniţa, Rica, Socolău, Coşnea, Frumuşeaua, Culic, Bistra, Valea Neagră, Mihăilecu - Farcău Mountain's waters, Vinderelu Lake, etc.

RESULTS

The systematic and chorological catalogue of the freshwater and hygrophilous Mollusca from the Maramureş Mountains Nature Park, is given below. 15 species (12 of snails and three bivalves) of molluscs have been found during the screening-type investigations. Except for two, all these species are first quotations in this area.

Classis Gastropoda Cuvier, 1795

Ordo Neotaenioglossa Haller, 1892

Fam. Hydrobiidae Troschel, 1857

1. *Bythinella austriaca* (v. Frauenfeld, 1857)

The habitat of the spring-snail *Bythinella austriaca* is represented by springs and mountain brooks, sometimes also in hilly areas, in shallow, cold waters, often rich in vegetation, on any type of solid substratum. The species was very seldom mentioned in the literature, but recent investigations in several massifs from the Romanian Carpathians showed that it can be encountered in several mountains, especially in limestone areas but also in some volcanic zones, although there are large areas where it was not found. *B. austriaca* presents important niche segregation, often being the single aquatic mollusc species in the populated habitat (Sîrbu and Benedek, 2004). It has a centraleastern European range and represents the single Prosobranch aquatic snail sampled from the area of interest, being a taxa of high bioindication and ecological value. In the proposal of Red List of freshwater molluscs from Romania (Sîrbu, unpublished) it is considered as near threatened (NT, IUCN, 2001, 2003).

Original data - spring and brook at the northern edge of the Bistra Valley, tributary of the Vişeu River; small brooks and rivulets in the Bistra River valley upstream the village; spring and brook beneath the Prislop Pass; brook in Culic Valley on the mountain slope.

Ordo Basommatophora Keferstein, 1864

Fam. Lymnaeidae Lamarck, 1812

2. *Galba truncatula* (O. F. Müller, 1774)

A highly tolerant and euribiont species inhabiting muddy riverbanks, ponds, lakes, marshes, seldom also springs, resistant to desiccation, sampled in all kind of aquatic habitats and conditions from lowland to subalpine levels; widely distributed throughout Romania. Originally a Palearctic species, in full progress of expansion in other regions.

Original data - brooks and marshes covered with vegetation at the northern edge of the Bistra Village in the Vişeu River valley.

3. *Stagnicola palustris* (O. F. Müller, 1774)

A Palearctic species, inhabiting a wide variety of aquatic habitats, largely distributed in Romania, especially in waters rich in vegetation as well as muddy wetlands.

Original data - brooks and marshes covered with vegetation at the northern edge of the Bistra Village in the Vişeu River valley.

4. *Radix labiata* (Rossmässler, 1835) syn. *Radix peregra*

Stagnant or running waters, but conditioned by a certain degree of oxygenation, usually encountered in higher altitudes, up to the upper mountain zone. It is a central-southern European species found in Romania in most mountain areas.

Original data - brooks and marshes covered with vegetation at the northern edge of the Bistra Village in the Vişeu River valley; Rica Valley upstream Coşnea, both in ponds and brooks; in the same habitats in Coşnea Valley; Culic Valley; Bistra Valley, here also in temporary pools in the flood area; marshes along Valea Neagră, in the Bistra village; ponds in the flood area of the Vişeu River at Leordina.

Fam. Planorbidae Rafinesque, 1815

5. Anisus spirorbis (Linnaeus, 1758)

Ditches, small lakes and ponds, both permanent and temporary, rich in vegetation, marshes and water filled pits. Palearctic species.

Original data - brooks and marshes covered with vegetation at the northern edge of the Bistra Village in the Vişeu River valley.

6. *Ancylus fluviatilis* O. F. Müller, 1774

An European species, typically confined to well-oxygenated flowing waters, sometimes also in glacial lakes, on hard, smooth substratum, indicating a certain quality of the aquatic habitats. It was quoted by M. v. Kimakowicz from the Vişeu area in the XIXth Century (Natural History Museum of Sibiu collection) without specific location.

Original data - according to the benthic investigations carried out by A. Bănăduc it lives in high numbers in Socolău River 50 m downstream the confluence with Rica; in Ruscova River 50 m upstream the confluence with Bardi; Cvaşniţa River 3.6 km upstream the confluence with Ruscova; in Repedea River 50 m upstream the omonimous locality; Ruscova River 50 m upstream the flow in the Vişeu River; Frumuşeaua River 2 km downstream the confluence of the rivulets Tomnatec and Pop Ivan; Vişeu River in its Defile. During the other researches it was found in the Bistra River upstream the omonimous village, in Rica (upstream the confluence in exceptionally large numbers, i. e. hundreds of individuals on square meter) and Coşnea rivers.

In 1999 it was not found in any station along the Vişeu River, from downstream Borşa to Petrova, upstream the Defile (I. Sîrbu and M. Sîrbu, unpublished data).

Fam. Carychiidae Jeffreys, 1839

7. *Carychium minimum* O. F. Müller, 1774

A northern-central European hygrophilous species (Grossu, 1993), inhabiting highly wet habitats, being found under logs, in the litter, marshy areas or close to waters.

Original data - in the Vişeu Valley at Bistra village.

Ordo Stylomatophora A. Schmidt, 1855

Fam. Succineidae Beck, 1837

8. *Succinea putris* Linnaeus, 1758

Hygrophilous snail, with European-Asian range, living always close to waters, in hygrophilous hayfields and meadows, on plants and wet soil, living up to 1800 m altitude (Grossu, 1993).

Original data - Repedea Valley at Coşnea; Vişeu Valley in Bistra village surroundings.

9. *Oxyloma elegans* Risso, 1826

Highly wet places, marshy areas, usually on plants very close to waters; European-Asian element. It was quoted by O. P. Popa et al. (2006) in the Coşnea area (Repedea Valley).

Fam. Cochilcopidae Pilsbry, 1900

10. *Cochlicopa lubrica* O. F. Müller, 1774

A preferential hygrophilous species, living among stones and moss, wood, wet soils, close to waters; Holarctic range.

Original data - Vaser River Valley at Bardău.

Fam. Valloniidae Morse, 1864

11. *Vallonia costata* O. F. Müller 1774

Its ecological state is somehow not clear; Grossu (1993, and other sources) claims that it usually inhabits xeromeso to mesophilous open habitats, in limestone areas, from lowland to mountains, but V. Gheoca argued that she sampled it always from wet habitats.

Original data - in a marshy area in the Vişeu Valley at Bistra.

Fam. Gastrodontidae Tryon, 1866

12. *Zonitoides nitidus* O. F. Müller, 1774

A hygrophilous species inhabiting marshy areas, wet forested lands, from lowland up to mountain; Holarctic range.

Original data - Vişeu River valley in Bistra village area.

CLASIS BIVALVIA Linnaeus, 1758

Ordo Veneroida H. and A. Adams, 1856

Fam. Sphaeriidae Deshayes, 1855 (1820)

13. *Pisidium casertanum* (Poli, 1791)

A highly euribiont and cosmopolitan species, inhabiting all kind of aquatic habitats, from mountain lakes and brooks, to deltas and estuaries. It can be found also in temporary pools. It is widely distributed in whole Romania, often encountered at higher altitudes, both in hilly and mountain areas, in running and stagnant waters, disregard of habitat dimensions.

Original data - brooks and marshes close to the northern edge of the Bistra Village, in the Vişeu River valley; ponds and rivulets in Rica Valley, in Coşnea, Culic and Bistra rivers valley; marshes in Valea Neagră.

14. *Pisidium personatum* Malm, 1855

Its range comprises Europe, Northern Africa, Asia Minor, Siberia and the Caspian Basin (Ellis, 1978). Inhabits cold springs, small rivulets or mountain rivers close to the riverbanks, helokrenic swamps, karstic underwater and lakes. Sometimes it can be found in puddles and temporary ponds. In the Romanian Inner Carpathian Basin is found mostly in small running waters from mountains and hilly areas, but also in riverbeds and stagnant waters from higher altitudes, being characteristic in springs (Sîrbu and Benedek, 2004). In the proposal for Red List of freshwater molluscs from Romania (Sîrbu, unpublished data), it is considered as near threatened (NT, according to IUCN, 2001, 2003).

Original data - brooks and puddles in Bistra Village, along several km upstream the locality.

15. *Pisidium nitidum* Jenyns, 1832

A Holarctic species, quoted by Ellis (1978) as inhabitant of ponds, lakes, marsh drains, streams and rivers. In Romania it seems to prefer mountain waters, being sometimes the single mollusc species inhabiting the glacial lakes (Sîrbu and Benedek, 2004)

Original data - lakes and pools above the upper mountain level in the Mihăilecu - Farcău mountains area, and in Vinderelu Lake.

DISCUSSION

Among the main functions held by these organisms, like valuabe food source, trophic abilities, water and substratum cleaners etc., their importance for bioindication of complex environmental quality is to be mentioned hereby. This is an outsanding tool for conservation and ecological monitoring for several reasons, like: it is one of the main future objectives of the park's administration and in general for regional sozology, they are philopatric animals, showing in excelent manner the changes of their living conditions, they respond in specific manner to environmental changes, and at least but not at last, compared to many other species, they can be easily be recognized by not expert conservationists. This are some of the main reasons why malacologist and malacology should be considered in the frame of grants and projects of biodiversity inventory, ecological state assessment, environmental quality evaluation etc., which is often neglected by project managers and leading staff, as it was the case in the present already explained event.

Some of these features should be briefly explained, in order to highlight the significance of the present mollusc species from this area. For instance *Bythinella austriaca* is encountered only in clean springs and brooks, in or close to limestony and - sometimes - vulcanic substratum, proving a good quality of water supply. *Ancylus fluviatilis* in some respect is witness of a certain rivers' and brooks' ecological state, and even when such kind of habitats are somehow organic loaded, it clearly proves a sound degree of oxygenation and self-cleaning capacity of the aquatic habitat. It's absence is equally significant, being the other side of the coin. For instance, during the hidrobiology investigations led by A. Bănăduc, the presence of *A. fluviatilis* in large numbers, especially in quantitative samples indicates, along other species and bioindicators, a high environmental quality. It's absence from a whole riverbed, as it is the case of Ţâşla River, supports a conclusion of severe debasement of river's system quality. Along the Vişeu River it is almost not to be found (as it was revealed by the researches done by I. Sîrbu and M. Sîrbu in 1999 and by A. Bănăduc in 2007), at least not downstream of Baia Borşa as far as Petrova, despite the fact that this river offers the specific conditions of its habitat. The remnant pollution caused by mining, related to heavy metals discharges, acidification, cianide spills etc., and other sources, are still the main causes of its absence. Although it is generally considered that the remnant pollution belongs to the past, its effects are still present, and will be also in the future a certain timespan. Another study, concerning benthic macroinvertebrates and fishes along Vişeu River, done by G. Staicu, D. Bănăduc and N. Găldean (1998) supports the same conclusion for the upper river's course, but gives also hints for a certain natural cleaning capacity along its flow. This is supported also by the highly significant fact that in 2007 A. Bănăduc found *A. fluviatilis* in the Vişeu River almost in the lowest sector, namely in its final defile, downstream Petrova.

All the other snails and clams treated in this paper are associated with certain features of the wetlands and associated vegetation, some - like *Pisidium personatum* - proving more exacting environmental conditions, or *Pisidium nitidum* - associated in Romania mainly with high altitudes and correlated functions, other - like *Galba truncatula, Radix labiata (syn. peregra), Stagnicola palustris* together with the hygrophilous snails, being associated with a wide range of wetlands, but sufficiently stable, at least to say. It is well known that human impact, generally speaking is associated with aridization. On the other side, very high individual numbers of *Galba truncatula* is usually explained by organic loaded, muddy, riverbanks and flood areas, proving wastewater discharges. The total absence of aquatic molluscs, while their presence should be the rule, is a sharp indicator of toxic spills, like it happens in Ţâşla River, in Vişeu River downstrem Baia Borşa and other running waters of Maramureş.

Usually in the Maramureş Mountains Nature Park the most rivers' ecological systems are of high quality in their upper sectors, as it is to be awaited. Other threat on their environment, with certain effects on all biota, is represented by deforestation, which is extremely beyond the capacity of some areas. There are far too many wood exploitations and sawmills, the latter causing the specific damages in respect of sawdust improper management, and often direct discharge into the running waters. Improper hydrotechnical works were also noted on many rivers, with no respect of ecological principles, planned by one-sided concepts of engineers. Obvious effects of overgrazing, mainly due to cows, were witnessed in many higher areas, above the upper forest limit. In some cases, like the valleys towards Farcău and Martincu Mountains, beside the large number of animals counted during our trips, were witnessed also the clear effects on the flora, vegetation, soil and waters. Another issue, with obvious outcomes on the environmental state, the usual neglection of household wastes disposal, often on the floodplain, has to be mentioned. At least but not at last, the law status of touristic endowments is also of a certain importance. There are old or inexistent marked tracks, lack of shelters, information points, camping sites, usually badly available and inconsistent maps, thus touristic management with its correlated benefits for a nature reserve, can hardly be used by both adminsitration and local economy. All these issues, briefly ennumerated hereby, should be tasks to be solved and targets for the future project runned by local communities as well as the park's administration.

CONCLUSIONS

Up to the present 15 species of aquatic and hygrophilous molluscs were identified in the Maramureş Mountains Nature Park, except for two all the rest being first quotations. Among them 12 taxa are snails (six of aquatic and six of hygrophilous gastropods) and three are clams (Bivalves and Sphaeriidae). At least some of them, if not all, should be taken as valuable bioindicators in future environmental monitoring systems, especially *Bythinella austriaca, Ancylus fluviatilis, Pisidium nitidum* and *Pisidium personatum.*

The main threats on both wetlands and associated communities are represented, in some areas, by mining industry's associated pollution, deforestation, waste deposits (typically on floodplains), sawdust improperly stored, household wastewater discharges, not environmental friendly hydrotechnical plants along the mountains' flowing waters, overgrazing with drastic effect on landscape and vegetation, especially in high altitudes pastures, low tourist management or even lack of specific endowments.

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DATA CONCERNING THE TERRESTRIAL GASTROPOD FAUNA OF THE MARAMUREŞ MOUNTAINS NATURE PARK (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, biodiversity, conservation, terrestrial gastropods.

ABSTRACT

The paper present the results of the research conducted on the park territory during July 2007 - May 2008. References concerning terrestrial gastropods of this region are scanty. The researches revealed the presence of 43 terrestrial gastropod species, for 24 of them this is the first record in the area. Most important are Clausiliidae, Helicidae and Hygromiidae families. Among the Helicidae we notice the presence of *Arianta arbustorum* and *Chilostoma banaticum.* The latest is a species from Habitat Directive "Natura 2000" Annex II and its populations in this area are very important for the species conservation at its distribution limit. The malacologic potential of this area is certainly more important and could be revealed by an extensive study.

RÉSUMÉ: Données sur la faune de gastropodes terrestres de Parc Naturel des Monts Maramureş (Maramureş, Roumanie).

L'article présent les résultats de la recherché du sur le territoire du Parc Naturel des Monts Maramureş dans l'intervalle July 2007 - May 2008. Les données bibliographiques sur les mollusques terrestres de la région sont pauvres et incomplètes. Nos recherches ont relevée la présence de 43 espèces de gastropodes terrestres, parmi quelles, 24 sont mentionnes pour la première fois dans la région. Dominantes sont les Clausiliidae, Helicidae et Hygromiidae. Parmi les Helicidae nous soulignons la présence de *Arianta arbustorum* et *Chilostoma banaticum*. La dernière est une espèce de l'Annexe II de Directive Habitâtes "Natura 2000", et sa présence dans la région est importante pour la conservation de l'espèce près de sa limite étique de distribution. Le potentiel malacologique de la région est certainement beaucoup plus important et il doit être relève par des études complémentaires.

REZUMAT: Date referitoare la fauna de gastropode terestre a Parcului Natural Munții Maramureşului (Maramureş, România).

Lucrarea de față prezintă rezultatele cercetării pe teritoriul Parcului Natural Munții Maramureşului în iulie 2007 - mai 2008. Datele bibliografice referitoare la gastropodele terestre din zonă sunt sporadice. Cercetările au relevat prezența a 43 de specii de gastropode terestre, dintre care 24 nu au mai fost menționate aici. Dominante sunt Clausiliidele urmate de Helicidae şi Hygromiidae. Dintre helicide, remarcăm prezența unor populații reprezentative de *Arianta arbustorum* şi *Chilostoma banaticum*. Ultima este o specie din Anexa II a Directivei Habitate, ale cărei populații din această zonă sunt extrem de importante pentru conservarea speciei, la limita estică a arealului său. Cu siguranță, potențialul malacologic al zonei este mult mai mare, subliniem necesitatea unui studiu mai aprofundat pentru completarea datelor.

INTRODUCTION

In the recent years, the decline in the number and abundance of populations of many European gastropod species has become especially dramatic. One of the reasons of this is a continuous human interference. The protection measures must begin with a right assumption of the actual situation. In many cases in Romania there are not sufficient recent data concerning the terrestrial gastropods and the inventory program had start with the protected natural areas.

The terrestrial gastropods study of the Maramureş Mountains Nature Park is a part of an extensive project for flora and fauna inventory of this protected area. The research was conducted by the "Lucian Blaga" University of Sibiu scientists between July 2007 and May 2008.

Data concerning the terrestrial gastropods of Maramureş are scanty. The first reference comes from Frivaldszky (1871) and concerns only about Clausilidae and Helicidae. Grossu also have recorded some information mostly about Clausiliidae, Limacidae and Helicidae, from the southern part of the province - Rodnei and Ţibleş Mountains (Grossu, 1983; 1993).

Most recently there were published data concerning *Helix pomatia* populations from Iza Valley (Andrei, 1997 a) and *Helicigona* genus populations (Andrei, 1997 b).

In July 2004, a team of the "Grigore Antipa" National Museum of Natural History has conducted a research in the northeast of the Maramureş County, from the confluence of rivers Tisa with Vişeu to Maramureş Mountains, including Ruscova - Poienile de sub Munte depression basin. They report 17 terrestrial gastropod species (Popa, Popa and Pisică, 2005).

MATERIAL AND RESEARCH AREA

Samples were taken from nine sampling areas at different altitudes and in different habitats and micro-habitats, in several campaigns during 2007 and 2008. Only qualitative samples were taken and snails were collected by individual collection of larger specimens from the vegetation and the soil surface, and from soil samples for small ones. The material was collected by Monica Sîrbu, Ioan Sîrbu, Andrei Cândea and Anamaria Gurzău.

The nine sampling areas are: S1 - Frumuşeaua-Paltin Valley; S2 - Repedea Valley; S3 - near Vinderelu Lake; S4 - Pietriceaua Peak area; S5 - Rica Valley, upstream Coşnea; S6 - Vaser Valley at Bardău; S7 -Vaser Valley at Făina; S8 - Vişeu Valley near Bistra; S9 - near Vişeu de Sus.

The material was identified in laboratory, after soil samples analysis, using Grossu (1983-1988) and Kerney and Cameron (1979).

RESULTS AND DISCUSSIONS

In the studied area were identified 43 species of terrestrial gastropods included in 14 families. Aquatic and hygrophilous species are not the object of this paper, being published in another paper in this review. Below is presented the systematic list, which contains the identified species, with indication of their presence in different sampling areas, but also a previous record (Popa, Popa and Pisică, 2005). The species systematic classification follows CLECOM I (Falkner et al., 2001).

Systematical list of terrestrial gastropods of Maramureş Mountains Nature Park

Class Gastropoda Cuvier, 1795

Pulmonata Cuvier in Blainville, 1814

Ord. Stylomatophora Schmidt, 1855

Fam. Cochilcopidae Pilsbry, 1900

1. *Cochlicopa lubrica* Müller, 1774: S6

Fam. Orculidae Pilsbry, 1918

2. *Sphyradium doliolum* Bruguière, 1792: S9

Fam. Valloniidae Morse, 1864

3. *Vallonia costata* Müller, 1774: S8; 4. *Vallonia excentrica* Sterki, 1893: S8

Fam. Vertiginidae Fitzinger, 1833

5. *Truncatellina cylindrica* Fèrussac, 1807: S6; 6. *Vertigo pygmaea* Draparnaud, 1801: S8

Fam. Enidae Woodward, 1903

7. *Ena montana* (Draparnaud, 1801)

Fam. Clausiliidae Gray, 1855

8. *Cochlodina laminata* Montagu, 1803: S5; 9. *Cochlodina orthostoma* Menke, 1828: S6, S9; 10. *Ruthenica filograna* Rossmassler, 1836: S6, S9; 11. *Clausilia dubia* Draparnaud, 1805: S6; 12. *Macrogastra latestriata* Schmidt, 1857: 13. *Balea perversa* Linnaeus, 1758: 14. *Balea biplicata* Montangu, 1803: 15. *Vestia turgida* Rossmaessler, 1836: S9; 16. *Bulgarica cana* Held, 1836: S9

Fam. Euconulidae Baker, 1928

17. *Euconulus fulvus* Müller, 1774: S6

Fam Pristilomatidae, Cockrell, 1891

18. *Vitrea contracta* Westerlund, 1871: S7

Fam. Oxychilidae Hesse, 1927

19. *Oxychilus draparnaudi* Beck, 1837: S6, S7, S8; 20 *Aegopinella pura* Alder, 1830: S7; 21. *Aegopinella epipedostoma* Fagot, 1869: S5, S8; 22. *Nesovitrea hammonis* Strom, 1765: S6

Fam. Limacidae Lamarck, 1801

23. *Limax maximus* Linnaeus, 1758: S8; 24. *Limax cinereoniger* Wolf, 1803: S1, S5, S6, S9; 25. *Lehmania marginata* Müller, 1774: S1; 26. *Bielzia coerulans* Bielz, 1851: S6, S7, S9

Fam. Agriolimacidae Wagner, 1935

27. *Deroceras reticulatum* Müller, 1774: S2, S6

Fam. Arionidae Gray, 1840

28. *Arion subfuscus* Draparnaud 1805: S6, S9; 29. *Arion circumscriptus* Johnston 1828: S6

Fam. Bradybaenidae Pilsbry, 1934

30. *Fruticicola fruticum* Müller, 1774: S1, S2, S4, S7, S8

Fam. Hygromiidae Tryon, 1866

31. *Trichia sericea* Draparnaud 1801: S5, S9; 32. *Trichia hispida* Linnaeus, 1758; 33. *Monachoides vicinus* Rossmassler, 1842: S2, S6, S7, S8; 34. *Perforatella bidentata* Gmelin 1791: S2; 35. *Perforatella dibothryon* Kimakowicz, 1890: S8, S9

Tribus incerta

36. *Xerolenta obvia* Menke, 1828: S3

Fam. Hellicidae, Rafinesque, 1815

37. *Arianta arbustorum* Linnaeus 1758: S3, S6, S7; 38. *Chilostoma banaticum* Rossmaessler, 1838: S2, S6, S7, S8; 39. *Faustina faustina* Rossmaessler, 1835: S2, S6, S7, S8; 40. *Isognomostoma isognomostomos* Schröter, 1784: S6; 41. *Cepaea (Austrotachea) vindobonensis* Pfeiffer, 1828: S8; 42. *Helix pomatia* Linnaeus, 1758: S2, S4, S5, S6, S8; 43. *Helix lutescens* Rossmassler, 1837: S6

We mention that among the 43 species, five were not identified in the present study, *Macrogastra latestriata, Balea perversa, Balea biplicata, Ena montana* and *Trichia hispida*, and 24 species identified by our team are mentioned for the first time in the area. The best represented is Clausilidae family with 9 species, followed by Helicidae (7), Hygromiidae (5), Arionidae and Limacidae (4). The rest of families are represented by one or two species (Fig. 1).

The zoogeographic distribution of the gastropod species indicates the dominance of the European (10) and Holarctic (7) species, but also are represented quite well Carpathic and central-eastern European species (Fig. 2).

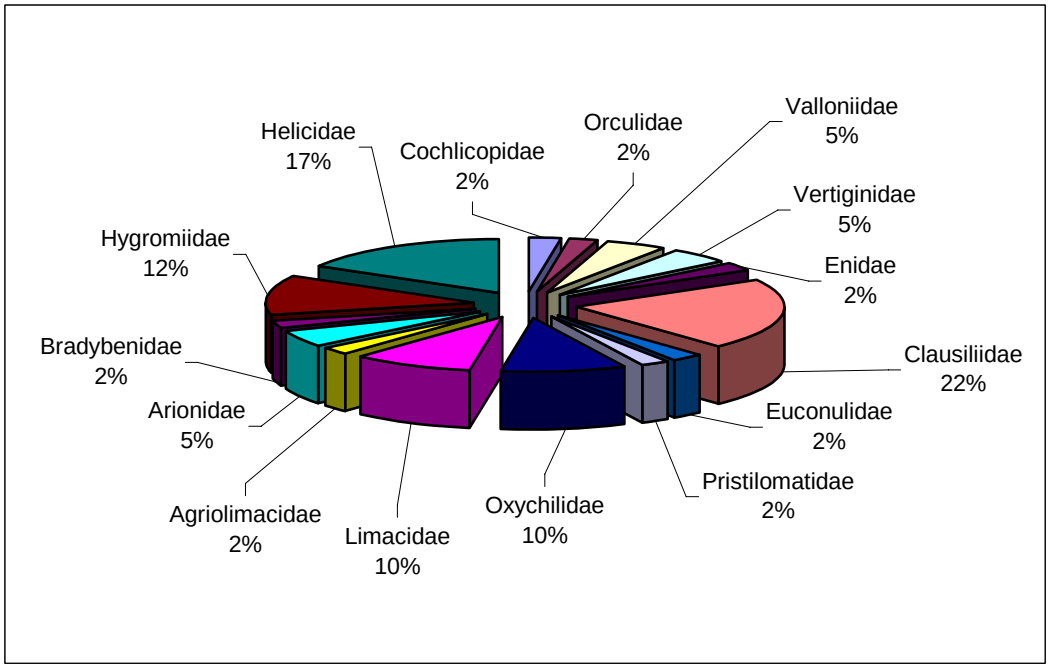

Figure 1: Distribution of terrestrial gastropods on families.

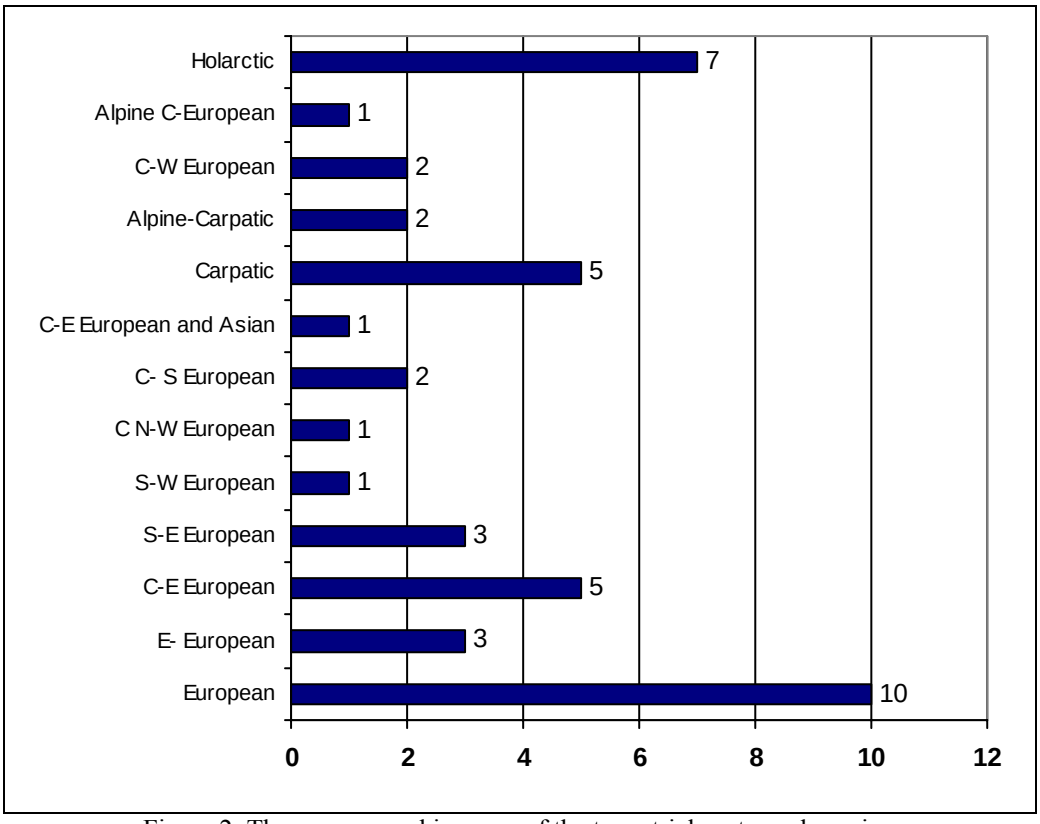

Figure 2: The zoogeographic range of the terrestrial gastropod species.

Among the identified species is important to mention *Chilostoma banaticum*, species included in Habitat Directive "Natura 2000" Annex II (Fig. 3).

Figure 3: *Chilostoma banaticum* (photo Gheoca).

Chilostoma banaticum is a Quaternary relict, its distribution in Europe is mainly represented in Romania, locally present in Hungary, Germany, Croatia, Ukraine (Sverlova and Gural, 2005), very probable locally also in Serbia and Slovakia. The species distribution in Hungary is limited to a few locations on Tisa, Mureş and Criş valleys. Banat area is considered its distribution center. Mezohygrophilous species are present mainly near the riverbeds, in the litter, on dead trees, from mountain area to depression and plain areas.

On the park's territory, the species was found in S2, S6, S7 and S8 sampling stations. Three of them - S2 Repedea Valley, S6 - Vaser Valley at Bardău and Vaser Valley at Făina are located in the proximity of the national border. This population's conservation could be important for the species conservation in both Romania and Ukraine. The park population is considered representing 2-10% of the entire Romanian population, and the site is considered important as external cross-border site for Romanian population, internal cross-border site for the Ukrainian population and a site for geographical coherence for the species distribution in Europe (according to Habitats Directive of the EU Natura 2000 classification).

There is poor information about this species in Ukraine; it seems to be included in category II, the correspondent of EN/VU in WCU classification (Witkowski et al, 2003).

We also wish to remark the presence in the park of *Arianta arbustorum*. This species is relatively common in westenn Europe, but its distribution in Romania is limited to several mountains. This area seems to shelter also some important populations of this species.

CONCLUSIONS

The investigated area shelter important terrestrial gastropods communities due to the diversity of the habitats. Certainly, their number is more important and further investigations are needed especially in woodlands.

The main threats on gastropod communities are represented, in some areas, by mining industry's associated pollution, deforestation, waste deposits (typically on floodplains), sawdust improperly stored, household wastewater discharges, overgrazing with drastic effect on landscape and vegetation, especially in high altitudes pastures, low tourist management or even lack of specific endowments. A quantitative analysis, especially for the rare and endangered species, will be able to bring more information on the mollusks communities' situation and their perspectives.

AKNOVLEDGEMENTS

This study was carried out in the Programme for the Inventory of the Maramureş Mountains Nature Park's Flora and Fauna - the volunteers program, coordinated by Ms. C. Bogdan. The field work were accomplished with the help of some students from the "Lucian Blaga" University of Sibiu, namely A. Gurzău, A. Cândea and A. Hărânglăvean. To all those mentioned the authors owe sincere gratitude.

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THE HARVESTMEN FAUNA (ARACHNIDA, OPILIONES) FROM THE MARAMUREŞ MOUNTAINS NATURE PARK (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, Maramureş Mountains Nature Park, harvestmen, checklist.

ABSTRACT

This paper presents the results of an inventory of harvestmen fauna from the Maramureş Mountains Nature Park, which was collected in June and August 2007. Overall, ten species from two families were inventoried - almost 60% of the species reported by Cârdei (1947, 1956). Two out of the ten inventoried species are endemic for the Carpathians.

RÉSUMÉ: La faune de facheurs (Arachnida, Opiliones) du Parc Naturel des Montagnes de Maramureş (Maramureş, Roumanie).

Dans cet travail les auteurs présentent les résultats des recherches effectuées dans le Parc Naturel Montagnes des Maramureş, dans les mois juin et août 2007. Nous avons inventorié dix espèces appartenant à deux familles, c'est à dire aprox. 60% des espèces semnalés par Cârdei (1947, 1956), dont deux espèces sont endémiques dans le Carpates.

REZUMAT: Fauna de Opilionide (Arachnida, Opiliones) din Parcul Natural Munţii Maramureşului (Maramureş, România).

Speciile aparţinând ordinului Opiliones au fost colectate în iulie şi august 2007, în arealul Parcului Natural Munţii Maramureşului. Au fost identificate zece specii aparţinând la două familii, ceea ce reprezintă aproape 60% dintre speciile menţionate de Cârdei (1947, 1956), două dintre cele zece specii inventariate sunt endemice în Carpaţi.

INTRODUCTION

Harvestmen colonize most terrestrial habitat types and are one of the common components of the terrestrial invertebrate community (Pinto-da-Rocha et al., 2007). Probably because of the relatively low number of species, less than 1% of the worldwide species, the Romanian harvestmen have been less studied.

The only data available on the harvestmen from the Maramureş Mountains Nature Park was reported by Cârdei (1947, 1956) who identified 17 species situated at altitudes between 600 and 1500 m, in the southern and southeastern part of the Maramureş Mountains near the park boundaries (Cătun Fîntînele and the area between Pietrosul, Ştiolu and Cearcănul mountains, Ţibău, Balaşina).

In 2007 we inventoried the harvestmen fauna from the Maramureş Mountains Nature Park for an updated checklist.

MATERIALS AND METHODS

The Maramureş Mountains Nature Park was established as a large protected area in 2004 (H. G. 2151/2004). It is located in the northeast part of Romania between the Vişeu Valley and the Romanian-Ukrainian border and covers approximately 150,000 ha out of which 9,050 ha are nature reserves (IV IUCN category) and 139,800 ha are protected landscape (V IUCN category). The altitude varies between 300 and 1970 m and the area receives an average 900 mm of rainfall annually and has an average annual temperature of 6 ºC.

The species inventory was conducted during two visits in June (northeastern part) and August 2007 (southern and eastern parts of the park). The inventory methods used were visual survey and pitfall traps. The search included areas under the rocks, litter and open habitats such as grasslands at different altitudes. Thirteen stations were investigated and each of the caught adult harvestmen was identified to sex level and species according to Martens (1978).

RESULTS

During the investigation carried out in June and August 2007, 223 harvestmen specimens were collected. We identified ten species belonging to two families (Tab. 1).

Table 1: Harvestmen species from the Maramureş Mountains Nature Park.

No.	Species	Cârdei 1947, 1956	2007	Station
	Fam. Nemastomatidae			
1.	*Nemastoma gigas gigas* (Soerensen) Roewer	x		Cătun Fîntîna
2.	*Nemastoma lugubre* (Müller, 1776)		x	Fîntana Stanchi, Toroioaga Peak
3.	*Paranemastoma kochi* (Nowicki, 1870)		x	Tocarnia
4.	*Paranemastoma quadripunctatum* (Perty, 1833)	x		Cătun Fîntîna
5.	*Mitostoma chrysomelas* (Hermann, 1804)	x	x	Fîntîna, Toroioaga, Ţibău
	Fam. Trogulidae			
6.	*Trogulus tricarinatus* (Linnaeus, 1767)	x		Cătun Fîntîna, Balaşina
	Fam. Ischyropsalidoidea			
7.	*Ischyropsalis hellwigi* (Panzer, 1794)	x		Cătun Fîntîna
	Fam. Phalangiidae			
8.	*Phalangium opilio* Linnaeus, 1761	x		Cătun Fîntîna
9.	*Opilio dinaricus* Silhavy, 1938		x	Vaser Valley
10.	*Opilio parietinus* (De Geer, 1778)	x		Cătun Fîntîna
11.	*Platybunus pallidus* Silhavy, 1938		x	Toroioaga Peak
12.	*Platybunus pinetorum* (Koch, 1839)	x		Cătun Fîntîna
13.	*Lophopilio palpinalis* (Herbst, 1799)	x		Cătun Fîntîna
14.	*Egaenus convexus* (Koch, 1835)		x	Tocarnia
15.	*Mitopus morio* (Fabricius, 1799)	x	x	present in all stations
16.	*Lacinius dentiger* (Koch, 1848)	x		Cătun Fîntîna, Borşa
17.	*Lacinius ephippiatus* (Koch, 1835)	x		Cătun Fîntîna
18.	*Lacinius horridus* (Panzer, 1794)	x		Cătun Fîntîna
19.	*Oligolophus tridens* (Koch, 1836)		x	Tocarnia, Piatra Arsă, Vaser
20.	*Paroligolophus agrestis* (Meade, 1855)	x		Balaşina
21.	*Leiobunum rupestre* (Herbst, 1799)	x	x	Cătun Fîntîna, Vaser Valley
22.	*Leiobunum limbatum* (Koch, 1861)	x		Balaşina
23.	*Gyas annulatus* (Olivier, 1791)	x		Cătun Fîntîna
24.	*Gyas titanus* (Simon, 1879)		x	Coman Peak, Vaser Valley

Paranemastoma quadripunctatum and *Gyas annulatus* were considered as erroneously identified (Băbălean, 2004 for *Paranemastoma quadripunctatum*) and were not included in the checklist of Romanian harvestmen (Moldovan et al., 2006). Also *Nemastoma gigas gigas* (Soerensen) Roewer is a species reported in Hungary with just one record in Romania. *Platybunus bucephalus* (Koch, 1835) and *Trogulus tingiformis* Koch, 1835 were found by Cârdei (1947) in the northern part of the Rodnei Mountains and were expected to be also present in the Maramureş Mountains.

Six species were present in just one station: *Egaenus convexus* and *Paranemastoma kochi* (Tocarnia), *Leiobunum rupestre* and *Opilio dinaricus* (Vaser Valley), *Mitostoma chrysomelas* and *Platybunus pallidus* (Toroioaga Peak) (Fig. 1). *Mitopus morio* is an ubiquitous species found in almost all types of habitats at different altitudes, considered to be "perhaps the most widespread harvestmen species" (Pinto-da-Rocha et al., 2007).

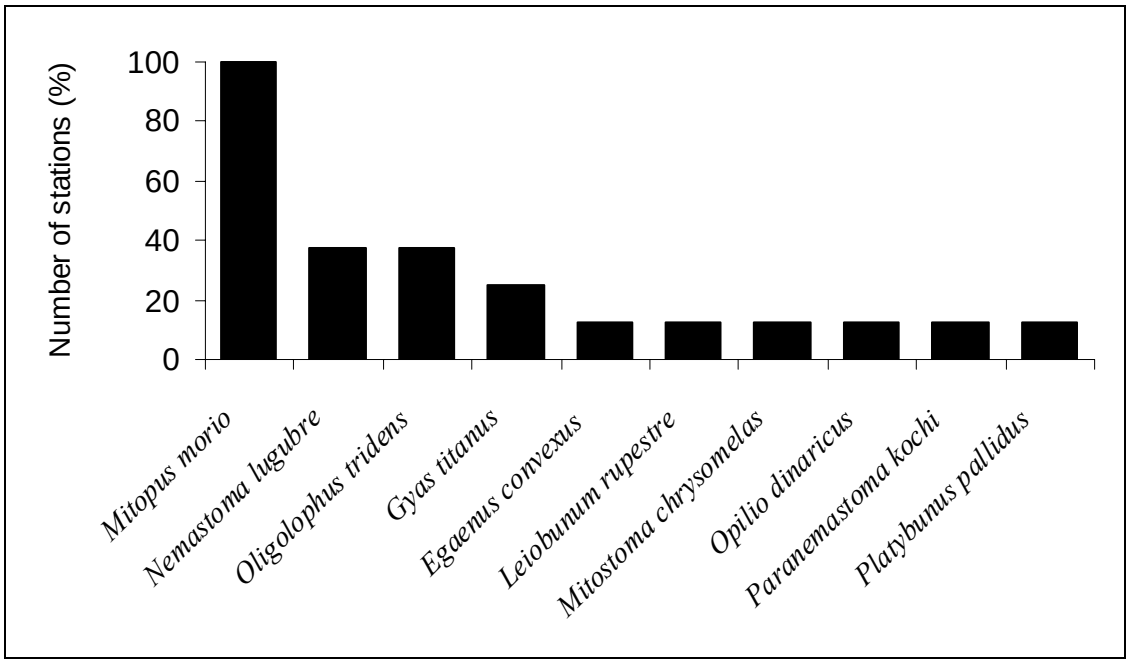

Figure 1: Frequency of harvestmen species, sampled in 2007, in 13 stations.

Nemastoma lugubre, *Oligolophus tridens*, *Egaenus convexus* and *Mitostoma chrysomelas* are also common species in habitats at low and moderate altitude.

Opilio dinaricus was reported only in the southwest (Banat area and Cerna Mountains) part of Romania (Dumitrescu, 1972; Rafalski, 1962); its rarity is probably a bias of the sampling methods.

DISCUSSION

A number of 56 harvestmen species were inventoried throughout all Romania (Avram et al., 1969; Dumitrescu, 1972; Băbălean 2005; Moldovan et al., 2006). The Maramureş Mountains have a rich harvestmen fauna. Up to now, 24 species of harvestmen were inventoried in Maramureş Mountains Nature Park representing more than 40% of the species inventoried in Romania. Riparian habitat, leaf litter of beach forest and grassland near to coniferous forest (Cârdei, 1956) were the most frequent habitats where specimens were found.

All species recorded were inventoried in previous studies in the Eastern Romanian Carpathians except for *Opilio dinaricus*, which was reported for the first time in the north part of Romania. A single species, *Egaenus convexus*, that is quite common for Romania, is considered vulnerable in the Carpathian Mountains (Witkowski et al., 2003), while two species, *Platybunus pallidus* and *Paranemastoma kochi* are endemic for the Carpathian Mountains.

Further investigations are required for a complete inventory of the harvestmen fauna from the Maramureş Mountains Nature Park.

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ASPECTS REGARDING THE DIVERSITY OF AQUATIC AND SEMIAQUATIC HETEROPTERA FROM THE MARAMUREŞ MOUNTAINS NATURE PARK (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romania, Maramureş, Vişeu Basin, α-biodiversity, β-biodiversity.

ABSTRACT

This paper is part of a study made in order to establish the quality of water resources of the Maramureş Mountains Nature Park. The aim was to inventory the habitats of aquatic and semiaquatic Heteroptera (inventory that will regard the number and quality of those habitats, and also the human intervention in the area), and to establish the biodiversity degree, using various indexes that estimate both α- and β-biodiversity. In order to reach that, we took samples from 15 sampling stations on three hydrographic basins from the park (Vişeu, Ruscova and Frumuşeaua). The results show the presence of seven species, most of them eurivalent ones, the exception being *Gerris (Aquarius) paludum* Fabricius 1794, species with rare sightings in Romanian fauna. The α-biodiversity analysis reveals low values for each sampling station, counterbalanced by higher values if we relate to hydrographical basins or to the entire area; this fact is in correlation with β-biodiversity results, which are showing high variation along the gradient (in this case altitude). Similitude analysis is showing the same species distribuition for suchlike habitat conditions.

ZUSAMMENFASSUNG: Aspekte des Bestandsverzeichnis der Wasser- und Halbwasser-Heteroptera im Naturpark der Maramuresch Bergen (Maramuresch, Rumänien).

Das Schreibarbeit gehört zu einer Studie durchgeführt um das Qualität der Wasserhilfsquellen im Naturpark der Maramureş Bergen einzuschätzen. Das Ziel war die Erstellung der Bestandsverzeichnis der von der Wasser- und Halbwasser-Heteroptera bevorzügte Habitate (das Bestandverzeichnis wird auf den Anzahl und die Qualität dieser Habitate, sowie auf den Menschlichen Anschlag rechnen), und die Feststellung des Artenreichtums, mit hilfe verschiedener Indizes, die auch die α- und die β-Artenreichtum schätzen. Um diesem Zweck zu reichen, wurden Proben von 15 Richtpunkte eingesammelt, in drei hidrograpfische Einzugsgebieten des Naturparks (Vişeu, Ruscova, Frumuşeaua). Die Ergebnisse zeigen 7 Sorten, die meisten davon eurivalent, ausgenommen die Sorte *Gerris (Aquarius) paludum* Fabricius 1794, die für die Fauna Rumäniens als sehr selten betrachtet ist. Die Analyse der α-Artenreichtums ergab niedrige Werte im allem Einsammlungspunkte, aufgewiegen von höheren Werte wenn im Verhältnis zu hidrographischen Einzugsgebieten oder den ganzen Teritorium betrachtet; dieser Ergebnis ist im Korrelation mit den Ergebnissen der β -Artenreichtum, die eine starke Variation im Länge des Gradients (in diesem Fall die Höhe) andeutet. Die Ähnlichkeits-Analyse zeigt eine gleichartige verteilung der Sorte in änliche Habitatkonditionen.

REZUMAT: Aspecte privind diversitatea Heteropterelor acvatice şi semiacvatice din Parcul Natural Munţii Maramureşului (Maramureş, România).

Lucrarea face parte dintr-un studiu realizat cu scopul de a evalua calitatea resurselor de apă din Parcul Natural Munţii Maramureşului. Ţinta a fost inventarierea habitatelor preferate de Heteropterele acvatice şi semiacvatice (inventariere ce va ţine cont de numărul şi calitatea acestor habitate, dar şi de impactul antropic din zonă), şi stabilirea valorilor biodiversităţii, cu ajutorul diverşilor indici, ce vor estima atât biodiversitatea α, cât şi β. Pentru atingerea scopului, au fost colectate probe din 15 puncte, în trei bazine hidrografice, din cadrul Parcului Natural (Vişeu, Ruscova şi Frumuşeaua). Rezultatele arată prezenţa a şapte specii, majoritatea eurivalente, cu excepţia speciei, *Gerris (Aquarius) paludum* Fabricius 1794, specie considerată rară pentru fauna României. Analiza de biodiversitate α oferă valori reduse pentru fiecare punct de colectare, contrabalansate de valori mai mari, raportat la bazine hidrografice sau la întreg teritoriul; faptul este în corelaţie cu rezulatele, referitoare la biodiversitatea β, care indică o variaţie puternică în lungul gradientului (în cazul de faţă, altitudinea). Analiza de similitudine arată o distribuţie a speciilor similară, pentru condiţii asemănătoare de habitat.

INTRODUCTION

The Maramureş Mountains Nature Park is located in the northern part of the Maramureş County, near the localities Borşa, Moisei, Vişeu de Sus, Vişeu de Jos, Leordina, Ruscova, Repedea, Poienile de sub Munte, Petrova and Bistra, overlapping to the entire surface of Maramureş Mountains up to the Romanian-Ukrainian border. The park also includes the land within the boundaries of the localities it covers.

The Maramureş Mountains are situated on the northern border of Romania, between 47°35'5'" and 47°58'20" north latitude, and between 24°8'12" and 25°2'38" west longitude, on the north of the Vişeu and Bistriţa Aurie valleys (a total length of over 100 km, and a total surface of around 1500 km^2). They are mostly made of crystalline rocks penetrated by eruptive and sedimentary rocks (conglomerates, sandstone, clay schist, shale, marl, clay) and two large sedimentary (Paleocene) formations (one being on Ruscova Valley and going all the way to Poienile de sub Munte).

The studied area (Fig. 1) contains three hydrographical basins: Frumuşeaua and Ruscova, from the north and Vişeu, from the west of the park (in this case, we analyzed only the lower and middle basin of Vişeu).

According to the latest classifications, aquatic Heteroptera belong to Infrasuborder *Nepomorpha* Popov 1968, and the semiaquatic ones, to Infrasuborder *Gerromorpha* Popov 1971 (Gaby Viskens, 2005, ***). Heteroptera are insects associated, more or less, to water surfaces, forming, along other groups, the nekton and the epineuston. They inhabit a large variety of micro biotopes, from those lacking vegetation, to those completely covered (Andersen, 1982; Davideanu, 1999).

MATERIALS AND METHODS

The field study took place in September 2007, and the goal was to take quantitative samples. There was taken one sample from each station, of about 10 meters, covering the entire habitat (water surface and interior, aquatic vegetation if present, bottom).

The identification of the species was made based on the insects' morphology, at the stereo binocular, or, in some cases, by genitalia, using data from other specialists (Jansson, 1986; Davideanu, 1999). Afterwards there were calculated biodiversity indexes (Menhinick Index and Simpson Index, for α-biodiversity, and Wilson-Smida Index, for β-biodiversity); in the end, we seek the relations between species and stations, with the use of cluster analysis.

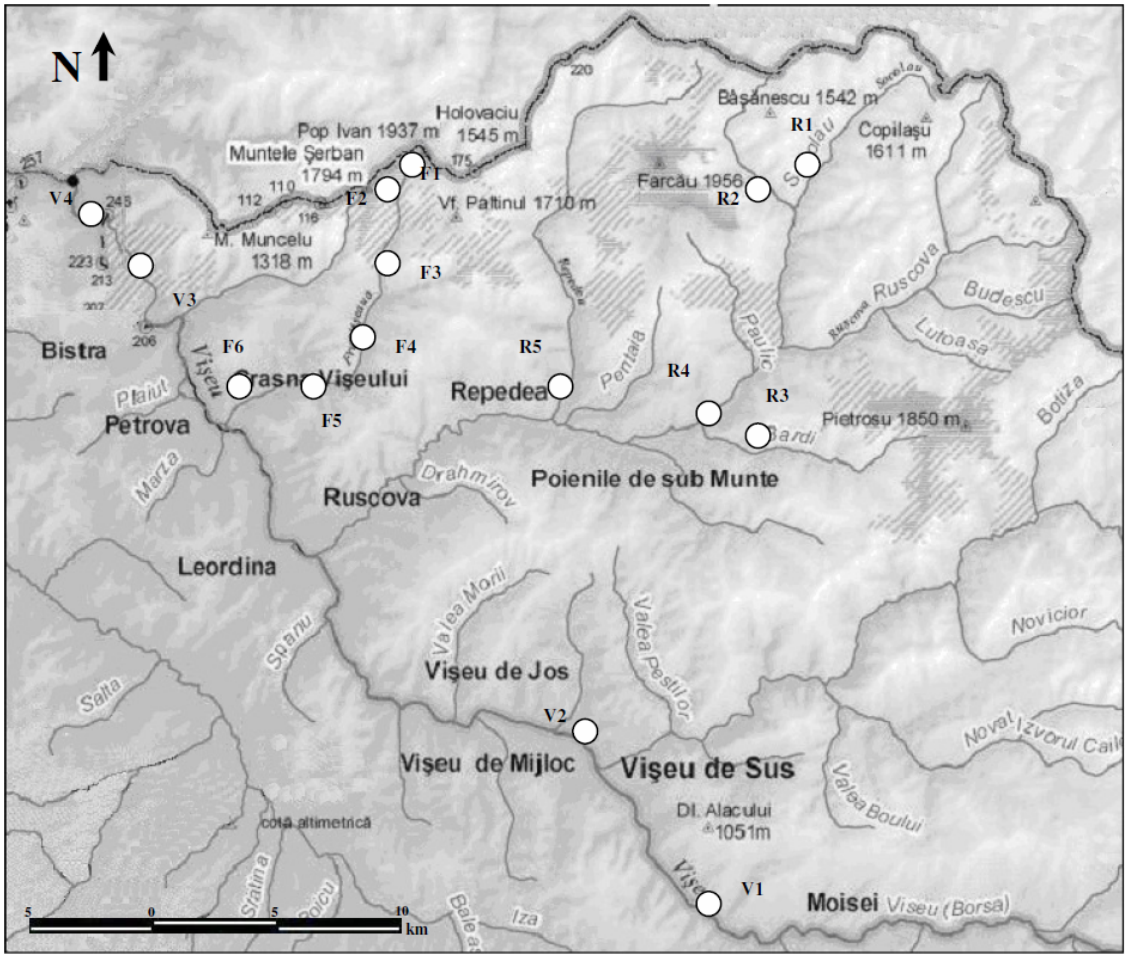

Figure 1: The studied area in the Maramureş Mountains Nature Park.

RESULTS AND DISCUSSIONS

For this study, we chose 15 sampling stations, in such way that we will be able to cover the entire diversity of habitats preferred by the target group. There are six stations in Frumuşeaua Basin, five in Ruscova Basin and four in Vişeu Basin, as follows:

Frumuşeaua River Basin

F1 - (Pop Ivan 400 m upstream the confluence with Tomnatecul) is a small spring, with a length of about 2 m and a width of about 30-40 cm, with a rocky bottom, no aquatic vegetation and clear water;

F2 - (Tomnatecul 200 m upstream the confluence with Pop Ivan) is a creek sector, affluent of Frumuşeaua, which flows slowly, before the confluence, on the river bed of the collector; the length of the station was conventionally chosen at 10 m, the width being less than 50 cm; the bottom is sandy and covered with small rocks, aquatic vegetation is relatively well represented, and there are no signs of atrophic impact;

F3 - (Frumuşeaua 2 km downstream the confluence of Tomnatec with Pop Ivan) is as well a creek sector, affluent of Frumuşeaua, which flows slowly, before the confluence, on the river bed of the collector; the length of the station was also conventionally chosen at 10 m, the width being up to one meter; the bottom is sandy and covered with small rocks, aquatic vegetation is relatively well represented, but the station is near the road, and there are signs of atrophic impact (animal and human crossing of the creek);

F4 - (Frumuşeaua 4 km downstream the confluence of Tomnatec with Pop Ivan) is a canal at the side of the road, with probable pluvial sources, from which were conventionally chosen 10 m; the width is around 30 to 40 cm; the bottom is sandy and loamy, with high quantity of organic detritus and invaded by aquatic vegetation, and from place to place are large rocks or wood parts; the proximity of the road leads to the presence of atrophic substances in the water, such as fuels;

F5 - (Frumuşeaua 6 km downstream the confluence of Tomnatec with Pop Ivan) is a medium size temporary puddle, resulted from the construction of the road: a lower sector was dammed by the road, and filled with pluvial water; the length of the station is around 3-4 m, its maximum width being over 2 m; the bottom is sandy and loamy, the aquatic vegetation is poor, and there are no signs of atrophic impact;

F6 - (Frumuşeaua 500 m upstream the confluence with Vişeu) is a swamp sector resulted from the damming of a spring by the road; the length of the station is about 5 m, and the width is less than 1 meter; the bottom is rocky, with a thin lair of mud, and the aquatic vegetation is relatively well represented.

Ruscova River Basin

R1 - (Socolău 20 m upstream the confluence with Răchita) is a swamp sector resulted from the damming of a spring by the road; the length of the station is about 15 meters, and the width is less than 3 meters; the bottom is rocky, with a thin lair of mud, the aquatic vegetation being poorly represented;

R2 - (Răchita 50 m upstream the confluence with Socolău) is a creek sector flowing along with the road; the length of the station is about 5 m, and the width is less than 0.5 m; the bottom is sandy and rocky, with high quantity of organic detritus, the aquatic vegetation being poorly represented; there are wood logs in the water, prepared for future transportation.

R3 - (Bardi 2 km upstream the confluence with Ruscova) is a canal at the side of the road, with pluvial and spring sources; the length of the station is about 10 m, and the width is around 20 to 30 cm; the bottom is sandy and loamy, with high quantity of organic detritus and of aquatic vegetation;

R4 - (Bardi at the confluence with Ruscova) is a stagnation sector of a Bardi affluent, caused by its damming from the road and by the level difference between the affluent and the canal from under the road; the station is cvasicircular in shape, with a diameter of around 2 m, the bottom is sandy with aquatic vegetation, and, on one side, there is wood stocked, probably scrap form primary treatment;

R5 - (Repedea 1 km upstream the confluence with Ruscova) consists of a chain of small temporary puddles, formed in tire tracks from transportation vehicles, near a wood storage area; total length of the station is around 25 m, its maximum width being of about 3 m; the bottom is sandy and loamy, there is no vegetation, and in the water are present substances from primary wood treatment (pieces of wood, sawdust, etc.).

Vişeu River Basin

V1 - (Vişeu 50 m upstream Moisei) is a large temporary puddle, located on a terrace of Vişeu, next to the national road and to some residential buildings; the length of the station is around 15 m, and the width is over 10 m, but the puddle is no more than 15 cm deep; the bottom is sandy and rocky, aquatic vegetation is absent, and the human impact is obvious: spots of hydrocarbons, garbage, pieces of wood;

V2 - (Vişeu 100 m downstream Vişeul de Jos) consists of a chain of small temporary puddles, formed in tire tracks from transportation vehicles, near a construction materials mining area; total length of the station is around 20 m, but the habitat is discontinuous, and the maximum width is no more than 2 m; the bottom is sandy and loamy, there is no vegetation, and there are traces of periodical human intervention in the habitat; also, there are traces of unnatural substances in the water (fuels, oil);

V3 - (Vişeu 250 m downstream the confluence with Ruscova) is a large temporary puddle, located in the flood plain of Vişeu, next to a wood industry scrap dump; the length of the station is around 7-8 m, and the width is over 4 m; the bottom is sandy and loamy, being also covered by a thick lair of sawdust from the damp; due to intense decompositions, the bottom is rich in organic detritus; aquatic vegetation is poorly represented, only in the shore area;

V4 - (Vişeu 400 m downstream the confluence with Frumuşeaua) is a river sector (a Vişeu affluent) partially dammed by a local road, in a way that in front of the dam, there is a low flowing sector, with deeper water; the length of the station was conventionally chosen at 5 m, the width being around 4 m; the bottom is rocky, without a lair of mud, and the aquatic vegetation is present at shores; due to low water speed and deeper water, the station acts as a settling area for floating materials, being highly influenced by human activities.

The samples showed the presence of seven species of the target group (Tab. 1), four belonging to Infrasubordo *Gerromorpha* (semiaquatic Heteroptera), and three to Infrasubordo *Nepomorpha* (aquatic Heteroptera). All species are eurivalent ones, found in aquatic habitats all around the country, excepting *Gerris paludum*. About this species, most authors consider it to be rare for the Romanian fauna, although it is found in most areas, this fact being probably the result of small number of individuals sampled, and not of the complete lack of the species. One cause for the small number of individuals is probably the species' preference for large still open waters (Andersen, 1982), where is in direct competition with *Gerris lacustris* Lineé 1758, the best adapted species of the group; another cause can be the fact that the majority of sampling stations are small, or the sampling is made at the shore, where few individuals of the species are present.

According to the list of aquatic and semiaquatic Heteroptera from Romania (Paina, 1975), none of the species were sampled in these specific locations, but all except *Velia (Plesiovelia) rivulorum* Fabricius 1794 were found in nearby regions (Sălaj, Bihor, Satu Mare or Maramureş areas). Some of them, like *Gerris lacustris* or *Nepa cinerea* Lineé 1758 are even named common species in the list. The absence from the list of the species is making them newly discovered in the area, as far as we know.

However, due to large ecological valences of the species, and to the large time interval since the list was made, it is possible that other researchers mentioned them since in the area, and the results were either unpublished or we were unable to consult them.

Table 1: The aquatic and semiaquatic Heteroptera sampled in the Maramureş Mountains Nature Park.

No.	Taxons (families, species)	Stations														
		F1	F2	F3	F4	F5	F6	R1	R2	R3	R4	R5	V1	V2	V3	V4
Infrasuborder Gerromorpha																
Fam. Gerridae																
1	*Gerris (Aquarius) paludum* Fabricius, 1794	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
2	*Gerris lacustris* Lineé, 1758	-	2	1	-	10	4	-	13	-	21	1	-	-	6	4
3	*Gerris costae* Herrich-Schäffer, 1853	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Fam. Veliidae																
4	*Velia (Plesiovelia) rivulorum* Fabricius, 1794 B	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Infrasuborder Nepomorpha																
Fam. Corixidae																
5	*Sigara* (*Pseudovermicorixa*) *nigrolineata* Jaczewski, 1962	-	-	-	-	16	-	1	-	-	-	1	5	1	-	-
6	*Sigara (Vermicorixa) lateralis* Leach, 1817	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Fam. Nepidae																
7	*Nepa cinerea* Lineé, 1758	-	3	-	2	1	-	4	-	1	-	-	-	-	-	-
Total		1	5	1	2	27	4	5	13	1	22	2	6	1	7	4

The values for biodiversity indexes selected to analyze the area are depicted in the table 2. Along with the values for each sampling point, we calculated the α-biodiversity values for each hydrographical basin (noted V, R and F), as well as the value for the entire area; for the Simpson Index, we used the reversed probability formula $D_s = 1 - l$, l being the normal Simpson Index (Sîrbu and Benedek, 2004); for this index, the values for five stations (F1, F3, R1, R3 and V2), as they result from the formula, are 1, meaning maximum biodiversity; in fact, the results are incorrect, because from each of those stations was sampled one individual, so the right value will be 0 - minimum biodiversity (Oloşutean, 2008); for an accurate analysis we present the results with the correct 0 values for the presented stations.

The Wilson-Smida Index has values only for hydrographic basins, because a gradient is needed to be applied (Sîrbu and Benedek, 2004); in our case, the choosed gradient was altitude. Menhinick Index values varies between 0.227 in R2 to 1.414 in R5, values that reveal low biodiversity; the values show the fact that a small number of species was sampled (ussualy one or two). If we relate to hydrographic basins or to the entire area, results are similar: values between 0.61 and 0.943, inside the interval of the stations, indicating the same situation - small number of species sampled (four for each station, seven in total).

Table 2: Biodiversity indexes values for the study area.

Station	Menhinick	Simpson	Wilson-Smida
F1	1	0	1.542
F2	0.894	0.6	
F3	1	0	
F4	0.707	0	
F5	0.577	0.53	
F6	0.5	0	
F	0.632	0.653	
R1	0.894	0.4	1.375
R2	0.227	0	
R3	1	0	
R4	0.426	0.091	
R5	1.414	1	
R	0.61	0.329	
V1	0.816	0.333	1.542
V2	1	0	
V3	0.756	0.286	
V4	0.5	0	
V	0.943	0.608	
Total	0.697	0.56	-

Simpson Index is showing a different situation, at least partialy. The values varies between 0 in 8 stations, to 1 in R5, in other words from minimum to maximum biodiversity possible. Even more, if we analyze all the stations, we can see that 12 out of 15 have values lower than 0.4, indicating less than 40% of the possible biodiversity. It is easy to conclude that biodiversity is low, aspect that will relate with Menhinick values.

The hydrographical basin values and the total value show a different picture: excepting Ruscova Basin, with values similar to majority of the sampling stations, Vişeu and Frumuşeaua have values over 0.6 (60% of possible biodiversity), and the total value is 0.56, higher than most stations. The explanation lies in the way this index sees biodiversity, as the probability that two individuals extracted randomly from a sample to belong to the same species; in that way, sampling station with small number of species normally will present low values, while a larger area, with a larger number of species, will probably show a larger value. The conclusion is that even though at a small level biodiversity values are not high, for the entire area the group is well represented from the Simpson point of view.

Wilson-Smida values are in correlation with the latter point of view: 1.542 for Vişeu and Frumuşeaua, 1.375 for Ruscova, values from an index that tends to be subunitary (Sîrbu and Benedek, 2004). In this case, the high values for this index are showing high variation along the gradient, and are also explaining the higher values of Simpson Index related to larger portions of the study area.

The conclusions for biodiversity analysis are that individual sampling points have low biodiversity, but the studied area presents higher values, both α- and β-biodiversity; the justification is that each aquatic and semiaquatic Heteroptera species is adapted to specific habitat conditions, making it difficult for many species to be found in a small sampling station (as most of them are). That explains why we found the highest number of individuals and species in F5, the largest and most heterogeneous sampling station from the area.

Cluster analysis was made for both species and sampling points with the method of complete linkage, using relative abundance as the reference value.

The graphic result for species sampled in the area (Fig. 2) is showing a group of four species: *Sigara (Vermicorixa) lateralis* Leach 1817*, Gerris costae* Herrich-Schäffer 1853, *Gerris paludum* and *Velia rivulorum*, with close relations, two more species: *Sigara (Pseudovermicorixa) nigrolineata* Jaczewski 1962 and *Nepa cinerea*, at a small distance from each other, and *Gerris lacustris* separate from the entire group. The analysis does not show preference for similar or complementary habitats or ecological niches; instead, it is revealing numerical proportion between the species: the four species that are close to one another are having only one individual in the samples we took, *Gerris lacustris* has the large majority of individuals and is present in almost three quarters of sampling stations, and the other two species are somewhere in between. The inconsistence of this graphic solution comes from the fact that we only took one sample from each station, so the number of individuals is low, a higher number presenting, probably, a different situation, at least for the group of four species with one individual. Due to his large ecological valence and adaptability, *Gerris lacustris'* position in the cluster is probably the correct one.

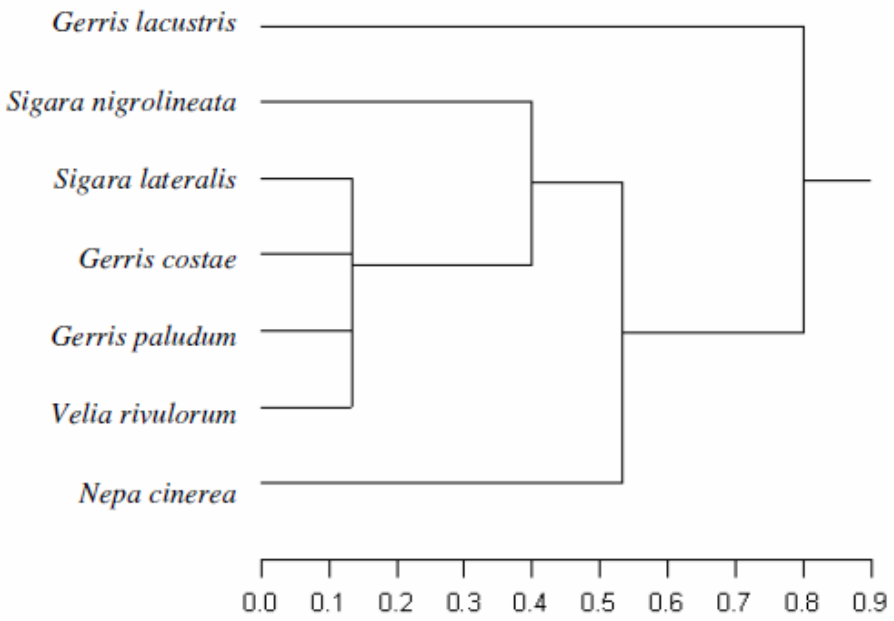

Figure 2. Cluster analysis for species sampled.

The cluster analysis made for sampling stations showing clearer results (Fig. 3). There are four groups of stations with close results: V4 and F6, both dammed river sectors, with changing conditions due to water flow, where only *Gerris lacustris*, the most adaptable species, was sampled; F4 and R3, canals at the side of the road, with slow flowing muddy water and low depth, perfect habitats for *Nepa cinerea*, the only species sampled; F3, R5 and V2, puddles or slow flowing areas with high atrophic impact, with few individuals from the least pretentious species of the target group: *Gerris lacustris* and *Sigara nigrolineata*; R2 and R4, larger stations, defined by the status of wood transport areas, where *Gerris lacustris* is highly dominant.

The rest of the stations are situated at a variety of distances related to each other, showing the same fact as biodiversity analysis: each species has a specific habitat or ecological niche, with the exception of *Gerris lacustris*, which is showing larger ecological valences; in fact, in changing conditions, it is the first species from the group to colonize open water, all the sampling stations in which it is not present being either swampy or canals, habitats with little open water; each station has its own particular conditions, so it will be colonized by the Heteroptera species best adapted to those conditions; in order to confirm that, the farthest station from the cluster analysis, F5, is the largest one, and the most heterogeneous from the area, offering micro niches for more species than any other station.

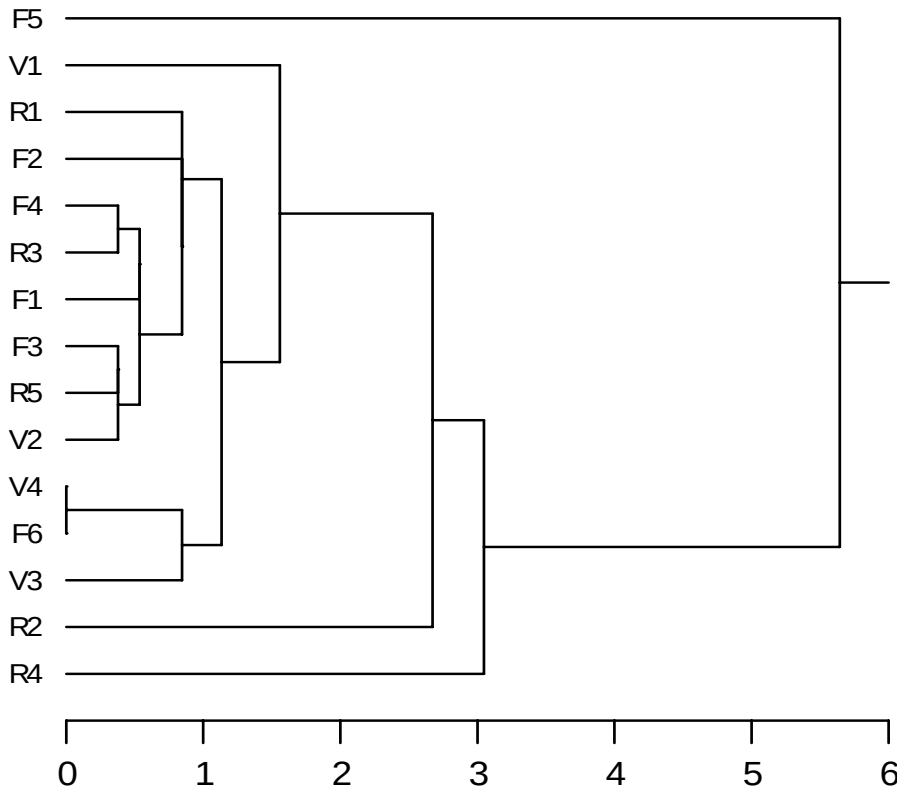

Figure 3: Cluster analysis for sampling points.

CONCLUSIONS

Aquatic and semiaquatic Heteroptera are represented in the northern and western part of Maramureş Mountains by seven species, mostly the common ones for the group in Romania. Compared to the 67 total number of species from Romania, the results are relatively low, fact in consistence with the small number of individuals captured (101 - imago).

The results obtained from biodiversity analysis are showing low values at a small range, but higher values for larger areas and high variation along gradients, which leads to the conclusion that most aquatic and semiaquatic Heteroptera species are well adapted to particular habitat conditions. This idea is sustained also by cluster analysis, showing similar species distribution for similar habitat conditions.

Low values from sampling points are the result of the quality of the aquatic habitats, fact that can be explained from the two different points of view: intense atrophic impact, represented by organic or mineral pollution in the aquatic environment, as well as territorial improvement (terrain levelling, water banking) which leads to absence of specific habitats to the group (still waters, puddles, low flow sectors); physico-geographical conditions, such as crystalline rock substratum in most areas, leading to rapid meteorically water infiltration, as well as to rapid flows of the local rivers and springs, concur to the absence of a category of habitats that are preferred by Heteropterans; also, the relatively harsh climatic conditions may be influenced the group's distribution (the species present are with wider ecological values).

The species sampled are new for the area, as far as we know, probably because of the lack of research made on the group. The results of this study can be improved by further research in the area.

ACKNOWLEDGEMENTS

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THE MIRIDAE (HETEROPTERA) SPECIES LIST OF MARAMUREŞ (ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, Heteroptera, Miridae.

ABSTRACT

Our paper presents a systematic list of Miridae species from the Maramureş region in the northern part of Romania. It is based on available literature data, on our own material collected during in 1996 in the field trips of the "Grigore Antipa" National Natural History Museum researchers in the Maramureş region, and also on the determined material preserved at this museum (A. L. Montanton collection and collected material from the last 50 years). The whole number of determined specimens in the framework of our research amounts to about 4000. They are integrated as Heteroptera collection in the "Fauna of Romania" of the "Grigore Antipa" National Natural History Museum.

ZUSAMMENFASSUNG: Liste der Miridenarten der Maramuresch (Rumänien).

Die vorliegende Arbeit beinhaltet eine systematische Aufzählung der Miriden der Maramuresch und stützt sich dabei sowohl auf die vorhandenen Angaben aus der Fachliteratur als auch auf das von uns 1996 während der Geländearbeiten mit der Forschergruppe des „Grigore Antipa"-Museums in der Maramuresch gesammelte Material und auf die Bestimmungen der Exemplare des „Grigore Antipa"-Museums (Sammlung A. L. Montandon sowie die Aufsammlungen der letzten 50 Jahre). Die Gesamtzahl der bestimmten Exemplare beträgt etwa 4000. Sie sind als Heteropterensammlung der "Fauna Rumäniens" eingegliedert.

REZUMAT: Lista speciilor de miride (Heteroptera) din Maramureş (România).

Lucrarea de față prezintă lista sistematică a miridelor din Maramureş şi se bazează atât pe citările din literatura de specialitate, cât şi pe studierea materialului colectat de noi în 1996 în Maramureş, cu ocazia deplasărilor efectuate cu colectivul de cercetători din Muzeul Național de Istorie Naturală „Grigore Antipa", la care s-au adaugat determinările asupra pieselor conservate în colecțiile acestui muzeu (colecția A. L. Montandon şi colectările din ultimii 50 de ani). Numărul total de exemplare determinate cu ocazia acestui studiu se ridică la aproximativ 4000. Aceste piese, sunt incluse în prezent în colecția de heteroptere „Fauna României" a Muzeului Național de Istorie Naturală „Grigore Antipa".

INTRODUCTION

Zoological studies made in Romania and worldwide during the last 10-15 years, communication efficiency between specialists and the specialized institutions of the world revealed the necessity of the global biodiversity study at a specific level.

Within this context, we think that any kind of study on an insect group, no matter the taxonomic level (order, family, genus, etc.), represents a step forward to the knowledge of the entomofauna of a certain country, of a continent, creating the possibility of a correct evaluation of any zoogeographical area, a step which is absolutely necessary in forming a general view on

the creatures we share this planet, no matter small or modest it would be. Heteropterans, whose species number cannot be not even approximately estimated, belong to the category of the less studied insects of the Romanian fauna, taking into account that most of the families of this group have never been the subject of a paper of synthesis. This is confirmed also by the absence of the reports on the Romanian species from the catalogues of different heteropteran families lately published, published more and more by the foreign specialists.

Order Heteroptera includes almost 40,000 species belonging to three suborders and 50 families, over 1,000 of them occurring also in Romania. They are common species, known as bugs, widely distributed in the terrestrial and aquatic biotopes. The necessity of their knowledge, both from faunistic point of view and of the species biology and their ecological preferences, is very important because most of the terrestrial heteropterans are either pest to the cultivated plants or entomophagous insects, very important in the nature economy and biological control.

Family Miridae is known, as the richest in species of the entire Heteroptera Order. For the time being, about 5,000 species are known in the world fauna, out of which 2,808 were reported in the Palaearctic Region, too. As the published data on this group, prevalent in the heteropteran fauna of Romania, are little and spread along 100 years, we considered that the publishing of a paper dedicated to the Romanian Miridae heteropterans could be not only useful but also necessary, the more so that the inventory of the European and Palaearctic fauna is obviously prior and current for the entomologists from different countries of Europe.

RESULTS

This paper present the systematical list of the Miridae from Maramureş and is based both on bibliography and on original biological material colected by the author in 1996 in Maramureş. At these were added also the data based on the study of the individuals of the "Grigore Antipa" National Museum of Natural History colections (A. L. Montandon colection and the material colected in the last 50 years). This study is based on around 4000 identified individuals, all of them being included in the heteropterans collection "Romanian Fauna".

Subfamily Bryocorinae Baerensprung, 1860

Genus *Bryocoris*: *Bryocoris pteridis* (Fallén, 1807), Mon. Cim. Sveciae: 105; *Capsus pulcher* Sahlberg, 1848, Mon. Geoc.: 93 (macropter form). Distribution: Eurasiatic species, montaneous. Distribution in Romania: Maramureş: Baia Mare (MM); Baia Mare (MM), Cavnic (MM), Strâmtura - Valea Slătioarei (MM);

Genus *Monalocoris*: *Monalocoris filicis* (Linnaeus, 1758), Syst. Nat. ed. X: 443: var. *atlantica* Lindberg, 1941. Soc. Sci. Fenn. Comm. Biol., VIII (8): 16. Distribution: Palearctic species, mountainous, Distribution in Romania: in the mountainous areas. Maramureş: Baia Mare (MM) - (1); Munţii Rodnei - Vârful Golgota, Lacul Iezer (MM), 12 - 13.07.1995, leg. C. P.; Strâmtura Forestry Cabin - Podul Slătioara (MM), 3.VII.1995, leg. A. S.; Săpânţa (MM), 9 - 12.07.1996, leg. A. S.; Repedea - Poiana Smereceni (MM), 22.08.1997, leg. C. P.

Subfamily Deraeocorinae Douglas - Scott, 1865

Genus *Deraeocoris*: *Deraeocoris (Deraeocoris) olivaceus* Fabricius, 1776, Gen. Ins.: 300; *Cimex triangularis* Goeze, 1778, Ent. Beitr., II: 278; *Cimex rufipes* Fabricius, 1803, Syst. Rhyng.: 242; var. *media* Kirschbaum, 1856, Caps. Umg. Wiesb.: 212; var. *fallax* Horvath, 1884, Termesz. Füzet., VIII: 317; var. *larvata* Horvath, 1884, ib.; var. *erythrostoma* Schrank, 1801, Fn. Boic.: 86. Distribution: Eurasiatic. Distribution in Romania: frequent in the hilly and mountainous areas of Romania (over 1000 m) Maramureş: Ieud (MM), Sighetul Marmaţiei - Vadu Izei (MM).

Deraeocoris (Deraeocoris) ruber (Linnaeus, 1758), Syst. Nat., éd. X: 446; *Cimex gothicus* Scopoli, non Linnaeus, 1763, Ent. Car.: 131; *Capsus laniarius* Linnaeus, 1767, Syst. Nat., éd XII: 726; *Cimex capilaris* Fabricius, 1775, Syst. Ent.: 725; *Cimex cymbricus* Müller, 1776, Zool. Dan.: 106; *Cimex croceus* Goeze, 1778, Ent. Beitr., I: 265; *Cimex rubroacuminatus* Goeze, 1778, ib.; *Cimex luteus* Goeze, 1778, ib.; *Cimex biguttatus* Goeze, 1778, ib.; *Cimex rubens* Harris, 1781, Expl. Engl. Ins.: 90; *Cimex melinus* Harris, 1781, ib.; *Cimex flammesus* Geoffroy, 1785, dans Fourcroy, Ent. Paris: 210; *Cimex rufescens* Gmelin, 1788, Syst. Nat., éd XIII: 2160; *Cimex chrysocephalus* Gmelin, 1788, ib.: 2164; *Cimex fuliginosus* Gmelin, 1788, ib.: 2164; *Cimex haematocephalus* Gmelin, 1788, ib.: 2166; Cimex *haematostictus* Gmelin, 1788, ib.: 2181; *Cimex adustus* Gmelin, 1788, ib.: 2185: *Cimex bimaculatus* Schrank, 1801, Fn. Boic.: 89; *Cimex olivaceus* Schrank, 1801, non Fabricius, ib.: 81; *Cimex daniae* Turton, 1806, Syst. Nat., II: 674; *Cimex geniculatus* Turton, 1806, ib.: 687; var. *segusina* Müller, 1766, Man. Ins. Taur.: 191; var. *danica* Fabricius, 1794, Ent. Syst., IV: 181; var. *tricolor* Fabricius, 1787, Mant. Ins.: 306; var. *concolor* Reuter, 1896, H. G. E. V.: 34; var. *fieberi* Stichel, 1930, Ill. Best. Tab.: 199; var. *dobsiki* Stehlik, 1948, Fol. Ent. Prag., XI: 5. Distribution**:** Palearctic region. Distribution in Romania: frequent in all the regions of Romania. Maramureş: Ieud (MM), Sighetul Marmaţiei - Vadu Izei (MM); Ieud (MM), 8.07.1995, leg. C. P.; Ieud (MM), 8.09.1995, leg. C. P.; Sighetul Marmaţiei - Vadu Izei (MM), 9.07.1995, leg. A. S.; Săpânţa (MM), 12.07.1996, leg. A. S.; Crasna Vişeului (MM), 23.07.1997, leg. C. P.; Leordina (MM), 22.07.1997, leg. C. P.; Berbeşti (MM), 24.07.1998, leg. C. P.

Subfamily Dicyphinae Reuter, 1883

Genus *Macrolophus*: *Macrolophus costalis* Fieber, 1858, Wien. Ent. Mon., II: 342. Distribution: Palearctic. Distribution in Romania: the first in the heteropterans of Romania. col.: Săpânţa (MM), 20.05.1996, leg. A. S.

Macrolophus pygmaeus (= *nubilus*, Herrich - Schäffer, 1835) Rambur, 1839, Faune Ent. And al. 2, p. 163; *Macrolophus melanotoma* Costa, 1852, Cim. Neap. 3, p. 269; *Macrolophus insignis* Josifov, 1968, Ann. Zool., Warszawa 25 (11), p. 453-454; *Macrolophus balcanicus* Wagner, 1969, Acta Ent. Mus. Nat. Pragae 33, p. 341; *Macrolophus nubilis geranii* Josifov, 1961, Comptes Rendus de l'Acad. Bulg. Sci. 14: 87-89. Distribution: Palearctic. Distribution in Romania: known in all the regions of Romania. Maramureş: Săpânţa, Valea Săpâncioarei (MM), 20.05.1996, leg. A. S.

Genus *Dicyphus*: *Dicyphus (Dicyphus) pallidus* Herrich - Schäffer, 1835, Wanz. Ins., III: 51; var. *nigricollis* Garbriglietti, 1869, Boll. Soc. Ent. Ital., I: 193. Distribution: European. Romanian Distribution: absent in south. Maramureş: Moisei (MM), 21.08.1997, leg. C. P.

Dicyphus (Dicyphus) constrictus (Boheman, 1852), Öefv. Vet. Ak. Förh.: 74; *Capsus pallidus* Thomson, 1871, non Herrich - Schäffer, Op. Ent., IV: 435; ? *Capsus collaris* Zetterstedt, 1840, non Fallén, Ins. Lappon.: 279. Distribution: Euroasiatic. Romanian Distribution: eastern, center, northern Romania. Maramureş: Mara (MM), 17.07.1998, leg. C. P.

Dicyphus (Dicyphus) errans (Wolff, 1804), Wanz. f.: 155; *Capsus collaris* Fallén, 1807, Mon. Cim. Sveciae: 125; var. *longicollis* (Fallén, 1829), Hem. Suec. Cim.: 125. Distribution: Eurasiatic. Distribution in Romania: known in all the regions, excepting Dobrogea. Maramureş: Bârsana (MM), 5.07.1995, leg. I. M.;

Dicyphus (Brachyceroea) geniculatus Fieber, 1858, Wien. ent. Mon., II: 343; var. *disjuncta* Reuter, 1903, Ent. M. Mag., XX: 121. Distribution: Eurasiatic. Romanian Distribution: known in the north, west and the center of Romania. Maramureş: Sârbi (MM), 19.07.1998, leg. Ş. P.

Genus *Campyloneura*: *Campyloneura virgula* (Herrich - Schäffer, 1835), Wanz. Ins., III: 51 (♀); *Miris pulchellus* Guerin, 1843, Icon. Règne Anim., II, t. 56, III: 348; E. Wagner, 1958, Nachr. Bl. Bayr. Ent., VI (♂). Distribution: Palearctic species introduced in North America. Distribution in Romania: new signalization in the Romanian fauna. Maramureş: Săpânța (MM), 12.07.1996, leg. A. S.

Subfamilia Mirinae Hahn, 1833

Genus *Leptopterna*: *Leptopterna dolabrata* (Linnaeus, 1758), Syst. Nat., (d. X: 449; ? *Cimex frumentarius* Poda, 1761, Ins. Mus. Graec.: 60*; Cimex riparius* Scopoli, 1763, Ent. Carn.: 135; *Cimex laevigatus* de Geer, 1773, Mem., III: 292; *Cimex lateralis* Fabricius, 1776, Gen. Ins.: 300; *Cimex antenni - rectus* Goeze, 1778, Ent. Beitr., II: 267; *Cimex v - flavum* Goeze, 1778, ib.: 279; *Cimex porrectus* Geoffroy, 1785, dans Fourcroy, Ent. Paris: 206; *Cimex recticornis* Gmelin, 1788, Syst. Nat., éd. XIII: 2185; *Miris abbreviatus* Wolff, 1802 (♀), Wanz.: 110; ? *Miris pictipes* Curtis, 1838, Brit. Ent., XV: 701; *Miris belangeri* Provencher, 1890, Natur. Canad., IV: 78; var. *aurantiaca* Reuter, 1875, rev. Crit. Caps., II: 16, Distribution: Europe, Asia, introduced also in North America. Distribution in Romania: in all the regions of Romania, exception Dobrogea and Danube Delta. Maramureş: Pitrosul Rodnei - Pietrosu Peak (MM), 4.08.1963, leg. I. S.; Săcături (MM), 7.07.1995, leg. C. P.; Bârsana (MM), 5.07.1995, leg. I. M., Săpânța (MM), 5 - 12. 07.1996, leg. A. S.; Mara (MM), 7.07.1998, leg. C. P.; Sârbi (MM), 19.07.1998, leg. C. P.; Repedea - Poiana Smereceni (MM), 22.08.1997, leg. A. S.;

Leptopterna ferrugata (Fallén, 1807), Mon. Cim. Sveciae: 129; *Lopus discors* Costa, 1852, Cim. Regn. Neap. Cent. III: 57; *Leptoterna dolobrata* Fieber, 1861, prt. Eur. Hem.: 245; var. *albescens* Reuter, 1891, Öefv. Fin. Vet. Soc. Förh., XXXIII: 188. Distribution: Europe, Asia, North America - introduced. Romanian Distribution: in all Romania, in the forested areas, exception Dobrogea and Danube Delta. Maramureş: Valea Frumoasei (MM) - (1);

Genus *Stenodema*: *Stenodema (Brachystira) calcarata* (Fallén, 1807), Mon. Cim. Sveciae: 131; *Miris dentatum* Hahn, 1831, Wanz. Ins., I: 15; var. *virescens* Fieber, 1861, Eur. Hem.: 241; var. *grisescens* Fieber, 1861, ib.; var. *rubricatus* Rey, 1894, l'Échange, X: 1; var. *pallescens* Reuter, 1904, Öefv. Fin. Vet. Soc. Förh., XLVI (15): 8; var. *fuscescens* E. Wagner, 1949, Entomon., I (2): 35. Distribution: Palearctic. Distribution in Romania: in all the regions; Maramureş: Bârsana (MM), Călineşti (MM), Ieud (MM) and Moisei (MM), Ieud (MM), 4.07.1995, leg. C. P.; Bârsana (MM), 5.07.1995, leg. I. M.; Săpânța (MM), 5.07.1996, leg. A. S., Berbeşti (MM), 24.07.1998, leg. I. M.; Ocna Şugatag (MM), 14.07.1998, leg. C. P.

Stenodema (Brachytropis) trispinosa Reuter, 1904, XLVI (15): 4; var. *virescens* Reuter, 1904, l. c.; var. *grisescens* Reuter, 1904, l. c.; var. *pallescns* E. Wagner, 1947, Bombus: 313; var. *reducta* E. Wagner, 1949, l. c.; var. *nigrescens* E. Wagner, 1949, l. c.; var. *quadrispinosa* E. Wagner, 1949, l. c.; var. *pulla* Stichel, 1951, Ill. Best. Tab., II: 567. Distribution: Holarctic. Romanian Distribution: first signalization in Romania. Maramureş: Strâmtura, Valea Slătioara - Pârâul Berşotă (MM), 7.09.1995, leg. A. S.; Strâmtura (MM), 7.09.1995, leg. C. P.; Ieud (MM), 4.07. 1995, leg. C. P.; Săpânța (MM), 12.07.1996, leg. A. S.; Berbeşti (MM), 24.07.1998, leg. A. S.

Stenodema (Stenodema) virens (Linnaeus, 1767), Syst. Nat., éd. XII: 730; *Miris laevigatum* Zetterstedt, 1828, non Linnaeus, Ins. Lapp.: 501; *Miris ruficornis* Hahn, 1834, non Geoffroy, Wanz. Ins., II: 220; var. *virescens* Fieber, 1861, Eur. Hem.: 242; var. *testacea* Reuter, 1875, Rev. Crit. Caps., II: 3; var. *nigrofusca* Fokker, 1885, Tijdschr. Ent., XXVIII: 54; var. *fulva* Fieber, 1836, Wietenw. Beitr., I: 101. Distribution: Palearctic. Romanian distribution: in all the coniferous forests, introduced in the Danube Delta with the black pine plantations. Maramureş: Borşa, "Pietrosul Rodnei" National Park (MM) (1370 m and 2000 m), Rodnei Mountainous - Pietrosu Peak (MM), 14.09.1995, leg. C. P.; Ocna Şugatag (MM), 14.07.1998, leg. C. P.

Stenodema (Stenodema) laevigata (Linnaeus, 1785), Syst. Nat., éd. X: 449; *Cimex frumentarius* Poda, 1761, Ins. Mus. Graec.: 60; ? *Cimex testaceus* Scopoli, 1763, Ent. Caen.: 135; ? *Cimex albolineatus* Goeze, 1778, Ent. Beitr.: 280; *Cimex pallidus* Harris, 1776, Expl. Engl. Ins.: 90; *Cimex lateralis* Geoffroy, 1785, dans Fourcroy, Ent. Paris: 209; ? *Cimex luecogrammus* Gmelin, 1788, Syst. Nat., éd. XIII: 2194; ? *Cimex pallescens* Donovan, 1794, Brit. Ins., III: 101; *Miris virens* Hahn, 1834, non Linnaeus, Wanz. Ins., II: 79; *var. virescens* Fallén, 1829, Hem. Suec. Cim.: 130; *var. pallescens* Fallén, 1829, ib.; *var. grisescens* Fallén, 1829, 16; *var. melas* Reuter, 1904, Öefv. Fin. Vet. Soc. Förh., XLVI (15): 16; *var. sulphurea* Westhoff, 1881, 9. Jahresber. Westf. Prov. Ver. Wiss. Kunst: 76; *var. albicans* Westhoff, 1881, ib. Distribution: Palearctic. Distribution in Romania: known all over the country. Maramureş: Strâmtura (MM), 3.07.1995, leg. C. P.; Săpânța (MM), 5 - 12.07.1996, leg. A. S.; Repedea - Poiana Smereceni (MM), 22.08.1997, leg. C. P.; Deseşti (MM), 18.07.1998, leg. C. P.

Stenodema (Stenodema) sericans (Fieber, 1861), Eur. Hem.: 140. Distribution: European, mountainous. Romania Distribution: only in the mountainous regions. Maramureş: Borşa, "Pietrosul Rodnei" National Park (MM) (1,400-2,000 m), 12.07.1995, leg. C. P.;

Stenodema (Stenodema) holsata (Fabricius, 1787), Mant. Ins.: 306; var. *viridilimbata* Reuter, 1904, Öefv. Fin. Vet. Soc. Förh., XLVI (15): 21; var. *testacea* Reuter, 1904, ib.; var. *dorsalis* Reuter, 1904, ib. Distribution: Euroasiatic. Romanian Distribution: in mountains only, absent in Dobrogea, Danube Delta. Maramureş: Borşa, "Pietrosul Rodnei" National Park (1,400-1,900 m) (MM), Ieud (MM); Ieud (MM), 4.07.1995, leg. C. P.; Săpânța (MM), 5.07.1996, leg. A. S.; Crasna Vişeului (MM), 23.08.1997, leg. C. P.; Deseşti (MM), 18.07.1998, leg. C. P.

Genus *Notostira*: *Notostira elongata* (Geoffroy, 1785), dans Fourcroy, Ent. Paris: 208; E. Wagner, 1957, Nachr. bl. Bayr. Ent., VI (1): 1-5. Distribution: Palearctic. Romanian Distribution: frequent everywhere, except in south (Dobrogea, Danube Delta). Maramureş: Călineşti (MM) - (30), *Notostira erratica* (Linnaeus, 1758), Syst. Nat., ed. X: 449; E. Wagner, 1957, Nachr. bl. Bayr. Ent., VI (1): 1-5. Distribution: Euroasiatic. Distribution in Romania: frequent in all the regions. Maramureş: Călineşti (MM); Bârsana (MM), 5.07.1995, leg. I. M.; Călineşti (MM), 7.07.1995, leg. I. M.; Ocna Şugatag (MM), 14.07.1998, leg. C. P.; Berbeşti (MM), 24.07.1998, leg. C. P.

Genus *Megaloceroea*; *Megalocoerea recticornis* (Geoffroy, 1785), in Fourcroy, Ent. Par.: 209; *Cimex linearis* Fusslin, 1775, non Fabricius, Verz. Schw. Ins.: 26; *Miris longicornis* Fallén, 1807, Mon. Cim. Suec: 129; *Miris megatoma* Mulsant and Rey, 1852, Ann. Linn. Lyon: 107; Carvalho, 1955, Beitr. Z. Ent., V: 334. Distribution: Holarctic. Distribution in Romania: frequent in all the regions excepting Dobrogea. Maramureş: Bârsana (MM), Călineşti (MM), Moisei (MM), Strâmtura (MM); Munții Făgăraşului - Cascada Bâlea (SB), 24 - 26.07.1994, leg. C. P.; Aleşd (BH), 24 - 37.06. 1994, leg. A. S.; Strâmtura (MM), 3.07.1995, leg. C. P.; Moisei (MM), 13.07.1995, leg. A. S.; Săpânța (MM), 5 - 12.07.1996, leg. C. P.; Repedea - Poiana Smereceni (MM), 22.08.1997, leg. C. P.; Vişeuț (MM), 20.08.1997, leg. C. P., Băile Herculane (CS), 23 - 24 - 06 - 1998, leg. R. T., Mara (MM), 17.07.1998, leg. C. P.; Ocna Şugatag (MM), 14.07.1998, leg. C. P.;

Genus *Trigonotylus*: *Trigonotylus pulchellus* (Hahn, 1834), Wanz. Ins., II: 119; var. *pseudoruficornis* Stichel, 1957, Ill. Best. Tab., II: 575; var. *wagneri* Stichel, 1957, ib.; E. Wagner, 1953, Nachr. Natw. Mus. Aschaffenbg., XL: 59. Distribution: Palearctic. Distribution in Romania: in all the regions, excepting Banat. Maramureş: Frumuşeaua (MM), 23 - 29.08.1997, leg. C. P.; Rona de Sus (MM), 20.07.1998, leg. C. P.

Trigonotylus ruficornis (Geoffroy, 1785), in Fourcroy, Ent. Paris: 209; var. *viridicornis* Reuter, 1901, Öefv. Fin. Vet. Förh., XLIII: 213; var. *pseudopulchellus* Stichel, 1957, Ill. Best. Tab., II: 575; var. *albescens* Sahlberg, 1880, Christ. Ved. Sallsk. Förh., IX: 4; E. Wagner, 1953, l. c.: 59. Distribution: Palearctic. Romanian Distribution: frequent everywhere. Maramureş:; Izvorul Izei (MM), 6.07.1995, leg. I. M.; Strâmtura (MM), 7.09.1995, leg. C. P.; Săpânţa (MM), 11.07.1996, leg. A. S.; Repedea - Poiana Smereceni (MM), 22.08.1997, leg. A. S.; Ocna Şugatag (MM), 14.07.1998, leg. C. P.; Berbeşti (MM), 24.07.1998, leg. C. P.

Genus *Phytocoris*: *Phytocoris (Ktenocoris) ulmi* (Linnaeus, 1758), Syst. Nat., éd. X: 449; *Cimex floralis* Fabricius, 1787, Mant. Ins., II: 303; *Coreus purgator* Fabricius, 1798, Ent. Syst., Suppl.: 537; *Lygaeus vividus* Fabricius, 1803, Syst. Rhyng.: 237; *Miris longicornis* Wolff, 1804, Wanz. f. 149; *Phytocoris divergens* Meyer - Duer, 1843, Caps.: 44. Distribution: Eurasiatic. Distribution in Romania: known in the Romanian wooden areas.

Phytocoris (Phytocoris) longipennis Flor, 1861, Rhynch. Livl., II: 601; *Phytocoris populi* Kirschbaum, 1856, non Linnaeus, Caps. Wiesb: 168; *Phytocoris dimidiatus* Fieber, 1861, non Kirschbaum, Eur. Hem.: 260; var. *signata* Reuter, 1875, Rev. Crit. Caps., II: 24; var. *grisescens* Sahlberg, 1920, Enum. Hem. Het. Fn. Fenn.: 113. Distribution: Eurasiatic. Romanian distribution: hilly and mountainous areas. Maramureş: Crasna Vişeului (MM), 23 - 29.08.1997, leg. C. P.

Genus *Adelphocoris*: *Adelphocoris seticornis* (Fabricius, 1775), Syst. Ent.: 725; *Cimex bimaculatus* Sulzer, 1761, non Linnaeus, Kennz. D. Ins.: 28; *Cimex exoletus* Gmelin, 1758, Syst. Nat., ed. XIII: 2165; *Cimex hirtus* Schrank, 1801, Fn. Boic.: 81; *Miris tibialis* Wolff, 1802, Wanz., f. 111; *Phytocoris lateralis* Fallén, 1829, Hem. Suec., Cim.: 88; *Phytocoris apicalis* Hahn, 1831, Wanz. Ins., I: 220; var. *nigra* Reuter, 1896, H. G. E., V: 211; var. *plagifer* Reuter, 1896, ib.; var. *pallidipennis* Reuter, 1896, ib.; var. *femoralis* E. Wagner, 1947, Bombus, 35, no. 278. Distribution: Eurasiatic. Distribution in Romania: frequent in all the areas of Romania. Maramureş: Gutin Peak (MM); Strâmtura (MM) and Săcel - Izvorul Albastru al Izei (MM); Strâmtura (MM), 7.09.1995, leg. C. P.; Crasna Vişeului (MM), 23.08. 1997, leg. C. P.; Mara (MM), 17.07.1998, leg. C. P.; Corneşti (MM), 19.07.1998, leg. C. P.;

Adelphocoris reichelii (Fieber, 1836), Weitenw. Beitr.: 103; var. *kellneri* Stichel, 1957, Ill. Best. Tab., II: 646; var. *breddini* Stichel, 1957, ib. Distribution: Eurasiatic. Distribution in Romania: frequent in Romania, excepting Dobrogea and Danube Delta. Maramureş: Sighetul Marmaţiei (MM); Vadu Izei (MM), 9.07.1995, leg. I. M.;

Adelphocoris detritus (Fieber, 1861), Eur. Hem.: 257; ? *Phytocoris salvie* Hahn, 1834, Wanz. Ins., II: 133; var. *cumulata* Stichel, 1957, Ill. Best. Tab., II: 648. Distribution: Eurasiatic. Romanian Distribution: everywhere. Maramureş: Bârsana (MM), Strâmtura (MM); Bârsana (MM), 8.09.1995, leg. C. P.; Strâmtura (MM), 7.09.1995, leg. C. P.; Corneşti (MM), 19.07.1998, leg. C. P.;

Adelphocoris josifovi E. Wagner, 1968, Reichenbachia 10: 119-125. Distribution: small areal in Europe: AL, BU, CZ, MC, PL, RO, SK. Distribution in Romania: the first signalization in Romania. Maramureş: Onceşti (MM), 10.07.1995, leg. I. M.; Bârsana (MM), 8.09.1995, leg. C. P.; Crasna Vişeului (MM), 23.08.1997, leg. C. P.

Adelphocoris lineolatus (Goeze, 1778), Ent. Beitr., II: 267; *Cimex albicans* Geoffroy, 1785, dans Fourcroy, Ent. Paris: 208; *Miris laevigatus* Wolff, 1800, non Linnaeus, Wanz. F.: 36; *Lygaeus chenopodii* Fallen, 1807, Mon. Cim. Sveciae: 74; *Phytocoris bipunctatus* Burmeister, 1835, Handb. Ent., II: 27; ? *Capsus brevicollis* Meyer - Duer, 1843, Caps.: 47; var. *binotata* Hahn, 1831, Wanz. Ins., I: 202; var. *implagiata* Westhoff, 1881, 9. Jahr. Ber. Westf. Ges. Wiss. Kunst.: 74; var. *baltrumensis* Schumacher, 1911, Ent. Rundsch., XXVII: 169. Distribution: Holarctic. Romanian Distribution: everywhere. Maramureş: Bârsana (MM), Ieud (MM), Sighetul Marmaţiei (MM), Strâmtura (MM); Strâmtura (MM), 7.09.1995, leg. C. P.; Bârsana (MM), 8.09.1995, leg. C. P.; Săpânţa (MM), 5 - 12.07.1996, leg. A. S.; Repedea - Poiana Smereceni (MM), 22.08.1997,

leg. C. P.; Crasna Vişeului (MM), 23.07.1997, leg. C. P.; Berbeşti (MM), 24.07.1998, leg. C. P.; Corneşti (MM), 19.07.1998, C. P.;

Adelphocoris annulicornis (Sahlberg, 1848), Mon. Geoc.: 100; *Lygaeus quadripunctatus* Fabricius, 1794, non Villers, Ent. Syst., IV: 172; subspec. *innotatus* Reuter, 1906, Ann. Mus. Zool. St. Petersburg, X: 20; subspec. *hercynicus* E. Wagner, 1937, Verh. Ver. Natw. Heim. Hamburg, XXXVI: 16; subspec. *uniannulatus* E. Wagner, 1937, ib.; var. *communis* Stichel, 1957, Ill. Best. Tab., II: 653; var. *despoliata* Stichel, 1957, ib. Distribution: European, very low: CZ, GE, SK. Romanian distribution: everywhere, except Dobrogea. Maramureş: Bârsana and Onceşti (MM); Berbeşti (MM), 24.07.1998, leg. C. P.; Ieud (MM), 8.09.1995, leg. C. P.; Crasna Vişeului (MM), 23 - 29.08.1997, leg. C. P.

Genus *Calocoris*: *Calocoris (Lophyromiris) sexguttatus* (Fabricius, 1776), Gen. Ins.: 299; ? *Cimex sexmaculatus* Müeller, 1776, Zool. Dan.: 108; ? *Cimex termaculatus* Goeze, 1778, Ent. Beitr., II: 267; ? *Cimex ternatus* Geoffroy, 1785, dans Fourcroy, Ent. Paris: 206; var. *vittifera* Reuter, 1896, H. G. E., V: 167; var. *reducta* Reuter, 1909, Öefv. Fin. Vet. Soc. Förh., XLVI: 2; var. *kolenatii* Fieber, 1864, Wien. Nt. Mon., VIII: 219; var. *extensa* Stehlik, 1952, ib.; Stys, 1951, Act. Soc. Ent. Czech., LIV (1): 1; E. Wagner, 1958, Dtsch. Ent. Z. (N. F.), V (1): 87. Distribution: European. Distribution in Romania: in all hilly and mountains areas, excepting Dobrogea. Maramureş: Borşa, "Pietrosul Rodnei" National Park (between 1,400 m and 2,000 m altitude) (MM), Săcel - Izvorul Albastru al Izei, (MM); Izvorul Izei (MM), 10.07.1995, leg. A. S.; Săpânța (MM), 5.07.1996, leg. C. H.;

Genus *Closterotomus*: *Closterotomus biclavatus biclavatus* (Herrich - Schäffer), 1835, Nomencl.: 48; ? *Cimex quadriguttatus* Goeze, 1778, Ent. Beitr., II: 275; *Phytocoris bifasciatus* Hahn, 1835, Wanz. In., III: 7; *Calocoris variegatus* Reuter, 1875, non Costa, Gen. Cim.: 12; var. *inducens* Stichel, 1930, Ill. Best. Tab: 167; var. *schillingi* Scholtz, 1846, Arb. Ver. Schles. Ges.: 182. Distribution: Eurasiatic. Distribution in Romania: montainous species, less frequent. Maramureş: Colibi Forestry Cabin (MM), 8.07.1996, leg. C. P.;

Closterotomus fulvomaculatus (De Geer, 1773), Mem., III: 294; ? *Cimex bimaculatus* Linnaeus, 1758, Syst. Nat., ed. X: 449; *Cimex rolandri* Retzius, 1783, Gen. and Spec.: 88; *Cimex genistae* Schrank, 1801, non Scopoli, Fn. Boic.: 87; *Cimex seticornis* Schrank, 1801, ib.; *Lygaeus saltatorius* Fabricius, 1803, Syst. Rhyng.: 239; *Phytocoris femoralis* Lucas, 1849, Expl. Alg., Hem.: 82; *Calocoris distinguendus* Garbiglietti, 1869, Boll. Soc. Ent. Ital., I: 184; *Calocoris simplicornis* Strobl, 1900, Mitt. Natw. Ver. Steierm., XXXVI: 189; var. *isabellina* Westhoff, 1886, 9. Jahr. Ber. Westf. Ver. Wiss. Kunst: 80; var. *versicolor* Stichel, 1930, Ill. Best. Tab.: 168; var. *biplagiata* Stichel, 1930, ib.; var. *fulva* Stichel, 1930, ib.; var. *deliquata* Stichel, 1930, ib. Distribution: Holarctic. Distribution in Romania: everywhere. Maramureş: Borşa (MM), 4.08.1963, leg. I. S.; Colibi Forestry Cabin (MM), 8.07.1996, leg. C. P.;

Closterotomus norwegicus (Gmelin, 1790), Syst. Nat., éd. XIII: 2176; *Cimex pabulinus* Scopoli, 1763, non Linnaeus, Ent. Caern.: 132; *Cimex bipunctatus* Fabricius, 1779, non Linnaeus, Reise n. Norw.: 346; ? *Cimex biguttatus* Schrank, 1801, Fn. Boic.: 94; *Phythocoris bimaculatus* Costa, 1852, Cim. Regn. Neap., Cent. III: 260; *Capsus contiguus* Walker, 1872, ib.: 96; subsp. *vittiger* Reuter, 1896, H. G. E., V: 205; var. *atava* Reuter, 1896, ib.; var. *immaculata* Stichel, 1930, Ill. Best. Tab.: 173; var. *picticollis* Horvath, 1909, Ann. Mus. Nat. Hung., VII: 293. Distribution: Holarctic and Australian. Distribution in Romania: frequent. Maramureş: Bârsana (MM), Călineşti (MM), Ieud (MM) and Sighetul Marmației (MM); Vadu Izei (MM), 9.07.1995, leg. A. S.; Bârsana (MM), 6.07.1995, leg. C. P.; Săcătura (MM), 7.07.1995, leg. I. M.

Calocoris (Calocoris) affinis (Herrich - Schäffer, 1835), Nomencl. Ent.: 49; *Capsus pabulinus* Schrank, 1785, non Linnaeus, Verz. Ins. Berchtesg.: 340; *Calocoris salvie* Reuter, 1888, Rev. Syn., no. 229. Distribution: Palearctic. Distribution in Romania: in all the areas, excepting Dobrogea. Maramureş: Bârsana - Onceşti (MM), Moisei (MM), Sighetul Marmaţiei - Vadu Izei (MM); Moisei (MM), 13.07.1995, leg. A. S.; Sighetul Marmaţiei - Vadu Izei (MM) 9 - 09.1995, leg. M. S.; Săpânţa (MM), 10 - 12.07.1996, leg. A. S.; Crasna Vişeului (MM), 23.08.1997, leg. C. P.; Vişeuţ (MM), 20.08.1997, leg. C. P.; Sârbi (MM), 19.07.1998, leg. C. P.; Berbeşti (MM), 24.07.1998, leg. I. M.;

Calocoris (Calocoris) alpestris (Meyer - Dűr, 1843), Caps.: 49; *Capsus pabulinus* var. *major* Scholtz, 1847, Arb. Ver. Schles. Ges.: 126; *Calocoris major* Carvalho, 1955, Beitr. Z. Ent., V (3-4): 336. Distribution: European, Alpine. Distribution in Romania: only in the high mountains areas. Maramureş: Ieud (MM), 4.07.1995, leg. C. P.;

Calocoris (Calocoris) roseomaculatus roseomaculatus (De Geer, 1773), Mem., III: 293; *Cimex bistriatus* Goeze, 1778, Ent. Beitr., II: 278; *Cimex cruentatus* Geoffroy, 1785, dans Fourcroy, Ent. Paris: 208: *Cimex diagrammus* Gmelin, 1788, Syst. Nat., éd. XIII: 2181; *Cimex sauciatus* Gmelin, 1788, ib.: 2191; *Lygaeus ferrugatus* Fabricius, 1794, Ent. Syst., IV: 173; *Cimex rosatus* Schrank, 1796, dans Hoppe, Ent. Taschb.: 95; *Lygaeus campestris* Panzer, 1804, Schäffer.: 19; *Cimex succinctus* Turton, 1806, Syst. Nat., II: 694; var. *decolor* Reuter, 1902, Öefv. Fin. Vet. Soc. Förh., XLIV: 53; var. *fuscosignata* Stichel, 1930, Ill. Best. Tab.: 173; var. *supervacua* Stichel, 1930, ib.; var. *nigroinducta* Stichel, 1930, ib. Distribution: European. Distribution in Romania: in the mountains and hilly areas, Romania is in the eastern and southeastern distribution of this species areal. Maramureş: Călineşti (MM); Săcături (MM), 7.07.1995, leg. C. P.; Săpânţa (MM), 12 - 13.07.1996, leg. A. S.; Sârbi (MM), 19.07.1998, leg. C. P.; Berbeşti (MM), 24.07.1998, leg. C. P.;

Genus *Stenotus*: *Stenotus* Jakovlev, 1877, Bull. Soc. Nat. Mosc., II: 288; *Oncognathus* Fieber, 1858, Wien. Ent. Mon., II: 303; *Umslopogas* Kirkaldy, 1902, Trans. Ent. Soc. London: 256; *Koraciocapsus* Kirkaldy, 1902, ib.: 260.

Stenotus binotatus (Fabricius, 1794), Ent. Syst., IV: 172; *Cimex paykulli* Turton, 1806, Syst. Nat., II: 609; *Stenotus sareptanus* Jakowlew, 1877, l. c.: 289. Distribution: Eurasiatic. Distribution in Romania: frequent in all the areas. Maramureş: Strâmtura (MM), Moisei (MM), Călineşti (MM), Strâmtura (MM), 3.07.1995, leg. C. P.; Moisei (MM), 13.07.1995, leg. A. S.; Săpânţa (MM), 6.07.1996, leg. A. S.; Borşa (MM), 20.08.1997, leg. C. P.; Repedea - Poiana Smereceni (MM), 22.08.1997, leg. A. S.; Mara (MM), 17.07.1998, leg. C. P.; Corneşti (MM), 19.07.1998, leg. C. P.

Genus *Dichrooscytus*: *Dichrooscytus rufipennis* (Fallen, 1807), Mon. Cim. Sveciae: 84; ? *Cimex apparitor* Villers, 1789, Ent. auct.: 535. Distribution: Holarctic. Distribution in Romania: little known, signalized only from the north and the center of the country. Maramureş: Săpânţa (MM), 12.07.1996, leg. I. M.

Dichrooscytus intermedius Reuter, 1885, Ann. Soc. Ent. Belg., XLII: 29; *Dichrooscytus* and *lirschi* Reuter, 1902, Öefv. Fin. Vet. Soc. Förh., XLIV: 165. Distribution: Euroasiatic. Distribution in Romania: in the center and the north of the country. Maramureş: Săpânţa (MM), 12.07.1996, leg. A. S.; Săpânţa Forestry Cabin - Nireş (MM), 10.07.1996, leg. A. S.

Genus *Apolygus: Apolygus lucorum* (Meyer - Duer, 1843), Caps: 46; ? *Capsus declivis* Scholtz, 1846, Arb. Ver. Schles. Ges.: 69; *Capsus bipunctatus* Sahlberg, 1848, Mon. Geoc.: 101; *Capsus contaminatus* Kirschbaum, 1856, non Fallén, Caps. Wiesb: 125; var. *maculata* Reuter, 1896, H. G. E., V: 108; var. *volgensis* Becker, 1864, Bull. Soc. Nat. Mosc.: 488; var. *concolor* Stichel, 1930, Ill. Best. Tab.: 184. Distribution: Holarctic. Romanian Distribution: exception of the mountainous one. Maramureş: Sârbi (MM), 19.07.1998, leg. I. M.

Apolygus spinolae (Meyer - Dür, 1841), Stett. ent. Zeit.: 86; ? *Capsus humuli* Stammbach, Allgem. Hopfenzeitung. Distribution: Eurasiatic. Distribution in Romania: in all the hilly and mountainous areas from the north, center and the west of the country. Maramureş: Bârsana (MM), 6.07.1995, leg. I. M.; Moisei (MM), 21.08.1997, leg. C. P.

Genus *Lygocoris*: *Lygocoris pabulinus* (Linnaeus, 1761), Fn. Suec.: 253; *Cimex microphtalmus* De Geer, 1783, Gen. and Spec.: ? *Cimex aerugineus* Geoffroy, 1785, in Fourcroy, Ent. Par.: 208; *Cimex hortorum* Tigny, 1813, Hist. Nat. Ins., IV: 287; *Capsus affinis* Meyer - Duer, 1843, Caps.: 48; var. *chloris* Fieber, 1858, Wien. Ent. Mon., II: 331; var. *flavovirens* Fieber, 1861, Eur. Hem.: 27. Distribution: Holarctic. Distribution in Romania: in all the hilly and mountainous areas, absent in Dobrogea. Maramureş: Săpânţa (MM), 6.07.1996, leg. A. S.; Crasna Vişeului (MM), 23 - 29.08.1997, leg. C. P.

Genus *Lygus*: *Lygus rugulipennis* (Poppius, 1911), Medd. Slsk. Fl. Fenn. Förh., XXXVII: 96; *Lygus pubescens* Reuter, 1912, Öefv. Fin. Vet. Soc. Förh., LIV: 36; *Lygus campestris* Fallén, 1807, non Hambg., XXVIII: 1; Linnavuori, 1951, Ann. Ent. Fenn., XVII: 57; var. *immaculata* E. Wagner, 1947, Mitt. Natw. Ver. Steierm., LXXVII: 76; var. *obscura* E. Wagner, 1947, ib. Distribution: Holarctic. Romania distribution: frequent everywhere. Maramureş: Bârsana (MM), Săcel (MM); Strâmtura (MM), 7.09.1995, leg. C. P.; Izvorul Izei (MM), 9.09.1995, leg. C. P.; Săpânţa (MM), 12.07.1996, leg. A. S.; Repedea - Poiana Smereceni (MM), 22. 08.1997, leg. C. P.; Berbeşti (MM), 24.07.1998, leg. C. P.; Sârbi (MM), 19.07.1998, leg. C. P.;

Lygus wagneri Remane, 195, Zool. Anz., CLV: 115. Distribution: Eurasiatic. Romanian Distribution: species frequent in the mountainous and hilly areas, absent in Dobrogea. Maramureş: Săcel (MM); Izvorul Izei (MM), 9.09.1995, leg. C. P.; Săpânţa (MM), 5 - 12.07. 1996, leg. A. S.; Deseşti (MM), 18.07.1998, leg. C. P.; Berbeşti (MM), 24.07.1998, leg. C. P.;

Lygus pratensis (Linnaeus, 1758), Syst. Nat., ed. X: 448; E. Wagner, 1940, Verh. Ver. Natw. Heimatf. Hamburg, XXVIII: 1. Distribution: Holarctic. Distribution in Romania: in all the areas. Maramureş: Valea Frumoasei (MM); Sibiu (SB), Valea Aurie (SB), Măgura Cisnădiei (SB), Dumbrava Sibiului (SB), Şelimbăr - Şopa Pădure (SB), Munţii Făgăraşului - Valea Sâmbăta (SB), Sibiu - Dealul Guşterița (SB), Aiud (AB), Hodod (SM), Sighişoara (MS); Cârţişoara - Vama Cucului (490 m) (SB), Munţii Făgăraşului - Cascada Bâlea (2,100-2,300 m) (SB); Borşa (MM), 5.08.1963, leg. I. S.; Ieud (MM), 8.09.1995, leg. C. P.; Onceşti (MM), 10.07.1995, leg. A. S.; Izvorul Izei (MM), 6.07.1995, leg. A. S.; Strâmtura (MM), 7.09.1995, leg. C. P.; Floreşti (GR), 18.05.1996, leg. C. P.; Săpânţa (MM), 5 - 12.07.1996, leg. C. P.; Galeş (AG), 7.08.1997, leg. C. P.; Crasna Vişeului (MM), 23.08.1997, leg. C. P.; Sârbi (MM), 19.07.1998, leg. Ş. P.; Ocna Şugatag (MM), 15.07.1998, leg. Ş. P.;

Lygus punctatus (Zetterstedt, 1839), Ins. Lapp.: 273; *Lygus rutilans* Horvath, 1888, Rev. d´Ent. Caen: 181; *Lygus pratensis* var. *fuscoruber* Strobl., 1900, Mitt. Natw. Ver. Steierm., XXXVI: 1955, Act. Ent. Mus. Nat. Prag., XXIX: 152. Distribution: Holarctic. Romanian Distribution: in hilly and mountainous areas, absent in Dobrogea. Maramureş: Săcel (MM);

Lygus gemellatus (Herrich - Schäffer, 1835), Wanz. Ins., III: 81; *Capsus artemisie* Schilling, 1846, ib.: 32; var. *autumnalis* E. Wagner, 1947, Bombus: 42; E. Wagner, 1940, Verh. Ver. Natw. Heim. Hambg., XXVIII: 1; var. *innotata* Polentz, 1954, Abh. Mus. Kult. Gesch. Magdebg., IX(2): 88. Distribution: Palearctic and oriental. Distribution in Romania: everywhere. Maramureş: Săcel (MM), Ieud (MM); Izvorul Izei (MM), 9.09.1995, leg. C. P.; Strâmtura (MM), 7.09.1995, leg. C. P.; Săpânţa (MM), 12.07.1996, leg. A. S.; Leordina (MM), 22.08.1997, leg. C. P.; Sârbi (MM), 19.07.1998, leg. C. P.; Berbeşti (MM), 24.07.1998, leg. C. P.;

Genus *Pinalitus*: *Pinalitus atomarius* (Meyer - Dűr, 1843) Caps.: 43; *Capsus atomarius* (Meyer - Dűr, 1843) Verzeichnis der in der Schweitz einheimichen Rhynchoten (Hemiptera Linn.). Erstes Heft. Die Familie der Capsini: i-x, 11-116, I-iv. Jent and Gassmann, Solothurn.; *Lygus (Lygus) atomarius* var. *maculosa* Stichel, 1930, Ill. Best. Tab.: 182; var. *martini* Stichel, 1930, ib.: var. *schmidti* Stichel, 1930, ib.: var. *negata* Stichel, 1958, ib., II: 719. Distribution: Palearctic. Distribution in Romania: in the center and in the north of the country: Săpânța (MM), 6 - 12.07.1996, leg. A. S.; Berbeşti (MM), 24.07.1998, leg. C. P.

Pinalitus rubricatus (Fallén, 1807), Mon. Cim. Sveciae: 100; *Capsus rubicundus* Meyer - Duer, 1843, non Fallén, Caps: 72; var. *loewi* Reuter, 1905, Ann. Mus. Zool. St. Petersburg., X: 27; var. *picea* Stichel, 1930, Ill. Best. Tab.: 182; var. *spadix* Stichel, 1958, ib., II: 720; subsp. *tyrolensis* E. Wagner, 1955, Act. Mus. Nat. Prag., XXIX: 155. Distribution: Holarctic. Distribution in Romania: less frequent. Maramureş: Săpânța - Poiana Brustani (MM), 6.07.1996, leg. A. S.

Genus *Orthops*: *Orthops (Orthops) basalis* (Costa, 1852), Cim. Regn. Neap., Cent. III: 38; var. *intermedia* Tamanini, 1951, Ann. Inst. Zool. Univ. Napoli, III(4): 6; var. *testacea* Tamanini, 1951, ib. Distribution: Holarctic. Distribution in Romania: in all the areas excepting the eastern and southern ones (Moldova and Dobrogea). Maramureş: Ieud (MM), 8.09.1995, leg. C. P.; Săpânța (MM), 6 - 12.07.1996, leg. A. S.; Sârbi (MM), 19.07.1998, leg. C. P.;

Orthops (Orthops) campestris (Linnnaeus, 1758), Syst. Nat. ed. X: 448; *Cimex transversalis* Fabricius, 1787, Mant. Ins.: 304; *Capsus lucidus* Kirschbaum, 1856, Caps. Umg. Wiesb.: 228; *Capsus transversus* Thomson, 1871, Op. Ent., IV: 427; *Lygaeus pastinacae* Fallen, 1807, Mon. Cim. Sveciae: 86; var. *viridipallens* Stichel, 1930, Ill. Best. Tab.: 186; var. *prasina* Stichel, 1930, ib.; var. *trimaculata* Tamanini, 1951, Ann. 1951, ib.; Ribaut, 1924, Bull. Soc. Hist. Nat. Toulouse, LII: 8; var. *herbacea* Stichel, 1958, Ill. Best. Tab., II: 726; var. *imperfecta* Stichel, 1958, ib.; var. *stillata* Stichel, 1958.: 727. Distribution: Palearctic. Distribution in Romania: known in all the areas. Maramureş: Strâmtura (MM), 3.07.1995, leg. C. P.; Săcel - Izvorul Albastru al Izei (MM), 9.09.1995, leg. C. P.; Săpânța (MM), 12.07.1996, leg. A. S.; Repedea - Poiana Smereceni (MM), 22.08.1997, leg. A. S.; Mara (MM), 17.07.1998, leg. C. P.; Corneşti (MM), 19.07.1998, leg. C. P.;

Orthops (Orthops) kalmii (Linnaeus, 1758), Syst. Nat., ed. X: 448; var. *picea* Reuter, 1894, Rev. d'Ent. Caen: 134; var. *flavovaria* Fabricius, 1794, Ent. Syst., IV: 178; var. *toracica* Westhoff, 1881, 9. Jhr. Ber. Westf. Ver. Wiss. Kunst: 68; var. *fieberi* Westhoff, 1881, ib.: 69: *Capsus pauperatus* Herrich - Schäffer, 1839, Wanz. Ins., IV: 31; *Orthops pellucidus* Fieber, 1858, Wien. Ent. Mon., II: 332; var. *orientalis* Reuter, 1896, H. G. E., V: 78; var. *frenata* Horvath, 1894, Rev. d'Ent. Caen: 182; var. *ferruginea* Reuter, 1906, Ann. Mus. Zool. St. Petersburg., X: 46; var. *vitticeps* Reuter, 1906, ib.; var. *westhoffi* Stichel, 1930, Ill. Best. Tab.: 186; var. *quadrimaculata* Stichel, 1958, ib.; var. *nigrovaria* Stichel, 1958, ib.: 731; var. *bipartita* Stichel, 1958, ib.; var. *triplex* Stichel, 1958, ib. 732; Ribaut, 1924, Bull. Soc. Hist. Nat. Toulouse, LII: 8. Distribution: Palearctic. Distribution in Romania: frequent in all the areas. Maramureş: Ieud (MM), Săcel - Izvorul Albastru al Izei (MM); Mara (MM), 17.07.1998, leg. C. P.; Corneşti (MM), 19.07.1998, leg. C. P.;

Genus *Agnocoris*: *Agnocoris rubicundus* (Fallén, 1829), Hem. Suec. Cim.: 92; *Lygus rubricatus* Hahn, 1831, Wanz. Ins., I: 156.; var. *minor* Reuter, 1896, H. G. E., V: 73; var. *collaris* E. Wagner, 1949, Verh. Ver. Natw. Heim. Hamburg, XXX: 36; var. *schmidti* Kiritschenko, 1926, Ann. Mus. Zool. Ac. Sci. U. R. S. S.; var. *fusco - angulata* Stichel, 1958, Ill. Best. Tab., II: 718; var. *variegata* Stichel, 11958, ib. Distribution: Holarctic. Distribution in Romania: in all the areas. Maramureş: Strâmtura - Valea Slătioarei (MM);

Genus *Liocoris*: *Liocoris tripustulatus* (Fabricius, 1781), Spec. Ins.: 2; ? *Cimex bifasciatus* Müller, 1764, Fn. Ins. Friedr.: 29; 274 (1764); *Cimex campestris* var. *autumnalis* Reuter, 1875, Rev. Crit. Caps., II: 71; var. *picta* (Hahn), Wanz. In., I: 215; var. *nepeticola* Reuter, 1896, H. G. E., V: 47; var. *pallens* Noualhier, 1895, Rev. d´Ent., XVI: 176; var. *inaequalis* Stichel, 1930, Ill. Best. Tab.: 193; var. *bimaculata* Stichel, 1930, ib.; var. *mutata* Stichel, 1930, ib.; var. *quadrimaculata* Stichel, 1930, ib.; var. *similis* Stichel, 1930, ib.; var. *sordida* Stichel, 1930, ib. Distribution: Eurasiatic: AL, AN, AU, BE, BH, BU, BY, CR, CZ, DE, EN, ET, FI, FR, GB, GE, GR, HU, IR, IT, LA, LS, LT, LU, MA, MC, MD, NL, NR, PL, PO, RO, RU(CT, NT, ST), SK, SL, SP, SV, SZ, UK, YU, AB, AK, AR, AT, GG, IQ, IS, LE, SY, TM, UZ. Distribution in Romania: everywhere. Maramureş: Ieud and Săcel (MM); Săpânța (MM), 12.07.1996, leg. A. S.;

Genus *Camptozygum*: *Camptozygum aequale* Villiers, 1789, Ent. Auct.: 589; *Lygaeus pinastri*, Fallèn, 1807, Mon. Cim. Sveciae Suec.: 95; *Capsus melanaspis* Mulsant, 1852, Ann. Soc. Linn. Lyon: 144; var. *maculicollis* Mulsant, 1852, ib.; var. *fieberi* Stichel, 1930, Ill. Best. Tab.: 189. Distribution: Holarctic. Distribution in Romania: the first signalization in Romania. Maramureş: Săpânța (MM) and Poiana Brustani (MM), 6.07.1996, leg. and det. A. S.;

Genus *Polymerus*: *Polymerus (Poeciloscytus) unifasciatus* (Fabricius, 1794), Ent. Syst., IV: 178; *Miris semiflavus* Wolff, 1804, Wanz.: 148; ? *Cimex tomentosus* Villiers, 1789, Ent. Auct.: 528; *Phytocoris marginatus* Hahn, 1834, Wanz. Ins., II; var. *lateralis* (Hahn, 1834), ib.; var. transita (Stichel, 1930), Ill. Best. Tab: 191; var. *disjuncta* (E. Wagner, 1951), Act. Ent. Mus. Nat. Prag., XXVI: 5. Distribution: Holarctic. Distribution in Romania: known in all the areas. Maramureş: Bârsana (MM), Strâmtura (MM); Strâmtura (MM), 7.09.1995, leg. C. P.; Bârsana (MM), 5.07.1995, leg. I. M.; Săpânța (MM), 11.07.1996, leg. I. M.; Crasna Vişeului (MM), 23.08.1997, leg. C. P.; Deseşti (MM), 18.07.1998, leg. C. P.

Genus *Charagochilus*: *Charagochilus gyllenhalii* (Fallen, 1807), Mon. Cim. Sveciae: 97; K. Schmidt, 1937, Mitt. D. ent. Ges., VIII: 43 (macropter form). Distribution: Palearctic. Distribution in Romania: known in all the areas. Maramureş: Făgăraş Mountains - Bâlea Fall (SB), 24 - 26.07.1994, leg. A. S.; Săpânța (MM), 12 - 13.07.1996, leg. A. S.

Genus *Capsus*: *Capsus ater* (Linnaeus, 1758), Syst. Nat., ed. X: 447; ? *Cimex sordeus* Gmelin, 1788, Syst. Nat., Ed. XIII: 2166; *Capsus nigricornis* Hahn, 1826, Icon, Cim., f. 20; var. *semiflava* Linnaeus, 1767, Syst. Nat., ed. XII: 725; var. *tyrannus* Fabricius, 1781, Ent. Syst., IV: 177; var. *nigripes* Strobl, 1900, Mitt. Natw. Ver. Steierm., XXXVI: 191; var. *rutila* Stichel, 1930, Ill. Best. Tab.: 199. Distribution: Holarctic. Distribution in Romania: known in all the areas. Maramureş: Bârsana (MM), Ieud (MM); Sibiu (SB), 25.06.1945, leg. E. W.; Ieud (MM), 4.07.1995, leg. C. P.; Bârsana (MM), 5.07.1995, leg. I. M.; Săpânța (MM), 12.07.1996, leg. A. S.; Ocna Şugatag (MM), 22.07.1998, leg. Ş. P.; Deseşti (MM), 18.07.1998, leg. C. P.

Genus *Horvathia*: *Horwathia hieroglyphica* (Mulsant and Rey, 1852), Ann. Soc. Linn. Lyon: 107; *Horvathia vittata* Reuter, 1876, Berl. Ent. Zeit.: 174. Distribution: European. Distribution in Romania: only in the mountainous areas. Maramureş Mountains: Pietrosu Peak and Pop Ivan Peak (MM), Rodnei Mountains, Pietrosu Peak (MM), 4.08.1963, leg. I. S.; Borşa (MM), 4.08.1963, leg. I. S.; Rodnei Mountains, Pietrosu Peak (MM), 12.07.1995, leg. A. S. Transylvania: Gurghiu (MS), Cârţişoara (SB);

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Halticus apterus apterus (Linnaeus, 1758), Fn. Suec. Spec.: 894: *Acanthia pallicornis* Fabricius, 1794, Ent. Syst., IV: 69; *Capsus pallidicornis* Flor, 1860, Rhynch. Livl., I: 583. Distribution: Holarctic. Romania distribution: all areas. Maramureş: Strâmtura - Valea Slătioarei (MM); Slătioara (MM), 3.07.1995, leg. I. M.; Săpânța (MM), 10 - 13.07.1996, leg. A. S.; Leordina (MM), 22.08.1997, leg. C. P.; Ocna Şugatag (MM), 17.07.1998, leg. C. P.;

Genus *Strongylocoris*: *Strongylocoris leucocephalus* (Linnaeus, 1758), Syst. Nat., éd. X: 446; *Cimex decrepitus* Fabricius, 1794, Ent. Syst., IV: 1125; subspec. *Steganoides* (J. Sahlberg), 1875, Nat. Soc. Fn. Fl. Fenn. Förh., XIV: 306; var. *sibirica* Reuter, 1891, H. G. E., IV: 28; var. *alpina* Strobl, 1899, Mitt. Natw. Ver. Steierm.: 192. Distribution: Palearctic. Distribution in Romania: in the mountainous and hilly areas, absent in the south of Romania. Maramureş: Moisei (MM), 13.07.1995, leg. A. S.; Leordina (MM), 22.08.1997, leg. C. P.; Repedea - Poiana Smereceni (MM), 27.06.1997, leg. I. M.;

Genus *Pachytomella*: *Pachytomella parallela* (Meyer - Duer, 1843), Caps.: 57. Distribution: Europe and North Africa. Distribution in Romania: Carpathians. Orienthal Carpathians: Pop Ivan Peak (MM);

Genus *Orthocephalus*: *Orthocephalus saltator* (Hahn, 1835), Wanz. Ins., III: 11; *Capsus mutabilis* Burmeister, 1835, Hanbd. Ent., II: 277; *Capsus hirtus* Curtis, 1838, Brit. Ent., XV, t. 693; *Pachytoma major* 1852, Cim. Regn. Neap., Cent. III: 278; *Globiceps infuscatus* Garbiglietti, 1869, Boll. Soc. Ent. Ital., I: 190. Distribution: Holarctic. Distribution in Romania: in all the areas excepting Dobrogea and Danube Delta. Maramureş: Sighetul Marmației (MM), Vadu Izei (MM); Călineşti (MM), 7.07.1995, leg. I. M.;

Orthocephalus vittipennis (Herrich - Schäffer, 1835), Wanz. Ins., III: 83; ? *Cimex hirtus* Mueller, 1776, Zool. Dan.: 108; var. *decipes* E. Wagner, 1942, Mitt. D. ent. Ges., XI: 74. Distribution: Eurasiatic. Distribution in Romania: frequent in all the areas. Maramureş: Săpânța (MM), 8.07.1996, leg. A. S.;

Genus *Globiceps*: *Globiceps (Kelidocoris) flavomaculatus* (Fabricius, 1794), Ent. Syst. IV: ! 82; *Gobiceps selectus* Fieber, 1858, Wien. ent. Mon. II: 33; *Capsus distinguendus* Snellen van Vollenhoven, 1878, Tidjschr. v. ent. VIII, t 19. Distribution: Eurasiatic. Distribution in Romania: in all the areas, excepting Dobrogea. Maramureş: Sighetul Marmației (MM), Vadu Izei (MM); Repedea - Poiana Smereceni (MM), 22.08.1997, leg. I. M.;

Globiceps (Kelidocoris) fulvicollis Jakovlev, 1877, Bull. de la Soc. des Nat. de Moscou 52 (2): 269-300; *Globiceps (Paraglobiceps) fulvicollis cruciatus* Reuter, 1879, Öefv. Fin. Vet. Soc. Förh., XXI: 36; ? *Polymerus flavomaculatus* Kolenati, 1845, non Fabricius, Melet. Ent. Sp. 75; *Globiceps fulvipes saunders*, 1892, non Scopoli, Synapse, II: 279; var. *suturalis* Reuter, 1879, e. c.; var. *obscuripes* Lindberg, 1940, Soc. Sci. Fenn. Comm. Biol, VII (14): 38. Distribution: Eurasiatic. Distribution in Romania: in all the areas, excepting Banat and Dobrogea. Maramureş: Bârsana (MM), 5.07.1955, leg. I. M.;

Genus *Heterocordylus*: *Heterocordylus genistae* Scopoli, 1763, Ent. Caen; 134; *Cimex ater* Schrank, 1801, Fn. Boic.: 86; *Capsus unicolor* Hahn, 1834, non Thomson, Wanz. Ins., II: 94; *Heterotoma pulverulenta* Burmeister 1835, Handb. Ent, II: 276; *Heterocordylus leptocerus* Douglas and Scott, 1863, non Kirschbaum, Brit. Hemi.: 433. Distribution: European. Distribution in Romania: in all the areas excepting Dobrogea. Maramureş: Săpânța (MM), 10.07.1996, leg. A. S.

Genus *Orthotylus*: *Orthotylus (Orthotylus) interpositus* Schmidt, 1938, in Stichel, Ill. Best. Tab.: 468; 1941, Mitt. D. ent. Ges., X: 10. Distribution: Eurasiatic. Distribution in Romania: new signalization in Romania. Maramureş: Bârsana (MM), 5.07.1995, leg. C. P.

Genus *Pilophorus*: *Pilophorus cinnamopterus* Kirschbaum, 1856, Caps. Wiesb: 232: *Capsus bifasciatus* Fabricius, 1775 non Linnaeus, Syst. Ent. 725; *Capsus confusus* Thomson, 1871, non Kirschbaum, Op. Ent: 442. Distribution: Eurasiatic. Distribution in Romania: less known. Maramureş: Leordina (MM), 22.08.1997, leg. C. P.

Pilophorus confusus Kirschbaum 1856, Caps. Ung. Wiesb.: 252; *Caps clavatus* Herrich - Schäffer, 1835, non Linnaeus, Wanz. Ins. III: 47; var. *nitidicollis* Puton, 1887, Rev. d'Ent. Caen: 103. Distribution: Holarctic. Romanian Distribution: excepting high mountains. Maramureş: Bârsana (MM), Onceşti (MM) 10.07.1995, leg. I. M.; Bârsana (MM), 5.07.1995, leg. I. M.

Subfamily Phylinae Douglas and Scott, 1865

Genus *Harpocera*: *Harpocera thoracica* (Fallén, 1807), Mon. Cim. Sveciae: 111; ? *Cimex prothyris* Villiers, 1789, Ent. Auct.: 529; *Harpocera burmeisteri* Curtis, 1838, Brit. Hem., XV, f. 704; *Capsus curvipes* Meyer - Duer, 1843, Caps.: 98 (♂); *Acinocera dispar* Stephenson, 1829, Syst. Cat. Brit. Ins., II: 347; *Phytocoris circumflexus* Costa, 1852, Cim. Regn. Neap., Cent. III: 36; *Capsus picticornis* Mulsant, 1852, Op. Ent., I: 149 (X); var. *confusa* Stichel, 1933, Ill. Best. Tab.: 257; var. *nigra* Stichel, 1933, ib.; var. *griscescens* Stichel, 1933, ib.; var. *ruficollis* Westhoff, 1881, 9. Jahr. Bes. Westf. Prov. Ver. Wiss. Kunst: 61. Distribution: Eurasiatic. Distribution in Romania: in all the regions. Maramureş: Ieud (MM), Bârsana (MM), 5.07.1995, leg. I. M.

Genus *Oncotylus*: *Oncotylus (Cylindromelus) setulosus* Herrich - Schäffer, 1839, Wanz. Ins., IV: 30. Distribution: Eurasiatic. Distribution in Romania: in all the regions. Maramureş: Repedea - Poiana Smereceni (MM), 22.08.1997, leg. A. S.

Genus *Plagiognathus*: *Plagiognathus (Plagiognathus) chrysanthemi* Wolff, 1864, Wanz. F. 151: ? *Cimex femuro - punctatus* Goeze, 1778, Ent. Beitr. II: 266; ? *Cimex femoralis* Geoffroy, 1785, in Fourcroy, Ent. Paris; 204; ? *Cimex viridescens* Gmelin, 1788, Syst. Nat. ed. XIII; 2184; *Plagiognathus cunctator* Horvath, 1887, Rev. d' Ent. Caen: 73; var. *vicaria* Reuter, 1891, Öefv. Fin. Vet. Soc. Förh. XXXIII: 2194; var. *bipunctata* Stichel, 1934, Ill. Best. Tab: 280; var. *maculata* Stichel, 1934, ib. Distribution: Eurasiatic. Distribution in Romania: in all the regions. Maramureş: Bârsana (MM), Ieud (MM), Strâmtura (MM), Moisei (MM), Sighetul Marmaţiei (MM), Călineşti (MM), 7.07.1995, leg. I. M.; Bârsana (MM), 5.07.1995, leg. I. M.; Săpânţa (MM), 5 - 12.07.1996, leg. A. S.; Crasna Vişeului (MM), 23.08. 1997, leg. I. M.; Mara (MM), 17.07.1998, leg. C. P.; Deseşti (MM), 18.07.1998, leg. I. M.

Plagiognathus (Plagiognathus) arbustorum (Fabricius, 1794), Ent. Syst., 1V: 175; ? *Cimex variegatus* Goeze, 1778, Ent. Beitr., II: 268; ? *Cimex plessaeus* Geoffroy, 1785, in Fourcroy, Ent. Paris: 211; ? *Cimex chloromelas* Gmelin, 1788, Syst. Na. Ed. XIII: 2185; *Phytocoris lugubris* Hahn, 1834, Wanz. Ins., II: 138; *Plagiognathus fulvipennis* Reuter, 1875, non Kirschbaum, Rev. Crit. Caps. II: 181; var. *hortensis* Meyer - Duer, 1843, Caps. 65; var. *brunnipennis* Meyer - Duer, 1843, ib.: 66; var. *palidipennis* Reuter, 1906, Ann. Mus. Zool. St. Petersburg: 75; var. *reuteri* Westhoff, 1881., 9 Jahresber. Westf. Ver. Wiss. Kunst: 61; var. *nigrofusca* Stichel, 1934, Ill. Best. Tab.: 281. Distribution: Eurasiatic. Distribution in Romania: Mountainous and high hilly areas. Absent in south. Maramureş: Sighetul Marmaţiei (MM), Ieud (MM), Strâmtura - Podul Slătioarei (MM), Munţii Rodnei - Pietrosu Peak (MM), 3.08.1963, leg. I. S.; Onceşti (MM), 10.07.1995, leg. I. M.; Vadu Izei (MM), 9.07.1995, leg. I. M.; Săpânţa (MM), 9.07.1996, leg. A. S.; Ocna Şugatag (MM), 15.07.1998, leg. I. M.

Genus *Monosynamma*: *Monosynamma bohemani* (Fallén, 1829), Hem. Suec. Cim.: 106; *Phytocoris ruficollis* Fallen, 1829, ib.: 107; *Capsus furcatus* Herrich - Schäffer, 1835, Nomencl. Ent.: 52; var. *rubronotata* Jakovlev, 1876, Bull. Soc. Nat. Mosc., III; 119; var. *scotti* Fieber, 1864, Wien. Ent. Mon., VIII: 75. Distribution: Eurasiatic. Romanian distribution: less known, may be everywhere. Maramureş: Borşa - "Pietrosul Rodnei" National Park şi Ieud (MM), Borşa (MM), "Pietrosul Rodnei" National Park - Valea Izvorului Verde (MM), 12.07.1995 leg. A. S.; Ieud (MM), 8.07.1995, leg. C. P.; Bârsana (MM), 5.07.1995, leg. C. P.

Chlamydatus (Euattus) pulicarius (Fallén, 1807), Mon. Cim. Sveciae: 95; *Capsus saliens* Wolff, 1804, Wanz. F., 194; ? *Agalliastes pallipes* Jakovleff, 1867, Horae Soc. Ent. Ross., IV: 158; var. *pseudopulla* Stichel, 1956, Ill. Best. Tab., II: 350. Distribution: Eurasiatic. Distribution in Romania: except the south of Romania. Maramureş: Săpânţa (MM), 13.07.1996, leg. A. S.

Genus *Europiella*: *Europiella alpina*, Reuter 1875, Verh. Zool. Ges. Wien.: 88; E. Wagner, 1956, Act. Mus. Nat. Prag. XXX: 298; *Psallus pallidus* Reuter, 1880, Öefv. Finn. Vet. Soc. Förh., XXII: 24; var. *nigrescens* Stichel, 1934, Ill. Best. Tab.: 279, var. *simplex* Stichel, 1956, ib. II: 332, E. Wagner, 1958, Vie and Milieu, 813: 324. Distribution: Euroasiatic. Distribution in Romania: known in all the areas excepting Dobrogea and Danube Delta. Maramureş: Moisei and Strâmtura (MM), Borşa (MM), 6.08.1963, leg. I. S.; Strâmtura (MM), 3.07.1995, leg. C. P.

Genus *Atractotomus*: *Atractotomus mali* (Meyer - Dür, 1843), Caps.: 63; *Capsus pyri* Meyer - Duer, 1841, Stett. Ent. Zeit., VI: 87; *Atractotomus magnicornis* Douglas and Scott, 1865, non Fallén, Brit. Hem.: 435; *Reduvius malinellus* Pommerol, 1900, Rev. Sc., XIV(4): 348; *Capsus forticornis* Mulsant and Rey, 1852, Op. Ent., I: 148; *Atractotomus rufus* Fieber, 1858, Wien. Ent. Mon., II: 334; var. *schlicki* Stichel, 1933, Ill. Best. Tab.: 274; var. *puton*i Stichel, 1933, ib.; var. *collare* Stichel, 1956, ib., II: 321; var. *britanica* Stichel, 1956, ib. Distribution: Eurasiatic. Romanian distribution: probable in all the areas. Maramureş: Bârgău (MM);

Subgenus Psallus Fieber, 1858

Psallus (Psallus) salicis (Kirschbaum, 1856), *Psallus scholtzi* Fieber, 1861, Eur. Hem.: 306; *Psallus alnicola* Reuter, 1875, non Douglas and Scott, Rev. Crit. Caps., II: 168; ? *Capsus signatipes* Herrich - Schäffer, 1835, Nomencl. Ent.: 49; var. *fieberi* Stichel, 1933, Ill. Best. Tab.: 266. Distribution: Euroasiatic. Distribution in Romania: in the northern half part of the country. Maramureş: Repedea - Poiana Smereceni (MM), 22.08.1997, leg. C. P.

Psallus (Psallus) falléni Reuter, 1883, H. G. E., III: 462; *Phytocoris roseus* Fallèn, 1829, non Fabricius, Hem. Suec. Cim.: 101; ? *Psallus salicis* Fieber, 1861, non Kirschbaum, Eur. Hem.: 307; var. *albicincta* Stichel, 1933, Ill. Best. Tab.: 268; var. *nigropunctata* Stichel, 1956, ib., II: 297. Distribution: Holarctic. Romanian Distribution: less known, may be in the hilly and mountainous areas. Maramureş: Săpânţa (MM), 12.07.1996, leg. A. S.

Genus *Orthonotus*: *Orthonotus rufifrons* Fallén, 1807, Mon. Cim. Sveciae: 105; ? *Cimex leucocephalus* Schrank, 1801, non Linnaeus, Fn. Boic.: 18; *Byrsoptera erytrocephala* Spinola, 1837, Ess. Ins. Hem.: 191; *Matthacus caricis* Fieber, 1861, non Fallén, Eur. Hem.: 313; var. *nigriceps* Stichel, 1933, Ill. Best. Tab.: 258. Romanian Distribution: frequent. Maramureş: Slătioara (MM), 3.07.1995, leg. I. M.

Genus *Hoplomachus*: *Hoplomachus* Fieber, 1858, Wien. Ent. Mon., II: 324; *Lopus* Kirkaldy, 1905, non Hahn, Wien. ent. Zeit.: 268.

Hoplomachus thunbergi Fallén, 1807, Mon. Cim. Sveciae: 91; *Lopus hieraci* Hahn, 1831, Wanz. Ins., I: 144. Romanian Distribution: quite frequent. Maramureş: Moisei (MM), 13.07.1995, leg. C. P.; Rodnei Mountains - Pietrosu Peak (MM), 12.09.1995, leg. C. P.; Săpânţa (MM), 6.07.1996, leg. A. S.

Genus *Lopus*: *Lopus decolor* Fallén, 1807, Mon. Cim. Sveciae, 123; *Lopus chrysanthemi* Hahn, 1831, Wanz. Ins., I: 10; *Capsus palliatus* Perris, 1875, Ann. Soc. Linn. Lion, IV: 166. Romanian Distribution: - Maramureş: Cârţişoara - Vama Cucului (SB), 29.07.1994, leg. A. S.; Făgăraş Mountains - Bâlea (SB), 27.07.1994, leg. A. S.; Săpânţa (MM), 12.07.1996, leg. C. P.

CONCLUSIONS

The research showed that, from 271 mirid species of the Romanian fauna, belonging to 105 genera, 83 species from 46 genera are present. The mirid species identified in the material collected in Maramureş are Palearctic and Holarctic species, only a small number of taxa being exclusively European. The first mention in Romanian fauna of the mirid species *Macrolophus costalis* Fieber 1858, *Stenodema (Brachytropis) trispinosa* Reuter 1904, *Adelphocoris josifovi* Wagner 1968 and *Camptozygum aequale* Villiers 1789 apearing in some sampling points from Maramureş. As the entire Mirid Romanian fauna is yet unsuficiently known, most certainly, the further heteropteran research in Maramureş will bring valuable informations regarding this grup of insects.

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APOID HYMENOPTERANS (MELITTIDAE, MEGACHILIDAE, ANTHOPHORIDAE, APIDAE) FROM MARAMUREŞ AREA (ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, Apoidea, Melittidae, Megachilidae, Anthophoridae, Apidae, faunistic data.

ABSTRACT

There is presented a synthesis of 51 apoid species belonging to 4 families collected in Maramureş. 16 species are mentioned for the first time in this researched area, 2 of these being at their second record in the Romanian fauna: *Stelis ornatula* Klug and *Hoplitis ravouxi* Pérez. For every species in the systematic list there are mentioned: the number of the specimens, the collecting sites and the phenology.

By the means of this contribution the number of apoidea species mentioned from Maramureş, as yet, increased to 68, representing about 10% of the species number cited in Romania.

RÉSUMÉ: Hyménoptères apoides (Melittidae, Megachilidae, Anthophoridae, Apidae) de Maramureş (Roumanie).

On présent une synthèse comprenant 51 espèces des apoids appartenant à 4 familles qui ont été recueillies dans le secteur de Maramureş. 16 espèces sont mentionnées pour la première fois dans la région de notre recherche. Deux de ces espèces ont été identifiés pour la deuxième fois dans la faune de la Roumanie: *Stelis ornatula* Klug et *Hoplitis ravouxi* Pérez. Pour chaque espèce dans la liste systématique sont mentionnés: le nombre des exemplaires, les sites de capture et la phenologie.

Par le données présentées dans ce travail le nombre de Apoidea de Maramureş atteints 68 espèces, représentant environ 10% du nombre total des espèces citées en Roumanie.

REZUMAT: Himenoptere apoide (Melittidae, Megachilidae, Anthophoridae, Apidae) din Maramureş (România).

Se prezintă o sinteză cu 51 de specii de apoide, aparţinând la 4 familii colectate din Maramureş. 16 specii sunt menţionate pentru prima dată în zona cercetată, 2 dintre acestea fiind şi la a doua semnalare, în fauna României: *Stelis ornatula* Klug şi *Hoplitis ravouxi* Pérez. Pentru fiecare specie din lista sistematică sunt menţionate: numărul exemplarelor, siturile de colectare şi fenologia.

Prin această contribuţie, numărul speciilor de apoide cunoscute din zona Maramureşului se ridică la 68, ceea ce reprezintă circa 10% din numărul speciilor semnalate până în prezent, în România.

INTRODUCTION

The apoid fauna in Maramureş was relatively less studied. The first notes regarding the presence of apoid in this area belong to Frivaldszky, Szilády, Zilahi-Kiss, Móczár and Pascu, who during 1871-1979 published systematic lists of 21 species collected from the Rodna, Ţibleş and Făina mountains. More recent data are brought by Ban (2005) and Ban-Călefariu and Sárospataki (2007), which signals for the first time in this area 31 apoid species (from nine genres, three families) collected during 1995-1998 and 2003-2004 by the specialists of The National Museum of Natural History "Grigore Antipa".

MATERIALS AND METHODS

The synthesis was done taking into account both the data brought by Ban (2005) and Ban-Călefariu and Sárospataki (2007) and the research of the material that was previously collected by the museum specialists during the mentioned periods and that hasn't been studied.

The identification of the species was done taking into consideration the works by: Celary (2005) for melittid species, Banaszak and Romasenko (2001) for megachilids, Iuga (1958) and Osychnyuk, Pamfilov and Ponomareva (1978) for anthophorids and Knechtel (1955) for apids. The material was gathered from 49 places from Maramureş (Fig. 1).

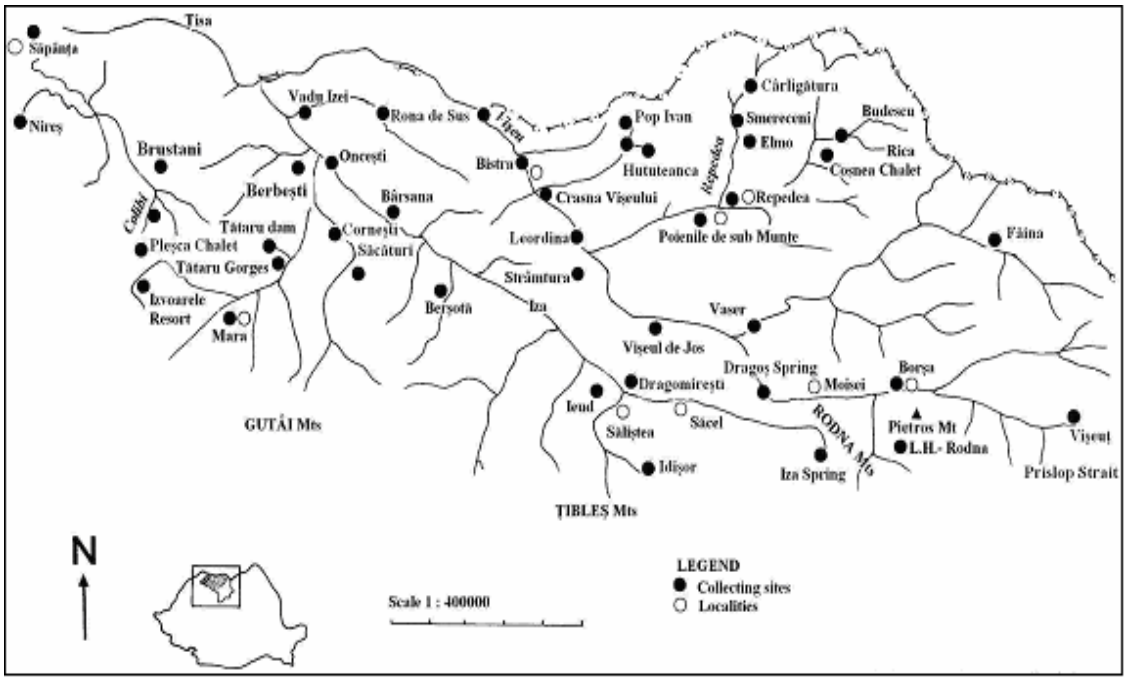

Figure 1: The map of the collecting stations in Maramureş (Bârsana, Berbeşti, Bistra: Bistra Valley, Borşa Resort; Călineşti: Văleni: "Săcătura" Forest Range, Corneşti; Corneşti: Coşeu River; Crasna Vişeu: confluence Hututeanca - Pop Ivan; Crasna Vişeu: Hututeanca Stream valley; Crasna Vişeu: Pop Ivan Stream valley; Dragomireşti, Dragomireşti: Baicu Forest; Dragomireşti: Lunca lui Cosiţă; Ieud, Iza Spring, Izvoarele Resort, Leordina, Mara, Mara: Pleşca Chalet: Roşu Stream; Mara: Tătaru dam; Mara: Tătaru Gorges; Moisei: Dragoş Spring; Nireş, Oncești, Pietrosul Rodnei: Laboratory House; Poienile de sub Munte: Coşnea Chalet; Poienile de sub Munte: Coşnea River valley; Poienile de sub Munte: Cvaşniţa Valley; Poienile de sub Munte: Rica River valley; Prislop Strait: Vişeuţ; Repedea: Cârligătura Valley; Repedea: Forest Range; Repedea: Elmo Clearing; Repedea: Smereceni Clearing; Rona de Sus; Sălişteа: Idişor Stream; Săpânţa: Brustani Clearing; Săpânţa: Colibi; Săpânţa: Săpâncioara Valley; Săpânţa: Săpânţa Valley; Strâmtura: "Podul Slătioarei" Forest Range; Strâmtura: Slătioara River: Berşota Stream; Vadu Izei; Vaser Valley: Făina;Vaser Valley: transect Făina - Bardău; Vaser Valley: transect Bardău - Cozia; Vişeu Valley; Vişeu Valley: confluence Vişeu - Tisa; Vişeul de Jos.

RESULTS

The list includes 51 apoid species belonging to 18 genres, four families: Melittidae (three species, two genres), Megachilidae (24 species, 10 genres), Anthophoridae (six species, four genres) and Apidae (18 species, two genres). For each species there are presented: the phenology, the distributional data and the literature quotation, where is the case (Tab. 1).

Table 1: Taxonomical list; the species mentioned for the first time in the area are marked with *.

Taxon	Collecting sites	References
Family Melittidae/Subf. Melittinae **Melitta leporine* (Panzer, 1799)	4 ♀♀, Bârsana, 5.VII.1995, 1 ♀, Onceşti, 10.VII.1995	
Subfamilia Macropinae **Macropis europaea* Warncke, 1973	1 ♀, Corneşti, 19.VII.1998	
**Macropis fulvipes* (Fabricius, 1804)	2 ♂♂, Cvaşniţa Valley, 15.VI.2003, Coşnea Chalet, 19.VII.2004	
Family Megachilidae Subfamily Megachilinae Tribe Anthidiini *Trachusa byssina* (Panzer, 1798)	1 ♂, Vadu Izei, 9.VII.1995, 2 ♂♂, 1 ♀, Brustani Clearing, 6.VII.1996, 13.VII.1996, 1 ♂, Coşnea Chalet, 19.VII.2004	(Ban, 2005)
**Anthidium punctatum* Latreille, 1809	1 ♂, Vişeul de Jos, 22.VIII.1997	
Anthidiellum strigatum (Panzer, 1805)	1 ♂, Colibi, 12.VII.1996, 1 ♂, Făina, 21.VII.2004	(Móczár, 1956)
**Stelis ornatula* (Klug, 1807)	1 ♂, 2 ♀♀, Ieud, 4.VII.1995	
**Stelis phaeoptera* (Kirby, 1802)	1 ♀, Repedea: Forest Range, 2.VII.1997	
Tribe Megachilini *Chelostoma campanularum* (Kirby, 1802)	1 ♂, Slătioara River: Berşota Stream, 9.VII.1995, 1 ♂, Pietrosul Rodnei: Laboratory House, 10.VII.1995, 1 ♂, Dragoş Spring, Forest Range, 13.VII.1995, 4 ♂♂, Văleni: "Săcătura" Forest Range, 7.VII.1995, 2 ♂♂, Colibi, 9.VII.1996, 1 ♂, 12 km upstream the confluence Hututeanca - Pop Ivan, 19.VII.2004, 1 ♂, Făina, 21.VII.2004, 1 ♂, Coşnea Chalet, 25.VII.2004, 1 ♂, Dragomireşti, 22.VI.2003	(Ban, 2005)
Chelostoma distinctum Stoeckhert, 1929	3 ♂♂, Văleni: "Săcătura" Forest Range, 7.VII.1995, 1 ♂, "Podul Slătioarei" Forest Range, 6.VII.1995, 1 ♂, Hututeanca Stream valley, 17.VI.2003, Pop Ivan Stream valley, 17.VI.2003, 1 ♂, Idişor Stream, 23.VI.2003, 1 ♂, 1 ♂, Coşnea Chalet, 25.VII.2004	(Ban, 2005)
Chelostoma florisomne (Linnaeus, 1758)	2 ♂♂, Săpâncioara Valley, 20.V.1996, 2 ♂♂, Smereceni Clearing, 22.VI.1997, Elmo Clearing, 24.VI.1997	(Ban, 2005)
Chelostoma rapunculi (Lepeletier, 1841)	1 ♂, Bârsana, 5.VII.1995, 2 ♂ ♂, Dragoş Spring, Forest Range, 750 m altitude, 13.VII.1995, 1 ♂, Brustani Clearing, 13.VII.1996	(Ban, 2005)
**Heriades crenulatus* Nylander, 1856	1 ♀, Smereceni Clearing, 22.VIII.1997, 1 ♀, transect Bardău - Cozia, 22.VII.2004	

Taxon	Collecting sites	References
**Heriades truncorum* (Linnaeus, 1758)	1 ♀, Ieud, 4.VII.1995, 1 ♀, Poienile de sub Munte, 30.VI.1997	
**Hoplitis claviventris* (Thomson, 1872)	1 ♂, Leordina, 22.VIII.1997	
**Hoplitis leucomelana* (Kirby, 1802)	1 ♂, Vadu Izei, 9.VII.1995	
**Hoplitis manicata* Morice, 1901	3 ♂♂, Bistra Valley, 28.VI.1997, 1 ♂, confluence Hututeanca - Pop Ivan, 18.VII.2004	
**Hoplitis ravouxi* (Pérez, 1902)	2 ♀♀, Bistra, 28.VI.1997, 24.VII.2004, 2 ♀♀, Mara, 17.VII.1998	
**Osmia fulviventris* (Panzer, 1798)	1 ♀, Bistra, 21.VII.1998	
**Megachile alpicola* Alfken, 1924	2 ♀♀, Mara, 17, 18.VII.1998	
Megachile lagopoda (Linnaeus, 1761)	1 ♂, Brustani Clearing, 10.VII.1996	(Ban, 2005)
Megachile lapponica Thomson, 1872	1 ♀, Coşnea Chalet, 19.VII.2004	(Ban, 2005)
Megachile ligniseca (Kirby, 1802)	1 ♂, Rica River valley, 2 km upstream Coşnea Chalet, 25.VII.2004	(Ban, 2005)
Megachile versicolor Smith, 1844	1 ♀, Crasna Vişeului, 23.VIII.1997	(Ban, 2005)
Megachile willughbiella (Kirby, 1802)	1 ♂, Ieud, 4.VII.1995, 1 ♂, Făina, 21.VII.2004	(Ban, 2005)
Coelioxys aurolimbata Förster, 1853	1 ♂, Bârsana, 5.VII.1995	(Ban, 2005)
Coelioxys rufescens Lepeletier and Serville, 1825	1 ♂, Crasna Vişeului, 23.VIII.1997	(Ban, 2005)
Family Anthophoridae Subfamily Anthophorinae Tribe Anthophorini *Anthophora furcata* (Panzer, 1798)	1 ♂, Pop Ivan Stream valley, 17.VI. 2003	Reported by Ban (2005) as *Clisodon furcatus*
Tribe Eucerini *Eucera dalmatica* Lepeletier, 1841	1 ♂, Baicu Forest Range, 21.VI.2003	(Ban, 2005)
Eucera longicornis (Linnaeus, 1758)	1 ♂, Bârsana, 5.VII.1995, 1 ♂, Pietrosul Rodnei, altitude 1380 m, 10.VII.1995, 5 ♂♂, Elmo Clearing, 24.VI.1997, Forest Range, 2.VII.1997, Smereceni Clearing, 22.VI.1997, 1 ♀, Coşnea Chalet, 16.VI.2003	(Ban, 2005)
Tetralonia salicariae (Lepeletier, 1841)	1 ♀, Onceşti, 10.VII.1995	(Ban, 2005)
Subfamily Nomadinae Tribe Nomadini **Nomada sexfasciata* Panzer, 1799	1 ♂, Onceşti, 10.VII.1995	
**Nomada stigma* Fabricius, 1804	1 ♀, Coşnea Chalet, 18.VI.2003	
Family Apidae *Bombus confuses* Schenck, 1859	1 ♀, Crasna Vişeului, 23 - 28.VIII.1997, 1 ♀, Mara - 2 km upstream, right bank, 18.VII.1998	(Ban and Sźrospataki, 2007)
Bombus gerstaeckeri Morawitz, 1882	1 ♂, Brustani Clearing, 10.VII.1996	(Ban and Sźrospataki, 2007)

Taxon	Collecting sites	References
Bombus hortorum (Linnaeus, 1761)	1 ♀, Bârsana, 5.VII.1995, 1 ♀, Iza Spring, 6.VII.1995, 1 ♀, Văleni: "Săcătura" Forest Range, 7.VII.1995, 1 ♀, Pietrosul Rodnei, 1500-2060 m alt., 12.VII.1995, 1 ♀, Smereceni Clearing, 22.VI.1997, 1 ♀, Cârligătura, 27.VI.1997, 2 ♀♀, 26.VI.1997, 3 ♀♀, Repedea - Forest Range, 26.VI.1997, 1 ♂, Borşa, 4 km upstream, 21.VIII.1997, 1 ♀, Berbeşti , 24.VII.19981 ♀, Hututeanca Stream valley, 17.VI.2003, 1 ♀, Dragomireşti: Lunca lui Cosiţă, 22.VI.2003, 1 ♀, transect Bardău - Cozia, 22.VII.2004	(Sziládi, 1914; Pascu, 1979; Ban, 2005; Ban-Călefariu and Sórospataki, 2007)
Bombus hypnorum (Linnaeus, 1758)	1 ♂, Tătaru dam, 16.VII.1998, 1 ♂, Tătaru Gorges, 19.VII.1998, 1 ♀, Repedea - Forest Range, 26.VI.1997	(Ban, 2005; Ban and Sórospataki, 2007)
Bombus jonellus (Kirby, 1802)	1 ♀, Repedea, 26.VI.1997	Ban and Sórospataki, (2007) as *B. jonellus f. flavicolor*
Bombus lapidaries (Linnaeus, 1758)	1 ♀, Bârsana, 5.VII.1995, 3 ♀♀, Ieud, 8.IX. 1995, 1 ♂, Slătioara River: Berşotă Stream, 7. IX.1995, 4 ♀♀, Brustani Clearing, 6.VII. 1996, 1 ♂, Colibi, 12.VII.1996, 2 ♀♀, Crasna Vişeului, 23 - 28.VIII.1997, 1 ♀, Vişeul de Jos, 22.VIII.1997, 2 ♀♀, Mara, 2 km upstream, 17.VII.1998, 1 ♀, Bistra, 21.VII.1998, 6 ♀♀, Coşnea Chalet, 19, 25.VII.2004	(Ban, 2005; Ban-Călefariu and Sórospataki, 2007)
Bombus pascuorum (Scopoli, 1763)	1 ♀, Săpânţa Valley, 18.V.1995, 1 ♀, Dragoş Spring, Forest Range, 13.VII.1995, 1 ♀, Iza Spring, 6.VII.1995, 1 ♀, Pietrosul Rodnei - Laboratory, 10.VII.1995, 2 ♂♂, Slătioara River: Berşotă Stream, 7.IX.1995, 1 ♀, Săpâncioara Valley, 20.V.1996, 2 ♀♀, Colibi, 12.VII.1996, 1 ♀, Repedea: Forest Range, 26.VI.1997, 1 ♀, Bistra Valley, 28.VI.1997, 1 ♀, Smereceni Clearing, 22, 27.VI.1997, 5 ♀♀, Mara, 18.VII.1998, 21.VII.1998, 3 ♀♀, Rona de Sus: Forest Range, 20.VII.1998, 1 ♀, Dragomireşti, 22.VI.2003, 1 ♀, Lunca lui Cosiţă, 22.VI.2003, 2 ♀♀, Pop Ivan Valley, 17.VI.2003, 2 ♀♀, Coşnea Chalet, 15.VII.2004, 1 ♀, Rica River valley, 2 km upstream Coşnea Chalet, 25.VII.20046 ♀♀, Făina, 21.VII.2004, 8 ♀♀, transect Bardău-Cozia, 22.VII.2004, 1 ♂, 2 ♀♀, Vişeu Valley, 4 km upstream, 24.VII.2004	(Ban, 2005; Ban-Călefariu and Sórospataki, 2007)

Taxon	Collecting sites	References
Bombus pomorum (Panzer, 1805)	1 ♂, Slătioara River: Berşotă Stream, 7.IX.1995, 1 ♀, Vişeuţ, 20.VIII.1997, 2 ♀♀, Dragomireşti, 21, 22.VI.2003	(Ban and Sárospataki, 2007)
Bombus pratorum (Linnaeus, 1761)	8 ♂♂, Colibi, 5 - 13.VII.1996, 8 ♂♂, 1 ♀, Tătaru dam, 16 - 19.VII.1998, 2 km upstream, straight bank, 18.VII.1998, 1 ♀, Pietrosul Rodnei, 12.VII.1995, 1 ♀, Iza Spring, 6.VII.1995, 1 ♂, 1 ♀, Pleşca Chalet - Roşu Stream, 22.VII.1998, 5 ♀♀, Smereceni Clearing, 22.VI.1997, 1 ♀, Elmo Clearing, 24.VI.1997, 1 ♀, Repedea - Forest Range, 26.VI.1997, 1 ♀, Vişeuţ, 20.VIII.1997, 1 ♀, Izvoarele Resort, 23.VII.1998, 1 ♀, Bistra Valley, 28.VI.1997, 1 ♂, Leordina, 22.VII.1997	(Ban, 2005); Ban-Călefariu and Sárospataki, 2007)
Bombus ruderarius (Müller, 1776)	1 ♂, 2 ♀♀, Onceşti, 10.VII.1995, 4 ♀♀, Brustani Clearing, 10.VII.1996, 2 ♀♀, Nireş, 11.VII.1996, 1 ♀ Repedea: Forest Range, 2l.VI.1996, 1 ♀, Smereceni Clearing, 22.VI.1997, 1 ♀, Poienile de sub Munte, 30.VI.1997, 1 ♂, 1 ♀, Crasna Vişeului, 29.VIII.1997, 11 ♀♀, Mara, 2 km upstream, left bank, 17.VII.1998, right bank, 18.VII.1998, 1 ♀, Izvoarele Resort, 23.VII.1998, 1 ♀, Coşnea Chalet, 19.VII.2004	(Ban, 2005; Ban-Călefariu and Sárospataki, 2007)
Bombus ruderatus Fabricius, 1775	1 ♂, Crasna Vişeului, 12 km upstream the Pop Ivan Stream valley, 18.VII.2004	(Ban, 2005; Ban and Sárospataki, 2007)
Bombus sylvarum (Linnaeus, 1761)	1 ♀, Iza Spring, 6.VII.1995, 2 ♀♀, confluence Vişeu - Tisa, 24.VII.2004	(Ban, 2005); Ban and Sárospataki, 2007)
Psithyrus barbutellus (Kirby, 1802)	1 ♂, Borşa - resort, 2 km downstream, 20.VIII.1997	(Sziládi, 1914; Ban, 2005; Ban and Sárospataki, 2007)
Psithyrus bohemicus Seidl, 1838	5 ♂♂, 1 ♀, Brustani Clearing, 6.VII.1996, 5 ♀♀, Forest Range, 26.VII.1997, Elmo Clearing, 29.VI.1997, 2 ♂♂, Rona de Sus: Forest Range, 20.VII.1998, 3 ♂♂, Pleşca Chalet: Roşu Stream, 22.VII.1998, 2 ♂♂, Rica River valley, 2 km upstream Coşnea Chalet, 15.VII.2004, 25.VII.2004, 1 ♂, confluence Vişeu-Tisa, 24.VII.2004	(Ban, 2005; Ban-Călefariu and Sárospataki, 2007)

Taxon	Collecting sites	References
Bombus terrestris (Linnaeus, 1758)	2 ♀♀, Iza Spring, 6.VII.1995, 2 ♀♀, Pietrosul Rodnei, alt. 2050 m, 12.VII.1995, 1 ♂, Ieud, 8.IX.1995, 3 ♂♂, 41 ♀♀, Colibi, 19.V.1996, 5, 6, 8, 9 - 12, 13 - 15.VII.1996, 3 ♂♂, 23 ♀♀, Brustani Clearing, 6 - 12.VII.1996, 13.VII.1996, 10 ♀♀, Nireş, 10.VII.1996, 11.VII.1996, 6 ♀♀, Săpânţa Valley, 12.VII.1996, 10 ♀♀, Smereceni Clearing, 22 - 29.VI.1997, 2 ♀♀, Elmo Clearing, 24, 29.VI.1997, 7 ♀♀, Forest Range, 26.VI.1997, 1 ♀, Cârligătura Valley, 27.VI.1997, 1 ♀, Borşa-resort, 2 km downstream, 20.VIII.1997, 1 ♀, Vişeuţ, 20.VIII.1997, 8 ♂♂, 4 ♀♀, Tătaru dam, 16, 19, 21, 22.VII.1998, 15 ♀♀, 2 km upstream, left bank, 17.VII.1998, right bank, 18.VII.1998, 3 ♀♀, Pleşca Chalet: Roşu Stream, 22.VII.1998, 1 ♂, 1 ♀, Bistra, 21.VII.1998, 1 ♂, 1 ♀, Rona de Sus: Forest Range, 21.VII.1998, 1 ♀, Izvoarele Resort, 23.VII.1998, 1 ♂, 11 ♀, Coşnea Chalet, 16.VI.2003, 15, 19, 25.VII.2004, 1 ♀, Pop Ivan Stream valley, 17.VI.2003, 1 ♂, Coşnea Valley, 20.VII.2004, 6 ♀♀, confluence Hututeanca-Pop Ivan, 18.VII.2004, 11 ♀♀, Făina, 21.VII.2004, 1 ♀, transect Făina-Bardău, 22.VII.2004, 1 ♂, 16 ♀♀, transect Bardău-Cozia, 22.VII.2004	(Szilády, 1914; Ban, 2005; Ban-Călefariu and Sórospataki, 2007)
Psithyrus campestris (Panzer, 1801)	1 ♀, Repedea - Forest Range, 26.VI.1997	(Ban and Sórospataki, 2007)
Psithyrus vestalis (Geoffroy in Fourcroy, 1785)	1 ♂, Izvoarele Resort, 1 km downstream, 23.VII.1998, 2 ♂ ♂, Săpânţa, 12.VII.1996	(Ban and Sórospataki, 2007)
**Apis mellifera* Linnaeus, 1758	4 ♀♀, Ieud, 4.VII.1995, 4 ♀♀, Vadu Izei, 9.VII. 1995, 4 ♀♀, Pietrosul Rodnei: Laboratory, 10. VII.1995, 8 ♀♀, Brustani Clearing, 6.VII.1996, 1 ♀, Cârligătura Valley, 27.VI.1997, 14 ♀♀, Smereceni Clearing, 29.VI.1997, 5 ♀♀, Elmo Clearing, 29.VI. 1997, 3 ♀♀, Borşa-resort, 20. VIII.1997, 2 ♀♀, Leordina, 22.VIII.1997, 7 ♀♀, Crasna Vişeului, 23.VIII.1997, 31 ♀♀, Mara, 2 km upstream, left bank, 17.VII.1998, right bank, 18.VII.1998, 2 ♀♀, Tătar Gorges, 19.VII.1998, 7 ♀♀, Cornești: Coşeu River, 19.VII.1998, 3 ♀♀, Rona de Sus, 20.VII.1998, 22 ♀♀, Bistra, 21.VII. 1998, 24.VII.2004, 5 ♀♀, Izvoarele Resort, 23. VII.1998, 3 ♀♀, Berbeşti, 24.VII.1998, 5 ♀♀, Baicu Forest, 21.VI.2003, 5 ♀♀, Coşnea Valley, 15.VII.2004, 2 ♀♀, Rica Valley, 25.VII.2004, 31 ♀♀, Coşnea Chalet, 19.VII.2004, 22.VII.2004, 3 ♀♀, transect Bardău-Cozia, 22.VII.2004, 9 ♀♀, Vişeu Valley, 24.VII.2004, 23 ♀♀, confluence Vişeu-Tisa, 24.VII.2004	(Ban, 2005)

CONCLUSIONS

This present synthesis comprises 51 apoid species that were collected from Maramureş, 16 of these being mentioned for the first time in this area.

The small diversity of apoid fauna that was noticed in this northern part of Romania is not accidentally. The temperate continental climate, having influences of wet air from the direction N-NV and cold ones from north (Ardelean and Béres, 2000) is the main obstacle in their spreading, apoidea being thermophilic and heliophilic species.

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CONTRIBUTIONS TO THE KNOWLEDGE OF THE DISTRIBUTION OF COCCINELIDS AND CERAMBYCIDS BEETLES (COLEOPTERA, COCCINELLIDAE, CERAMBYCIDAE) IN THE MARAMUREŞ MOUNTAINS NATURE PARK (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, Maramureş Mountains Nature Park, Coccinellidae, Cerambycidae, distribution.

ABSTRACT

Data on the species of Coccinellidae and Cerambycidae coleopterans in the Maramureş Mountains Nature Park are presented. The species *Brumus quadripustulatus*, *Calvia quatuordecemguttata Coccinula quatuordecimpustulata*, *Oenopia conglobata* (Coccinellidae) and *Chlorophorus herbstii*, *Rosalia alpina*, *Stenopterus flavicornis*, *Opsilia coerulescens*, *Leptura aurulenta*, *Stenurella bifasciata*, *Stictoleptura scutellata* (Cerambycidae) are mentioned for the first time in this area. *Nivellia sanguinosa* is proposed to be included on the list of species with legal protection status in Romania.

RÉSUMÉ: Contribution sur la connaissance la distribution des espèces de coléoptères Coccinellidae et Cerambycidae dans le Parc Naturel des Monts Maramureş (Maramureş, Roumanie).

On présente les données concernant la distribution des espèces de coléoptères Coccinellidae et Cerambycidae dans le Parc Naturel des Monts Maramureş. Les espéces *Brumus quadripustulatus*, *Calvia quatuordecemguttata Coccinula quatuordecimpustulata*, *Oenopia conglobata* (Coccinellidae) et *Chlorophorus herbstii*, *Rosalia alpina*, *Stenopterus flavicornis*, *Opsilia coerulescens*, *Leptura aurulenta*, *Stenurella bifasciata*, *Stictoleptura scutellata* (Cerambycidae) sont mentionnées pour la première fois dans cette zone. *Nivellia sanguinosa*, une espèce rare, est proposée de figurer sur la liste des espèces ayant le statut juridique de protection en Roumanie.

REZUMAT: Contribuţii la cunoaşterea distribuţiei coccinelidelor şi cerambicidelor, în Parcul Natural Munţii Maramureşului (Maramureş, România).

Sunt prezentate date referitoare la speciile de coleoptere Coccinellidae şi Cerambycidae din Parcul Natural Munţii Maramureşului. Speciile *Brumus quadripustulatus*, *Calvia quatuordecemguttata*, *Coccinula quatuordecimpustulata*, *Oenopia conglobata* (Coccinellidae) şi *Chlorophorus herbstii*, *Rosalia alpina*, *Stenopterus flavicornis*, *Opsilia coerulescens*, *Leptura aurulenta*, *Stenurella bifasciata*, *Stictoleptura scutellata* (Cerambycidae) sunt menţionate pentru prima oară în această zonă. *Nivellia sanguinosa* este propusă pentru a fi inclusă pe lista de specii cu un statut de protecţie legală în România.

INTRODUCTION

In the second half of the 19th century, Frivaldszky (1871) published the first data on the coleopterans from Maramureş Mountains, especially from Făina. The study is renewed by Petri (1912, 1925-1926).

This paper is the result of the faunal researches on the coleopterans diversity of the Maramureş Mountains Nature Park (the Eastern Romanian Carpathians).

In 1995 the "Grigore Antipa" National Museum of Natural History (Bucharest) has begun the study on the fauna of Maramureş. Many expeditions were organized in Maramureş Depression, in Iza Valley and in Rodna Mountains (Rodna Mountains National Park) (1995) and in Igniş Plateau, Săpânţa River basin (1996), in Gutâi Mountains, Mara River basin (1998).

During the period 1997-2004 the study of terrestrial fauna has continued with the exploration of the Maramureş Mountains, Vişeu River basin (valleys of Bistra, Frumuşeaua, Ruscova, Repedea, Hututeanca, Pop Ivan, Cvaşniţa, Lutoasa, Budescu, Coşnea, Rica rivers) and Vaser River basin (in particular the valley of Făina River) (Serafim, 1997, 2004).

MATERIAL

The material studied for this paper contains 1705 specimens collected between 1966 and 2004, from 29 new collecting sites (Fig. 1).

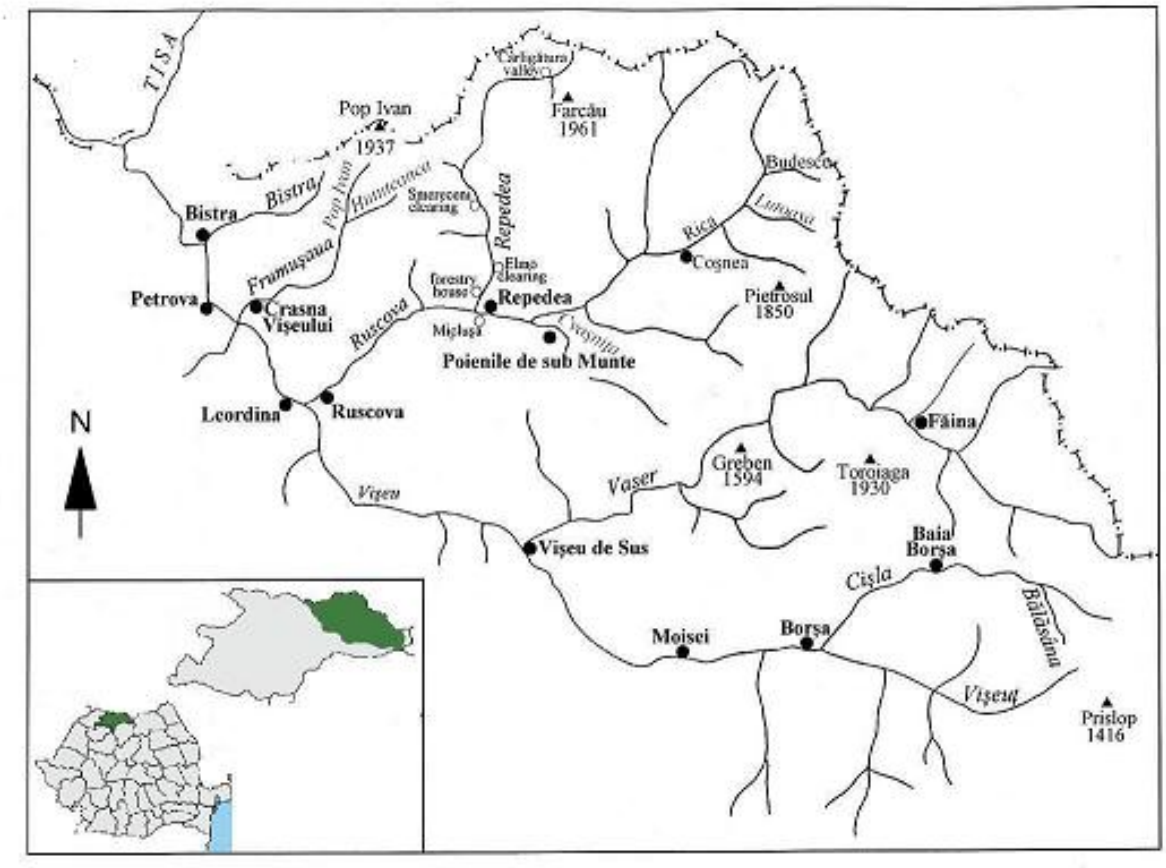

Figure 1: The map of the collecting stations in the Maramureş Mountains Nature Park.

The taxa list, collecting sites, names of the collectors, specimens' number and biogeographical distribution are mentioned, for every species. Collecting data are chronologically presented.

The species reported for the first time in Maramureş Mountains Nature Park are marked with *.

The systematic presentation and nomenclature used in this paper are mostly according to those cited by Canepari (2005) for Coccinellidae, and Danilevsky (2005) and Sama (2005) for Cerambycidae.

RESULTS AND DISCUSSIONS

We shall present data on the distribution of the Coccinellidae and Cerambycidae from this area, based upon the material preserved in the collections of the "Grigore Antipa" National Museum of Natural History, and also from published papers.

1705 specimens were available, 443 of Coccinellidae and 1262 of Cerambycidae, collected by the museum's specialists during the 1997, 2003 and 2004 campaigns in Maramureş.

Abbreviations

Names of the collectors:

A. G. - Andrei Gabriela; A. M. - Andrei Mircea; B. C. - Ban Cristina; C. G. - Chişamera Gabriel; H. C. - Hoinic Cristina; M. I. - Matache Ioana; P. C. - Pârvu Corneliu; P. A. - Petrescu Angela; R. E. - Rusu Elena; R. D. - Ruşti Dorel; S. N. - Săvulescu Nicolae; S. D. - Scăunaşu Dragoş; S. R. - Serafim Rodica; S. Me. - Stan Melania; S. A. - Stănescu Aurora; S. M. - Stănescu Mihai; V. A. - Văraru Adriana.

f. h. - forestry house; spec./s - specimen/s; Mts. - mountains; * species recorded for the first time from the Maramureş Mountains Nature Park.

The numbers in brackets refers to the printed papers.

Family Coccinellidae

The Coccinellidae (ladybirds) is an economically important family within Coleoptera Order. Some members are phytophagous pests, but many are beneficial predators and valuable biocontrol agents. The ladybirds are voracious predators feeding on aphids (greenfly), coccids (scale insects), mealybugs, whitefly and occasionally, on other insect pests of garden and crop plants, both in larval and adult stages.

Subfamily Chilocorinae

Tribe Chilocorini

**Brumus quadripustulatus* (Linnaeus, 1758), (syn. *Exochomus* auct.). Material: 1 spec., the confluence of the Rica and Budescu, Poienile de sub Munte, 14.06.2003, P. C. Distribution: Europe, East Palaearctic, Near East. In Romania in spruce forests. Food: coccids.

Subfamily Coccinellinae

Tribe Coccinellini

Adalia bipunctata Linnaeus, 1758 Records: 1 spec., valley of Frumuşeaua River, Crasna Vişeului, 29.08.1997, P. C. (13). Material: 1 spec. Coşnea f. h., Poienile de sub Munte, 18.07.2004, P. C.; 2 specs. valley of Socolău River, 2 km upstream the confluence of Socolău and Rica rivers, 19.07.2004, S. R.; 2 spec. valley of Făina River, Maramureş Mts., 22.07.2004, S. Me., B. C. Distribution: Palaearctic region, Nearctic region, Oriental region, Australian region. In Romania very common species, frequent in diverse habitats.

Anatis ocellata (Linnaeus, 1758). Records: Maramureş Mts., Făina Valley (4); 1 spec. Smereceni clearing, 7 km upstream Repedea, 22.08.1997, P. C. (13). Distribution: Europe, Siberia. In Romania especially in hilly and mountainous zones, in conifer woodland.

Aphidecta obliterata (Linnaeus, 1758). Records: 1 spec. Repedea f. h., 22.06.1997, A. G. (13); 1 spec. Bălăsâna Valley, 4 km upstream Baia Borşa, 21.08.1997, P. C. (13). Material: 1 spec. the confluence of Pop Ivan and Hututeanca rivers, 18.07.2004, C. G. Distribution: Europe, Near East.

**Calvia (Anisocalvia) quatuordecimguttata* (Linnaeus, 1758). Material: 2 specs. Maramureş Mts., valley of Vaser River, Făina, 21.07.2004, P. C. Distribution: Europe, East Palaearctic, Nearctic region.

Calvia (*Calvia*) *decemguttata* (Linnaeus, 1758). Records: 3 specs. Repedea f. h., 30.06.1997, S. A. (collected at night, with fluorescent light bulb) (13). Distribution: Palearctic region, Oriental region. Common species in Romania.

Coccinella quinquepunctata Linnaeus, 1758. Records: 4 specs. Smereceni clearing, 7 km upstream Repedea, 27.06.1997, S. A. (13); 2 specs. valley of Frumuşeaua River, Crasna Vişeului, 29.08.1997, P. C. (13). Material: 1 spec. Leordina, 15.06.2003, S. R.; 1 specs. valley of Cvaşniţa River, 6 km upstream Coşnea f. h., Poienile de sub Munte, 15.06.2003, S. R.; 2 specs. valley of Pop Ivan River, 12 km upstream Crasna Vişeului, 17.06.2003, S. R., S. Me.; 1 spec. Coşnea f. h., Poienile de sub Munte, 18.06.2003, P. C.; 2 specs. Maramureş Mts., Valley of Vaser River, Bardău - Cozia range, 22.07.2004, P. C. Distribution: Europe, Siberia. In Romania common species, occuring in various habitats.

Coccinella septempunctata Linnaeus, 1758. Records: 2 specs. Moisei ("Izvorul lui Dragoş" f. h.), 13.07.1995, S. A. (12); 8 specs. Smereceni clearing, 7 km upstream Repedea, 20 - 29.06.1997, M. I., S. R., 22.08.1997, P. C. (13); 7 specs. Elma clearing, 2 km upstream Repedea, 24 - 29.06.1997, P. C., S. R., S. A. (13); 4 specs. valley of Frumuşeaua River, 10 km upstream Crasna Vişeului, 25.06. - 29.08.1997, P. C. (13); 1 spec. Repedea f. h., 26.06.1997, P. C. (13); 3 specs. Poienile de sub Munte, 30.06.1997, S. A. (13); 4 specs. Leordina, 22.08.1997, R. E. (13); 2 specs. valley of Vişeuţ River, 2 km upstream Borşa, 20.08.1997, P. C., R. E. (13). Material: 19 specs. the confluence of the Rica and Budescu rivers, Poienile de sub Munte, 14.06.2003, P. C.; 3 specs. valley of Cvaşniţa River, 6 km upstream Coşnea f. h., Poienile de sub Munte, 15.06.2003, P. C., S. Me.; 17 specs. Coşnea f. h., Poienile de sub Munte, 15.06.2003 - 25.07.2004, P. C., B. C.; 7 specs. Leordina, 15.06.2003, S. R., P. C.; 6 specs. valley of Pop Ivan River, Crasna Vişeului, 17.06.2003, S. R., S. Me.; 11 specs. Maramureş Mts., valley of Vaser River, Făina, 20.06.2003 - 21.07.2004, P. C., S. R.; 23 specs. the confluence of Pop Ivan and Hututeanca rivers, 18.07.2004, S. R., B. C., C. G.; 3 specs. valley of Coşnea River, Poienile de sub Munte, 19.07.2004, C. G.; 9 specs. valley of Socolău River, 2 km upstream the confluence of Socolău and Rica rivers, 19 - 23.07.2004, S. R., P. C.; 2 specs. valley of Vişeu River, 2 km upstream Bistra, 24.07.2004, P. C.; 5 specs. valley of Rica River, 2 km upstream Coşnea f. h., Poienile de sub Munte, 25.07.2004, S. R. Distribution: Palearctic region, Afro-tropical region, Nearctic region, Oriental region. In Romania common species, occurring in various habitats without special preference.

**Coccinula quatuordecimpustulata* (Linnaeus, 1758). Material: 1 spec. valley of Coşnea River, Poienile de sub Munte, 19.07.2004, S. R.; 1 specs. the confluence of Vişeu and Tisa rivers, 24.07.2004, P. C. Distribution: Palearctic region, Near East, Oriental region. Common species in Romania.

Hippodamia (*Adonia*) *variegata* (Goeze, 1777). Records: 1 spec. Smereceni clearing, 7 km upstream Repedea, 22.08.1997, P. C.; 1 spec. valley of Frumuşeaua River, Crasna

Vişeului, 29.08.1997, R. E. (13). Material: 1 spec. the confluence of the Rica and Budescu rivers, Poienile de sub Munte, 14.06.2003, P. C.; 29 specs. the confluence of Pop Ivan and Hututeanca rivers, 18.07.2004, S. R., P. C., B. C., C. G.; 2 specs. valley of Coşnea River, Poienile de sub Munte, 19.07.2004, C. G.; 15 specs. valley of Socolău River, 2 km upstream the confluence of Socolău and Rica rivers, 19 - 23.07.2004, S. R.; 36 spec. Maramureş Mts., valley of Vaser River, Făina, 21.07.2004, P. C., S. R.; 15 specs. valley of Vişeu River, 4 km upstream Bistra, 24.07.2004, S. R.; P. C., C. G., B. C.; 43 specs. the confluence of Vişeu and Tisa rivers, 24.07.2004, P. C., S. R.; 3 specs. valley of Rica River, 2 km upstream Coşnea f. h., Poienile de sub Munte, 25.07.2004, S. R.; 1 spec. Coşnea f. h., Poienile de sub Munte, 25.07.2004, P. C. Distribution: Palearctic region, Near East, North Africa, Oriental region. In Romania common, frequent species.

Hippodamia (*Hippodamia*) *tredecimpunctata* (Linnaeus, 1758). Records: 1 spec. valley of Frumuşeaua River, Crasna Vişeului, 29.08.1997, P. C. (13). Material: 2 specs. valley of Socolău River, 2 km upstream the confluence of Socolău and Rica rivers, 19.07.2004, S. R.; 2 spec. Maramureş Mts., valley of Vaser River, Făina, 21.07.2004, P. C., B. C.; 1 specs. the confluence of Vişeu and Tisa rivers, 24.07.2004, P. C. Distribution: Palaearctic region, Near East, North Africa, Nearctic region.

Hippodamia (*Semiadalia*) *notata* (Laicharting, 1781). Records: 1 spec. Repedea f. h., 22.06.1997, S. R.; 1 spec. valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 23.06.1997, S. R. (13). Material: 1 spec. Coşnea f. h., Poienile de sub Munte, 18.06.2003, P. C.; 1 spec. Maramureş Mts., valley of Vaser River, Făina, 20.06.2003, P. C. Distribution: Palaearctic region. Boreo - mountainous species. In Romania only in mountainous zone.

Hippodamia (*Semiadalia*) *undecimnotata* (Schneider, 1792). Records: 4 specs. Repedea f. h., 22 - 26.06.1997, A. M., S. R., P. C. (13); 1 spec. Cârligătura Valley, 17 km upstream Repedea, 27.06.1997, M. I. (13); 1 spec. Smereceni clearing, 7 km upstream Repedea, 22.08.1997, P. C. (13). Material: 4 specs. the confluence of Pop Ivan and Hututeanca rivers, 18.06.2004, S. R., P. C., C. G.; 2 specs. valley of Socolău River, 2 km upstream the confluence of Socolău and Rica rivers, 19.07.2004, S. R.; 1 spec. valley of Coşnea River, Poienile de sub Munte, 20.07.2004, S. R.; 4 specs. valley of Vişeu River, 4 km upstream Bistra, 24.07.2004, S. R., P. C., C. G.; 16 specs. the confluence of Vişeu and Tisa rivers, 24.07.2004, P. C.; 3 specs. valley of Rica River, 2 km upstream Coşnea f. h., Poienile de sub Munte, 25.07.2004, S. R.; 3 specs. Coşnea f. h., Poienile de sub Munte, 25.07.2004, P. C. Distribution: Palaearctic region, Near East. In Romania common species.

**Oenopia conglobata* (Linnaeus, 1758). Material: 1 spec. Coşnea Valley, Poienile de sub Munte, 15.07.2004, S. Me. Distribution: Europe, East Palaearctic, Near East, North Africa.

Propylea quatuordecimpunctata (Linnaeus, 1758). Records: Maramureş Mts., Făina Valley (4); 1 spec. Moisei ("Izvorul lui Dragoş" f. h., 750 m), 13.07.1995, H. C. (12); 7 spec. Elma clearing, 2 km upstream Repedea, 24 - 29.06.1997, M. I., P. C., S. A. (13); 5 specs. Smereceni clearing, 7 km upstream Repedea, 24 - 29.06.1997, S. R., M. I., 22.08.1997, P. C. (13); 4 specs. valley of Frumuşeaua River, 10-12 km upstream Crasna Vişeului, 25.06.1997, M. I., S. A., 29.08.1997, P. C. (13); 10 specs. Repedea f. h., 2.07.1997, M. I. (13); 1 spec. Vişeu Valley, 6 km downstream Moisei, 21.08.1997, R. E. (13). Material: 1 spec. Leordina, 15.06.2003, P. C.; 4 specs. Maramureş Mts., valley of Vaser River, Făina, 21.07.2004, P. C.; 1 spec. the confluence of Pop Ivan and Hututeanca rivers, 18.07.2004, B. C. Distribution: Palaearctic region, Near East, North Africa. In Romania common, frequent species.

Tribe Psylloborini

Halyzia sedecimguttata (Linnaeus, 1758). Records: 2 specs. Repedea f. h., 30.06.1997, S. M. (night - fluorescent light) (13). Material: 1 spec. Coşnea f. h., Poienile de sub Munte, 13.06.2003, S. M. Distribution: Palaearctic region, Near East. In Romania a common species.

Psyllobora (*Thea* auct.) *vigintiduopunctata* (Linnaeus, 1758). Records: 1 spec. Smereceni clearing, 7 km upstream Repedea, 20.06.1997, M. I. (13). Material: 2 specs. the confluence of the Rica and Budescu rivers, Poienile de sub Munte, 14.06.2003, P. C.; 1 specs. Coşnea f. h., Poienile de sub Munte, 19.07.2004, B. C.; 1 spec. Maramureş Mts., valley of Vaser River, Făina, 21.07.2004, P. C. Distribution: Palaearctic region. In Romania common.

Subfamily Epilachninae

Tribe Madaini

Subcoccinella vigintiquatuorpunctata (Linnaeus, 1758). Records: 7 specs. Smereceni clearing, 7 km upstream Repedea, 24 - 29.06.1997, S. R., M. I., S. A., 22.08. P. C., 1997 (13); 4 specs. Repedea f. h., 26.06.1997, P. C. (13); 1 spec. Cârligătura Valley, 17 km upstream Repedea, 27.06.1997 (13); 3 specs. Poienile de sub Munte, 30.06.1997, S. A. (13); 2 specs. Leordina, 22.08.1997, R. E. (13); 3 specs. Frumuşeaua Valley, Crasna Vişeului, 29.08.1997, P. C. (13). Material: 2 specs. the confluence of Vişeu and Tisa rivers, 24.07.2004, P. C. Distribution: Palaearctic region, North Africa, Nearctic region. A phytophagous species, common.

Subfamily Scymninae

Tribe Scymnini

Scymnus (*Scymnus*) *frontalis* (Fabricius, 1787). Records: 6 specs. valley of Frumuşeaua River, 12 km upstream Crasna Vişeului, 25.06. - 29.08.1997, S. A., P. C., R. E. (13); 1 spec. Smereceni clearing, 7 km upstream Repedea, 27.06.1997, S. A. (13); 2 specs. Bistra Valley, 28.06.1997, M. I. (13); 3 specs. Elma clearing, 2 km upstream Repedea, 29.06.1997, S. A. (13); 3 specs. Poienile de sub Munte, 30.06.1997, S. A. (13). Distribution: East Palaearctic, ? Near East, common species.

443 specimens, 19 species of 14 genera, 5 tribes, and 4 subfamilies were identified. The subfamily Coccinellinae, with 16 species, is best represented. Each of the subfamilies Chilocorinae, Epilachninae and Scymninae are represented only by a single species.

Some of the most known predator coccinelids, aphidophagous as: *Adalia*, *Hippodamia*, *Calvia*, *Coccinella*, *Propylaea* are presented. The commonest species, the variegated ladybird (*Hippodamia variegata*) and the seven-spot ladybird (*Coccinella septempunctata*) are well represented. *Anatis ocellata* (the eyed ladybird) is found in coniferous forests and plantations, it feeds on aphids (Lachnidae), *Chrysomela* and Tortricidae larvae. *Brumus quadripustulatus* eats scale insects (Coccids). *Hippodamia tredecimpunctata* (thirteen-spot ladybird) has the a preference for humid biotopes, being occurred on *Phragmites* sp., *Typha* sp., *Carex* sp., *Sparganium* sp., *Salix* sp. This species feeds on aphids, especially *Hyalopterus pruni*. *Calvia decemguttata* has preferences for psyllids and aphids. The species from the tribe Psylloborini: *Halyzia sedecimguttata* and *Psyllobora vigintiduopunctata* are mycetophagous. The phytophagous species, *Subcoccinella vigintiquatuorpunctata* (twenty-four-spot ladybird) attack different grassy plants like: *Medicago sativa*, *Silene dioica*, *Cirsium* sp., *Lactuca* sp.

From Maramureş Mountains Nature Park two Coccinellidae species were cited in literature: *Anatis ocellata* and *Propylea quatuordecimpunctata* (Frivaldszky, 1871).

Following studies developed between 1995-1997 reported 13 other species in the area: *Adalia bipunctata* (13), *Aphidecta obliterata* (13), *Calvia decemguttata* (13), *Coccinella quinquepunctata* (13), *Coccinella septempunctata* (12), *Hippodamia tredecimpunctata* (13), *Hippodamia notata* (13), *Hippodamia undecimnotata* (13), *Hippodamia variegata* (13), *Halyzia sedecimguttata* (13), *Psyllobora vigintiduopunctata* (13), *Subcoccinella vigintiquatuorpunctata* (13), *Scymnus frontalis* (13). *Brumus quadripustulatus*, *Calvia quatuordecimguttata*, *Coccinula quatuordecimpustulata* and *Oenopia conglobata* are now recorded from the Maramureş Mountains Nature Park. *Brumus quadripustulatus* and *Oenopia conglobata* are recorded for the first time from the Maramureş County.

Family Cerambycidae

The longhorn beetles or longhorned beetles (Cerambycidae) are a cosmopolitan family of beetles, characterized by extremely long antennae, which are often as long as or longer than the beetle's body. Depending on the species, adults may be observed feeding on flower parts, leaves, or bark. Females lay eggs in bark crevices or in soil near roots. Newly hatched larvae immediately begin to excavate into the plant they feed on. Some species feed only on dead or decaying wood, while others bore into roots or beneath bark of living trees and shrubs. Some species of longhorned beetles are serious pests of forest, shade, or fruit trees and certain shrubs. They can cause extensive damage to either living trees or to wood in buildings. Most longhorned beetles attack only injured or weakened woody plants. Longhorned beetles help to decompose dead and dying trees, thereby making nutrients and sunlight available for new plants.

Subfamily Cerambycinae

Tribe Callidiopini

Axinopalpis gracilis (Krynicky, 1832). Records: 5 specs. Moisei ("Izvorul lui Dragoş" f. h.), 13.07.1995, M. I. (12). Distribution: Europe, Near East. In Romania from the steppe zone till the deciduous forests floor. Larvae live in diverse deciduous trees.

Tribe Callidiini

Ropalopus femoratus (Linnaeus, 1758). Records: 5 specs. Smereceni clearing, 7 km upstream de Repedea 22 - 27.06.1997, S. R., S. A., S. M. (13); 1 spec. Elma clearing, 2 km upstream Repedea 24.06.1997, P. C. (13). Distribution: Europe. In Romania, in the oak and beech forests, larvae live in deciduous trees.

Ropalopus macropus (Germar, 1824). Records: 1 spec. Repedea f. h., 22.06.1997, S. R. (13). Distribution: Europe, Near East. In Romania especially in oak and beech forests and in mountainous zone.

Tribe Cerambycini

Cerambyx scopolii Fuessly, 1775. Records: Maramureş Mts., Făina Valley (4). Distribution: Europe, East Palaearctic, Near East. In Romania common species, found as well in forests from the plain as in those from mountainous zone, although preferring the oak forests. Larvae live in diverse deciduous trees.

Tribe Clytini

**Chlorophorus herbstii* (Brahm, 1790). Material: 1 spec. Bistra 21.07.1998 V. A.; 2 specs. the confluence of Pop Ivan and Hututeanca rivers, 18.07.2004, C. G. Distribution: Europe, northern and central Caucasus, Siberia. In Romania recorded more in beech and oak forests. Larvae live in diverse deciduous trees.

Chlorophorus sartor (Müller, 1766). Records: 1 spec. Coşnea f. h., Poienile de sub Munte, 15.06.2003, P. C. (15). Distribution: Europe, East Palaearctic, Near East. In Romania common species, found everywhere. Larvae live in deciduous trees.

Chlorophorus varius (Müller, 1766). Records: 2 specs. Smereceni clearing, 7 km upstream Repedea 22.08.1997 P. C. (13); 1 spec. Leordina 22.08.1997 R. E. (13); 4 specs. Frumuşeaua Valley, Crasna 29.08.1997 P. C. (13). Distribution: Europe, Crimeea, East Palaearctic, Near East. In Romania in all regions. Larvae live in vine, fruit trees, chestnut, maples, alders, elms, nut trees.

Clytus arietis (Linnaeus, 1758). *Records*: 3 specs. Repedea f. h., 22 - 26.06.1997, S. R., M. I., P. C. (13); 3 specs. Frumuşeaua Valley, 10 km upstream Crasna 23.06. - 29.08.1997 S. R., P. C. (13); 1 spec. Smereceni clearing, 7 km upstream Repedea 27.06.1997, S. A. (13). Distribution: Europe, East Palaearctic, Near East. In Romania from the steppe zone till the subalpine forest floor. Larvae live in deciduous trees.

Cyrtoclytus capra (Germar, 1824). Records: 1 spec. Maramureş Mts., Pop Ivan Valley, 12 km upstream Crasna, 17.06.2003, S. R. (15). Distribution: Europe, East Palaearctic, Oriental region.

Tribe Obriini

Obrium brunneum (Fabricius, 1792). Records: Maramureş Mts., Făina Valley (4). Distribution: Europe, East Palaearctic, Near East, Oriental region. In Romania from the oak forests zone till the spruce forests. Larvae live in coniferous trees.

Tribe Rosalini

**Rosalia alpina* (Linnaeus, 1758). Material: 4 specs. valley of Hututeanca River, 18.07.2004, C. G., S. R. Distribution: Europe, Near East. In Romania rare, endangered species, beech forests are their preferred habitat. Polyphagous species in deciduous trees, preferring beech (*Fagus*), but also in *Ulmus*, *Carpinus*, *Tilia*, *Castanea*. Larvae develop in dead, decaying, relatively dry wood, or on living trees in wounds and abrasions.

Tribe Stenopterini

**Stenopterus flavicornis* Küster, 1846. Records: 2 specs. the confluence of the Pop Ivan and Hututeanca rivers, 18.07.2004, C. G. Distribution: Europe.

Stenopterus rufus (Linnaeus, 1767). Records: 1 spec. Elma clearing, 2 km upstream Repedea 24.06.1997 S. R. (13). Distribution: Europe, Near East. In Romania common species, frequent from steppe zone till the floor of the spruce fir forests. Larvae live in deciduous trees.

Subfamily Lamiinae

Tribe Acanthoderini

Aegomorphus clavipes (Schrank, 1781). Records: 2 specs. valley of the Rica River, 5.5 km upstream Poienile de sub Munte, 14.06.2003, S. R., S. M. (15). Distribution: Europe, East Palaearctic, Near East, North Africa.

Tribe Agapanthiini

Agapanthia villosoviridescens (De Geer, 1755). Records: Maramureş Mts., Făina Valley (4); 1 spec. Lutoasa Valley, Poienile de sub Munte, 14.06.2003, P. C. (15); 1 spec. Maramureş Mts., valley of Vaser River, Făina, 19.06.2003 (15). Distribution: Europe, East Palaearctic, Near East. Larvae live in grasses, from plain till mountains.

Tribe Monochamini

Monochamus sartor (Fabricius, 1787). Records: 6 specs. 500 m downstream the confluence of the Rica and Budescu, Poienile de sub Munte, 14.06.2003, S. R., P. C. (15); 10 specs. the left bank of Rica River, Poienile de sub Munte, 14.06.2003, S. R., S. M. (15); 19 specs. Repedea Valley, 500 m upstream Repedea f. h., 18.06.2003, S. R., S. Ma., S. M. (15). Material: 51 specs. Maramureş Mts., Vaser Valley, Făina, 22.07.2004, S. R., C. G., B. C. (Figs. 2 A, B). Distribution: Europe. *M. sartor* is a technical pest of spruce. In Romania especially in beech and coniferous forests. Larvae live mostly in spruce, pine, common fir and other conifers.

Monochamus sutor (Linnaeus, 1756). Records: Maramureş Mts., Vaser Valley (4); 9 specs. the confluence of the Rica and Budescu rivers, Poienile de sub Munte, 14.06. 2003, S. R. (15); 5 specs. 500 m downstream the confluence of the Rica and Budescu rivers, Poienile de sub Munte, 14.06.2003, S. R. (15); 12 specs. valley of Rica River (left bank), Poienile de sub Munte, 14.06.2003, S. R., S. M. (15); 5 specs. valley of Repedea River, 500 m upstream Repedea f. h., 18.06.2003, S. R., S. Ma., S. M. (15); 1 spec. Maramureş Mts., valley of Vaser River, Făina, 19.06.2003, S. R. (15). Material: 43 specs. Maramureş Mountains, valley of Vaser River, Făina, 22.07.2004, S. R., C. G., B. C. (Figs. 2 C, D). Distribution: Europe, East Palaearctic, Oriental region. *Monochamus sutor* is one of the most prevalent stem-infesting insects. In Romania found in beech and coniferous forests. Larvae live more in spruce, occasionally in pine, common fir and other conifers species. These pest species were present in large numbers in Făina area, being carried with the wood logs from upstream Făina. Then, the infested wood was transported to Vişeu.

Tribe Phytoeciini

**Opsilia coerulescens* (Scopoli, 1763). Material: 1 spec. Bistra Valley, 28.06. 1997, M. I. Distribution: Europe, East Palaearctic, Near East, North Africa. In Romania common species, found nearly in all vegetation zones, larvae live in grassy plants.

Tribe Pogonocherini

Pogonocherus hispidus (Linnaeus, 1758). Records: 1 spec. Vişeu de Sus, 11.06.1966, N. S. (12). Distribution: Europe, North Africa. In Romania recorded from the steppe zone till the mountains. Larvae live in different deciduous trees.

Tribe Saperdini

Saperda scalaris (Linnaeus, 1758). Records: 10 specs. valley of the Rica River, Poienile de sub munte, 14.VI.2003, S. R., S. M. (15). Material: 1 spec. Maramureş Mts., valley of Vaser River, Bardău - Cozia range, 22.07.2004, B. C. Distribution: Europe, East Palaearctic, Near East, North Africa. In Romania found more in oak and beech forests.

Subfamily Lepturinae

Tribe Lepturini

Alosterna tabacicolor (Degeer, 1775). Records: 1 spec. the confluence of the Rica and Coşnea rivers, Poienile de sub Munte, 15.06.2003, S. R. (15); 3 specs. valley of Cvaşniţa River, 6 km upstream Coşnea f. h., Poienile de sub Munte, 16 - 17.06.2003, P. C., S. R. (15); 1 spec. valley of Pop Ivan River, 10 km upstream Crasna Vişeului, 17.06.2003, S. R. (15). Distribution: Europe, East Palaearctic, Near East. In Romania common species, observed especially in mountainous and subalpine forest floors. Larvae feed on several species of deciduous trees.

Anastrangalia dubia (Scopoli, 1763). Records: 1 spec. Elma clearing, 2 km upstream Repedea, 24.06.1997, P. C.; 1 spec. Repedea f. h., 26.06.1997, P. C. (13); 1 spec. Maramureş Mts., Poienile de sub Munte, 500 m downstream of the confluence of Rica and Budescu rivers, 14.06.2003, S. R. (15). Material: 3 specs. Maramureş Mts., valley of Vaser River, Făina, 21.07.2004 S. R., B. C.; 2 specs. Coşnea f. h., Poienile de sub Munte, 25.07.2004, P. C. Distribution: Europe, Near East, North Africa. In Romania in mountainous and subalpine forest floors. Larvae live in coniferous trees.

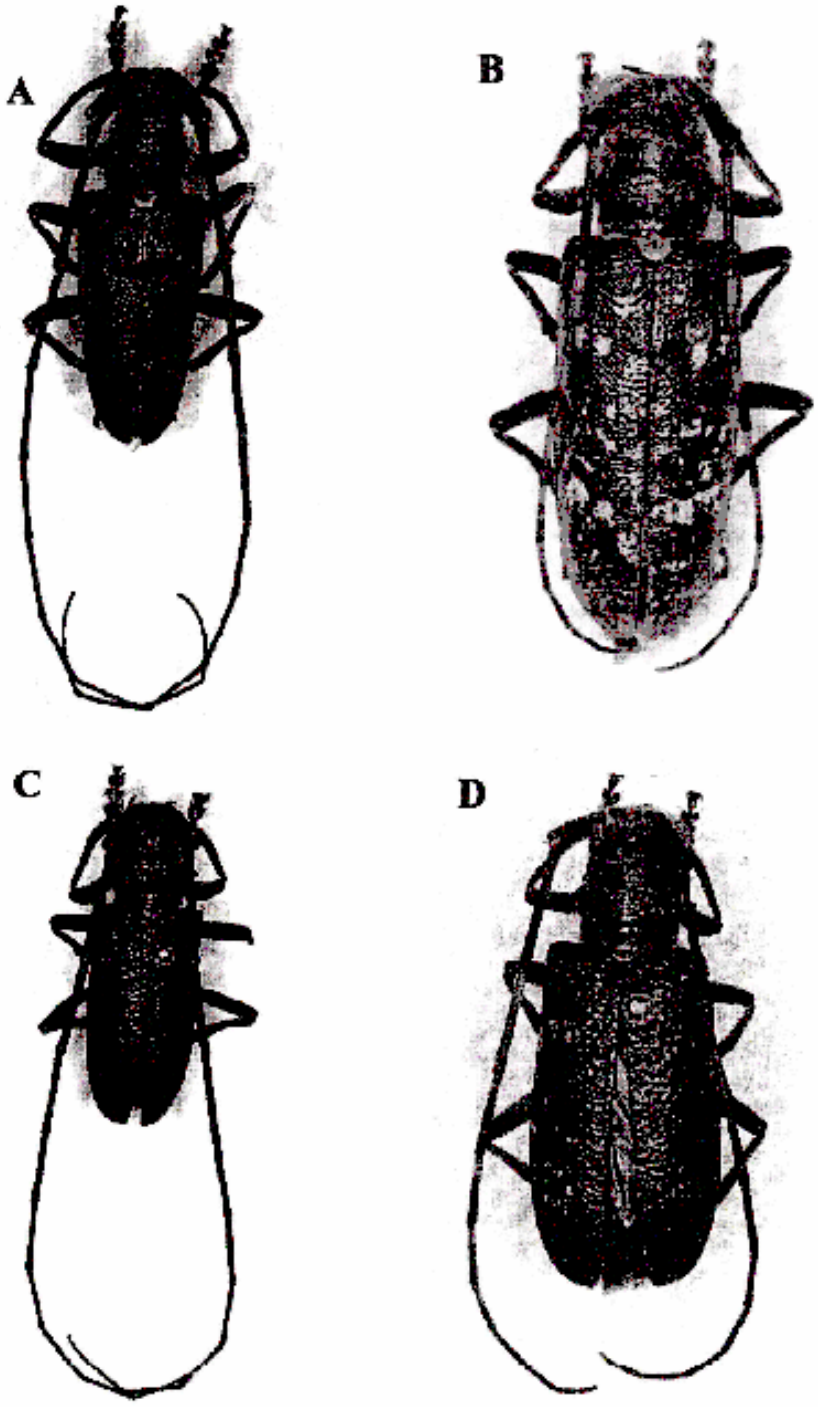

Figure 2: *Monochamus sartor:* A male; B female;
Monochamus sutor: C male; D female.

Anastrangalia sanguinolenta (Linnaeus, 1761). Records: 7 specs. Moisei ("Izvorul lui Dragoş" f. h.), 13.07.1995, P. C., S. A. (12); 3 specs. Repedea f. h., 26.06. - 2.07.1997, M. I. (13); 4 specs. Elma clearing, 2 km upstream Repedea, 24 - 29.06.1997, S. R., R. D. (13); 6 specs. Vişeuţ River, 12 km upstream Borşa, 20.08.1997, P. C. (13); 5 specs. Bălăsâna Valley, 4 km upstream Baia Borşa, 21.08.1997, P. C., R. E. (13); 2 specs. Frumuşeaua Valley, 12 km upstream Crasna, 25.06. - 29.08.1997, S. A., R. E. (13); 3 specs. Maramureş Mts., 500 m downstream the confluence of Rica and Budescu, Poienile de sub Munte, 14.06.2003, S. R. (15); 11 specs. Coşnea f. h., Poienile de sub Munte, 15 - 18.06.2003, P. C. (15); 8 specs. Cvaşniţa Valley, 6 km upstream Coşnea f. h., Poienile de sub Munte, 15.06.2003, P. C., S. R. (15); 1 spec. Pop Ivan Valley, 10 km upstream Crasna, 17.06.2003, S. R. (15); 1 spec. Maramureş Mts., Vaser Valley, Făina, 19.06.2003, S. Ma. (15). Material: 5 specs. Maramureş Mts., Vaser Valley, Făina, 21.07.2004, S. R., B. C. Distribution: Europe, Near East. In Romania especially in mountainous forest floor, larva lives in conifers.

Leptura annularis Fabricius, 1801. (syn. *arcuata*, Panzer, 1793). Records: 5 specs. Elma clearing, 2 km upstream Repedea, 24 - 29.06.1997, M. I., S. A., S. R. (13). Distribution: Europe, East Palaearctic. In Romania especially in mountainous and subalpine forest floors, sometimes in oak forests. Larvae live in coniferous and deciduous trees.

**Leptura aurulenta* Fabricius, 1792. Material: 1 spec. the confluence of the Pop Ivan and Hututeanca rivers, 18.07.2004, P. C.; 2 specs. Maramureş Mts., valley of Vaser River, Făina, 22.07.2004, C. G. Distribution: Europe, Near East, North Africa.

Leptura quadrifasciata Linnaeus, 1758. Records: 4 specs. valley of Frumuşeaua River, 10 km upstream Crasna Vişeului, 23.06.1997, S. R. (13); 1 spec. Vişeu Valley, 2 km downstream Baia Borşa, 20.08.1997, P. C. (13); 1 spec. Vişeu Valley, 6 km downstream Moisei, 21.08.1997, R. E. (13); 1 spec. Bistra, 4 km upstream Bistra, 26.08.1997, P. C. (13); 2 specs. at Rica and Budescu rivers confluence, Poienile de sub Munte, 14.06.2003, P. C. (15); 3 specs. Leordina, 15.06.2003, P. C., S. R. (15); 1 spec. Coşnea f. h., Poienile de sub Munte, 16.06.2003, P. C. (15); 1 spec. Maramureş Mts., Vaser Valley, Făina, 19.06.2003, S. R. (15). Material: 1 spec. Coşnea f. h., Poienile de sub Munte, 19.07.2004 P. C.; 1 spec. Maramureş Mts., Vaser Valley, Făina, 21.07.2004, S. R.; 3 specs. Socolău Valley, 2 km upstream the confluence of Socolău and Rica rivers, 23.07.2004, S. R.; 4 specs. Rica Valley, 2 km upstream Coşnea f. h., Poienile de sub Munte, 25.07.2004, S. R.; 1 spec. the confluence of the Pop Ivan and Hututeanca rivers, 18.07.2004, P. C.; 1 spec. Maramureş Mts., Bardău, valley of Vaser River, 22.07.2004 P. C., 1 spec. valley of Vişeu River, 4 km upstream Bistra, 24.07.2004, P. C. Distribution: Europe, East Palaearctic, Near East. In Romania found especially in beech and coniferous forests or in the steppes with bushes. Larvae live in deciduous trees (*Betula* sp., *Corylus* sp., *Alnus* sp., *Salix* sp., *Populus* sp.).

Lepturobosca virens (Linnaeus, 1758). Records: Maramureş Mts., Făina Valley (4); 1 spec. Elma clearing, 2 km upstream Repedea, 24.06.1997, P. C. (13); 1 spec. Vişeuţ River, 12 km upstream Borşa, 20.08.1997, P. C. (13); 1 spec. Bălăsâna Valley, 4 km upstream Baia Borşa, 21.08. 1997, R. E. (13); 2 specs. 500 m downstream the confluence of Rica and Budescu rivers, Poienile de sub Munte, 14.06.2003, S. R. (15); 1 spec. Hututeanca Valley, 12 km upstream Crasna Vişeului, 17. 06.2003, S. Ma. (15). Material: 5 specs. the confluence of the Pop Ivan and Hututeanca rivers, 12 km upstream Crasna Vişeului, 18.07.2004, C. G.; 1 spec. Coşnea f. h., Poienile de sub Munte, 19. 07.2004, P. C.; 19 specs. Maramureş Mts., Făina, Vaser Valley, 21 - 22.07.2004, S. R., P. C.; 1 spec. Socolău Valley, 2 km upstream the confluence of the Socolău and Rica rivers, 23.07.2004, S. R. Distribution: Europe, East Palaearctic, Oriental region. In Romania common species, in mountainous and subalpine forest floors. Larvae live in conifers.

Nivellia sanguinosa (Gyllenhal, 1827). Records: Maramureş Mts., Făina Valley (4), 1 spec. Cârligătura Valley, 17 km upstream Repedea, 27.06.1997, P. C. (13). Distribution: Europe, East Palaearctic, Oriental region. Boreomountainous species. *Nivellia sanguinosa*, rare species in Romania, was cited in Maramureş Mountains, the valley Făina River (Frivaldszky, 1871), Bocicoiul Mare (Kuthy, 1900), Sinaia (Fleck, 1905); Broşteni (Montandon, 1906), Retezat Mountains - Râu de Mori and Rodnei (Petri, 1912). In 1994 the species was found in Nemira Mountains (Szél and col., 1995).

Pachytodes cerambyciformis (Schrank, 1781). Records: Maramureş Mts., Făina Valley (4); 1 spec. Moisei ("Izvorul lui Dragoş" f. h.), 13.07.1995, S. A. (12); 3 specs. valley of Frumuşeaua River, 10 km upstream Crasna Vişeului, 23.06. - 29.08.1997, S. R., S. A., M. I., P. C. (13); 9 specs. Repedea f. h., 26.06. - 2.07.1997, M. I., P. C. (13); 2 specs. Smereceni clearing, 7 km upstream Repedea, 27.06.1997, S. A. (13); 3 specs. Bistra Valley, 4 km upstream Bistra, 28.06. - 26.08.1997, P. C., S. A. (13); 2 specs. Vişeuţ River, 12 km upstream Borşa, 20.08. 1997, P. C., R. E. (13); 1 spec. Bălăsâna Valley, 4 km upstream Baia Borşa, 21.08.1997, P. C. (13); 1 spec. Repedea, Micluşa, 08.1997, P. C. (13); 2 specs. Poienile de sub Munte, 500 m upstream the confluence of Rica and Budescu rivers, 14.06.2003, S. R. (15); 4 specs. Coşnea f. h., Poienile de sub Munte, 16 - 18.06.2003, S. R., P. C., S. M. (15); 2 specs. valley of Hututeanca river, 10 km upstream Crasna Vişeului, 17.06.2003, S. R., P. C. (15). Material: 1 spec. Coşnea f. h., Poienile de sub Munte, 19.07.2004, P. C.; 1 spec. Maramureş Mts, valley of Făina River, 22.07.2004, S. R.; 1 spec. Maramureş Mts., valley of Vaser River, Bardău, 22.07.2004 P. C.; 1 spec. valley of Socolău River, 2 km upstream the confluence of the Socolău and Rica rivers, 23.07.2004 S. R.; 1 spec. valley of Vişeu River, 4 km upstream Bistra, 24.07.2004, P. C. Distribution: Europe. In Romania common species, found especially in beech and coniferous forests. Larvae live in roots of deciduous trees.

Paracorymbia (*Brachyleptura* auct.) *maculicornis* (De Geer, 1775). Records: 3 specs. Moisei ("Izvorul lui Dragoş" f. h., 750 m), 13.07.1995, P. C. (12); 1 spec. Elma clearing, 2 km upstream Repedea, 24.06.1997, S. R. (13); 1 spec. Repedea f. h., 2.07.1997, M. I. (13); 2 specs. Vişeuţ River, 12 km upstream Borşa, 20.08.1997, P. C. (13). Material: 1 spec. the confluence of the Pop Ivan and Hututeanca rivers, 18.07.2004, B. C.; 1 spec. Coşnea f. h., Poienile de sub Munte, 18.06.2003, P. C.; 1 spec. valley of Socolău River, 2 km upstream confluence of the Socolău and Rica rivers, 19.07.2004 S. R.; 1 spec. valley of Coşnea River, Poienile de sub Munte, 20.07.2004, S. R.; 1 spec. Maramureş Mts., valley of Vaser River, Făina - Bardău range, 22.07.2004, B. C. Distribution: Europe (in south, especially in mountains), Near East. In Romania more observed in mountainous and subalpine floors, it lives as well in coniferous trees as deciduous ones (*Betula* sp., *Corylus* sp., *Fagus* sp.).

Pseudovadonia (syn. *Vadonia*) *livida* (Fabricius 1776). Records: 5 specs. Moisei ("Izvorul lui Dragoş" f. h.), 13.07.1995, S. A., M. I. (12); 7 specs. Repedea f. h., 22.06. - 2.07.1997, M. I., S. R., P. C. (13); 7 specs. Elma clearing, 2 km upstream Repedea, 24.06.1997, P. C., S. R. (13); 17 specs. valley of Frumuşeaua River, Crasna Vişeului, 23 - 29.06.1997, S. R., S. A., P. C. (13); 2 specs. Smereceni clearing, 7 km upstream Repedea, 27.06.1997, S. A. (13); 1 spec. Bistra, 21.07.1998, P. C. (14); 8 specs. Coşnea f. h., Poienile de sub Munte, 15 - 20.06.2003, P. C., S. D. (15); 3 specs. Leordina, 15.06.2003, S. R., P. C. (15); 1 spec. valley of Cvaşniţa River, Poienile de sub Munte, 15.06.2003, P. C. (15). Material: 5 specs. the confluence of the Pop Ivan and Hututeanca rivers, 18.07.2004, S. R., C. G.; 1 spec. Coşnea f. h., Poienile de sub Munte, 25.07.2004, P. C. Distribution: southern and South - Eastern Europe, East Palaearctic, Near East. In Romania common species every where, it lives in oaks and other deciduous trees.

Rutpela maculata (Poda, 1761). Records: 1 spec. Moisei ("Izvorul lui Dragoş" f. h.), 13.09.1995, P. C. (12); 12 specs. valley of Frumuşeaua River, Crasna Vişeului, 25.06. - 29.08.1997, S. R., P. C., R. E. (13); 1 spec. Smereceni clearing, 7 km upstream Repedea, 27.06.1997, S. A. (13); 1 spec. Elma clearing, 2 km upstream Repedea, 29.06.1997, S. A. (13); 3 specs. Repedea f. h., 2.07.1997, M. I. (13); 3 specs. Bistra Valley, 4 km upstream Bistra, 26.08.1997, P. C. (13); 1 spec. Bistra, 21.07.1998, V. A. (14); 2 specs. Coşnea f. h., Poienile de sub Munte, 17.06.2003, S. M. (15); 4 specs. valley of Pop Ivan River, Maramureş Mts., 17.06.2003, S. R., P. C., S. Ma. (15); 1 spec. valley of Hututeanca River, Maramureş Mts., 17.06.2003, S. R. (15); 1 spec valley of Repedea River, 500 m upstream Repedea f. h., 18.06.2003, S. R. (15). Material: 1 specs. the confluence of the Pop Ivan and Hututeanca rivers, 18.07.2004, P. C.; 1 spec. Maramureş Mts., Făina, valley of Vaser River, 21 - 22.07.2004, P. C.; 1 spec. Maramureş Mts., Bardău, 22.07.2004, P. C.; 1 spec. valley of Vişeu River, 2 km upstream Bistra, 24.07.2004, B. C.; 2 specs. Coşnea f. h., Poienile de sub Munte, 25.07.2004, P. C., B. C. Distribution: Europe, East Palaearctic, Near East. In Romania common species found also in oak forests, but especially in beech and coniferous forests till the subalpine floor. Larvae live in deciduous (*Corylus* sp., *Alnus* sp., *Fagus* sp.) and coniferous trees.

**Stenurella bifasciata* (Müller, 1776). Material: 1 spec. Maramureş Mts., the confluence of the Pop Ivan and Hututeanca rivers, 18.07.2004, C. G. Distribution: Europe, East Palaearctic, Near East. In Romania common species, found from the ante steppe complex (here being less frequent) till the mountainous zone. Larvae live in bushes and deciduous trees.

Stenurella melanura (Linnaeus, 1758). Records: 5 specs. Moisei ("Izvorul lui Dragoş" f. h.), 13.07.1995, P. C., S. A. (12); 3 specs. Bistra Valley, 28.06.1997, M. I. (13); 2 specs. Bistra Valley, 4 km upstream Bistra, 26.08.1997, P. C. (13); 5 specs. Repedea f. h., 2.07.1997, M. I. (13); 25 specs. valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 23.06. - 29.08.1997, S. R., P. C. (13); 2 specs. Vişeuţ River, 12 km upstream Borşa, 20.08.1997, P. C. (13); 1 spec. Vişeu Valley, 2 km downstream Borşa, 20.08.1997, P. C. (13); 6 specs. Bălăsâna Valley, 4 km upstream Baia Borşa, 21.08.1997, P. C. (13); 2 specs. Bistra, 21.07.1998, M. I., V. A. (14). Material: 7 specs. valley of Repedea River, 500 m upstream Repedea f. h., 18.06.2003, S. R.; 2 specs. Leordina,15.06.2003, P. C.; 2 specs. Poienile de sub Munte, the confluence of the Rica and Budescu rivers, 14.06.2003, S. R., P. C.; 1 spec. Poienile de sub Munte, Lutoasa Valley, 14.06.2003, P. C.; 47 specs. Poienile de sub Munte, Coşnea f. h., 15 - 16.06.2003, P. C., S. R., 19 - 25.07.2004, C. G., P. C., B. C.; 20 specs. valley of Hututeanca River, 17.06.2003, S. R., S. Me.; 13 specs. the confluence of the Pop Ivan and Hututeanca rivers, Maramureş Mts., 18.07.2004, P. C., S. R., B. C., C. G.; 10 specs. valley of Pop Ivan River, 19.07.2004, S. R.; 8 specs. Coşnea f. h., Poienile de sub Munte, 19.07.2004, P. C., C. G.; 11 specs. valley of Coşnea River, Poienile de sub Munte, 20.07.2004, S. R.; 8 specs. Maramureş Mts., valley of Vaser River, Făina, 21.07.2004, P. C., C. G., B. C.; 2 specs. Maramureş Mts., valley of Făina River, 22.07.2004, S. R.; 6 specs. valley of Vaser River, Făina - Bardău range, 22.07.2004, B. C.; 26 specs. valley of Vişeu River, 2 km upstream Bistra, 24.07.2004, P. C., C. G., S. Me.; 1 spec. the confluence of the Vişeu and Tisa rivers, Maramureş Mts., 24.07.2004 P. C. Distribution: Europe, East Palaearctic, Near East, Oriental region. In Romania common species found from the sylvosteppe till the mountains; it lives as well in deciduous as in coniferous trees.

Stenurella nigra (Linnaeus, 1758). Records: 14 specs. Repedea f. h., 22.06. - 2.07.1997, M. I., S. R. (13); 2 specs. Elma clearing, 2 km upstream Repedea, 24.06.1997, M. I., S. A. (13); 11 specs. valley of Frumuşeaua River, 10-12 km upstream Crasna Vişeului, 23 - 25.06.1997, S. R., S. A. (13); 1 spec. Bistra Valley, 28.06.1997, M. I. (13); 1 spec. Poienile de sub Munte, 500 m upstream the confluence of Rica and Budescu rivers, 14.06.2003, S. R. (15); 21 specs. valley of Hututeanca River, 12 km upstream Crasna Vişeului, 17.06.2003, S. R.; 5 specs. Poienile de sub Munte, Coşnea f. h., 18.06.2003, P. C., S. R. (15). Distribution: Europe, East Palaearctic, Near East. In Romania a common species especially in oak forests.

Stictoleptura (syn. *Corymbia*) *rubra* (Linnaeus, 1758). Records: 2 specs. Moisei ("Izvorul lui Dragoş" f. h., 750 m), 13.09.1995, P. C., H. C. (12); 4 specs. Vişeu Valley, 2 km downstream Baia Borşa, 20.08.1997, P. C., R. E. (13); 1 spec. Bălăsâna Valley, 4 km upstream Baia Borşa, 21.08.1997, P. C. (13); 1 spec. Smereceni clearing, 7 km upstream Repedea, 22.08.1997, P. C. (13); 1 spec. Bistra Valley, 4 km upstream Bistra, 26.08.1997, P. C. (13); 1 spec. valley of Frumuşeaua River, Crasna Vişeului 29.08.1997 P. C. (13). Material: 3 specs. valley of Pop Ivan River, 18.07.2004, S. R.; 1 spec. valley of Hututeanca River, 18.07.2004, S. Me.; 2 specs. the confluence of the Pop Ivan and Hututeanca rivers, Maramureş Mts., 18.07.2004, S. R., P. C.; 4 specs. Coşnea f. h., Poienile de sub Munte, 19.07.2004, C. G.; 2 specs. valley of Coşnea River, Poienile de sub Munte, 20.07.2004, S. R.; 4 specs. Maramureş Mts., valley of Vaser River, Făina, 21.07.2004, S. R., B. C.; 4 specs. Maramureş Mts., valley of Vaser River, Bardău, 22.07.2004, P. C.; 4 specs. Maramureş Mts., valley of Vaser River, Cozia, 22.07.2004, P. C.; 3 specs. Maramureş Mts., valley of Vaser River, Bardău - Cozia range, 22.07.2004, B. C.; 7 specs. valley of Socolău River, 2 km upstream confluence of the Socolău and Rica rivers, 19 - 23.07.2004, S. R.; 5 specs. valley of Rica River, 2 km upstream Coşnea f. h., Poienile de sub Munte, 25.07.2004, S. R. Distribution: Europe, East Palaearctic, North Africa. In Romania common species in mountainous and subalpine forest floors. The larvae live in coniferous trees, sometimes also in telegraph pillars.

**Stictoleptura* (syn. *Corymbia*) *scutellata* (Fabricius, 1781). Material: 2 specs. valley of Hututeanaca River, 18.07.2004, S. Me.; 1 spec. Coşnea f. h., Poienile de sub Munte, 25.07.2004, P. C. Distribution: Europe, East Palaearctic, North Africa. In Romania observed from the zone of ante steppe till the mountains. The larvae live in oak, birch tree, chestnut tree, conifers.

Strangalia attenuata (Linnaeus, 1758). Records: 2 specs. Leordina, 22.08.1997, R. E. (13); 2 specs. Bistra Valley, 4 km upstream Bistra, 26.08.1997, P. C. (13); 1 spec. valley of Frumuşeaua River, Crasna Vişeului, 29.08.1997, P. C. (13). Distribution: Europe, East Palaearctic, Near East, Oriental region. In Romania common species, frequent, spread from plain up to mountainous zone.

Tribe Oxymirini

Oxymirus cursor (Linnaeus, 1758). Records: Maramureş Mts., Vaser Valley, on the fallen fir trees (4); 1 spec. Maramureş Mts., valley of Vaser River, Făina, 19.06.2003, S. R. (15).

Distribution: Europe, East Palaearctic. In Romania common species, especially in mountains, in coniferous forests, larvae live in coniferous trees. Adult on the trunks of the coniferous trees.

Tribe Rhagiini

Dinoptera (*Acmaeops*) *collaris* (Linnaeus, 1758). Records: 9 specs. Moisei ("Izvorul lui Dragoş" f. h.), 13.09.1995, P. C., M. I., H. C. (12); 2 specs. Vişeul de Sus, 10.06.1966, S. N. (13); 5 specs. Repedea f. h., 21 - 26.06.1997, M. I., P. C., S. R., S. A. (13); 21 specs. Elma clearing, 2 km upstream Repedea, 24 - 26.06.1997, S. R., M. I., P. C., S. A. (13); 1 spec. valley of Frumuşeaua River, 10 km upstream Crasna Vişeului, 25.06.1997, S. R. (13); 3 specs. Cârligătura Valley, 17 km upstream Repedea, 27.06.1997, P. C. (13). Material: 6 specs. Maramureş Mts., valley of Vaser River, Făina, 21.07.2004, P. C.; 1 spec. Poienile de sub Munte, Coşnea f. h., 19.07.2004, P. C. Distribution: Europe, Near East. In Romania especially in oak forests, less in beech and coniferous ones. It lives under the bark of several deciduous trees (especially chestnut trees and oaks).

Evodinus clathratus (Fabricius, 1792). Records: Maramureş Mts., Lungacsászán (4); 2 specs. Smereceni clearing, 7 km upstream Repedea, 22.06.1997, S. R., 22.08.1997, P. C. (13); 3 specs. Elma clearing, 2 km upstream Repedea, 24 - 27.06.1997, S. R., P. C. (13); 5 specs. Cârligătura Valley, 17 km upstream Repedea, 27.06.1997, S. A. (13). Distribution: Central and South-Eastern Europe. In Romania mountainous species, common in beech and coniferous forests. Unknown biology of the larva.

Gaurotes (*Carilia*) *virginea* (Linnaeus, 1758). Records: Maramureş Mts., Lungacsászán (4); 5 specs. Moisei ("Izvorul lui Dragoş" f. h.), 13.07.1995, S. A., H. C. (12); 24 specs. Smereceni clearing, Repedea, 20 - 27.06.1997, M. I., S. R., S. A., 22.08.1997, P. C. (13); 12 specs. Repedea f. h., 21 - 29.06.1997, S. A, S. R., P. C. (13); 3 specs. valley of Frumuşeaua River, 10 km upstream Crasna Vişeului, 23 - 25.06.1997, S. R., M. I., S. A. (13); 5 specs. Elma clearing, 2 km upstream Repedea, 24 - 29.06.1997, P. C., S. A., S. R. (13); 2 specs. Cârligătura Valley, 17 km upstream Repedea, 27.06.1997, M. I. (13); 1 spec. Poienile de sub Munte, 30.06.1997, S. A. (13); 4 specs. Bălăsâna Valley, 4 km upstream Baia Borşa, 21.08.1997, P. C. (13); 2 specs. Vişeuț River, 12 km upstream Borşa, 30.08.1997, P. C. (13); 7 specs. 500 m downstream of the confluence of the rivers Rica and Budescu, Poienile de sub Munte, 14.06.2003, S. R. (15); 1 spec. Lutoasa Valley, Poienile de sub Munte, 14.06.2003, P. C. (15); 5 specs. valley of Cvaşnița River, 6 km upstream Coşnea f. h., Poienile de sub Munte, 15.06.2003, P. C., S. Ma. (15); 7 specs. Coşnea f. h., Poienile de sub Munte, 15 - 18.06.2003, P. C., S. R. (15). Material: 1 spec. the confluence of Pop Ivan and Hututeanca rivers, 18.07.2004, P. C.; 5 spec. Maramureş Mts., valley of Vaser River, Făina, 21.07.2004, P. C.; 19 specs. Maramureş Mts., valley of Făina River, 22.07.2004, S. R.; 2 specs. valley of Socodol River, 24.07.2004, C. G. Distribution: Europe, East Palaearctic. In Romania common in montainous zone. Larva in coniferous trees.

Grammoptera ustulata (Schaller, 1873). Records: Maramureş, without other data (4); 37 specs. Repedea f. h., 22.06. - 2.07.1997, S. R., M. I., P. C., A. M. (13); 9 specs. valley of Frumuşeaua River, 12 km upstream Crasna Vişeului, 23 - 29.06.1997, S. R., S. A., P. C. (13); 57 specs. Elma clearing, 2 km upstream Repedea, 24.06. - 29.08.1997, S. R., M. I., P. C. (13); 30 specs. Smereceni clearing, 17 km upstream Repedea, 24.06. - 29.08.1997, S. R., P. C., S. A. (13); 3 specs. Cârligătura Valley, 17 km upstream Repedea, 27.06.1997, P. C. (13). Distribution: Europe, Near East. In Romania was recorded from Braşov, Cisnădie, Sighişoara, Măgura Mts. (Petri, 1925-1926), Guşteriţa, Băile Herculane (Panin and Săvulescu, 1961). Larvae in dead branches of oak, lime, chestnut trees.

Pachyta quadrimaculata (Linnaeus, 1758). Records: Maramureş Mts., Făina Valley (4); 1 spec. Elma clearing, 2 km upstream Repedea, 24.06.1997, S. R. (13); 4 spec. Repedea f. h., 26.06.1997, P. C., M. I. (13); 1 spec. Vişeu Valley, 2 km downstream Borşa, 20.08.1997, P. C. (13). Material: 1 spec. Maramureş Mts., valley of Vaser River, 21.07.2004, P. C.; 1 spec. Maramureş Mts., valley of Vaser River, Bardău - Cozia range, 22.07.2004, P. C. Distribution: Europe. Common in Romania, especially in mountains, in coniferous forests, where the larvae live in unhealthy trees or chumps.

Pidonia lurida (Fabricius, 1792). Records: Maramureş Mts., Făina Valley (4); 2 specs. Moisei ("Izvorul lui Dragoş" f. h., 750 m), 13.09.1995, M. I., P. C. (12); 21 specs. Smereceni clearing, 7 km upstream Repedea, 20 - 27.06.1997 M. I., S. R., S. A., P. C., 22.08.1997, P. C. (13); 23 specs. Repedea f. h., 21.06. - 2.07.1997, S. A., P. A., P. C., M. I. (13); 13 specs. valley of Frumuşeaua River, Crasna Vişeului, 23 - 26.06.1997, S. R., S. A., M. I. (13); 47 specs. Elma clearing, 2 km upstream Repedea, 24 - 29.06.1997, P. C., S. R., M. I., S. A., R. D. (13); 10 specs. Cârligătura Valley, 17 km upstream Repedea, 27.06.1997, P. C., M. I., S. A. (13); 2 specs. Bălăsâna Valley, 4 km upstream Baia Borşa, 21.08.1997, P. C. (13); 2 specs. Lutoasa Valley, Poienile de sub Munte, 14.06.2003, P. C. (15); 14 specs. the confluence of the rivers Rica and Budescu, Poienile de sub Munte, 14.06.2003, P. C. (15); 1 spec. the confluence of the rivers Rica and Coşnea, Poienile de sub Munte, 15.06.2003, S. R. (15); 10 specs. valley of the Pop Ivan River, 12 km upstream Crasna Vişeului, 17.06.2003, S. R., S. Ma. (15). Distribution: Europe. In Romania common mountainous species, larvae live in fir trees from mountainous and subalpine zones.

Rhagium (*Megarhagium*) *mordax* (De Geer, 1775). Records: 2 specs. Smereceni clearing, 7 km upstream Repedea, 20 - 22.06.1997, S. R., S. M. (13); 1 spec. Elma clearing, 2 km upstream Repedea, 29.06.1997, S. A. (13); 1 spec. valley of the Rica River, 3 km upstream Poienile de sub Munte, 14.06.2003, S. R. (15). Distribution: Europe, Siberia. In Romania common species, larvae live in deciduous trees (*Alnus* sp., *Fagus* sp.), sometimes also in coniferous ones. The adult on the branches and trunks.

Rhagium (*Rhagium*) *inquisitor* (Linnaeus, 1758). Records: Maramureş Mts., Vaser Valley, on the fallen fir trees (4); 4 specs. Smereceni clearing, 7 km upstream Repedea, 20 - 27.06.1997, M. I., S. R., S. A. (13); 1 spec. Repedea f. h., 22.06.1997, S. R. (13); 2 specs. Cârligătura Valley, 17 km upstream Repedea, 27.06.1997, S. A., R. D. (13); 2 specs. Maramureş Mts., valley of Vaser River, Făina, 19.06.2003, S. R., S. Ma. (15). Distribution: Europe, East Palaearctic, Near East, Nearctic region, Oriental region. In Romania common, in mountainous zone. The larvae live in coniferous trees.

Subfamily Spondylidinae

Tribe Asemini

Tetropium castaneum (Linnaeus, 1758). Records: Maramureş Mts., Vaser Valley (4); 1 spec. valley of Vaser River, Maramureş Mts., 20.08.1982, I. A. (18); 5 specs. Smereceni clearing, 7 km upstream Repedea, 24 - 27.06.1997, S. R., S. A., S. M. (18); 1 spec. Elma clearing, 2 km upstream Repedea, 24.06.1997, P. C. (18); 1 spec. Poienile de sub Munte, 500 m downstream the confluence of the Rica and Budescu rivers, 14.06.1997, S. R. (15, 18); 1 spec. Repedea, 500 m upstream Repedea f. h., 18.06.2003, S. R. (15, 18). Distribution: Europe, East Palaearctic, Oriental region. In Romania common species found most in beech and coniferous forests; sometimes it appears in oak forests. Larvae live under the bark of coniferous trees.

In the studied material (1,208 specimens) 48 species of 37 genera, 17 tribes, and four subfamilies were identified. The subfamily Lepturinae, with 27 species, is best represented. The subfamily Cerambycinae is represented by 13 species, the subfamily Lamiinae by seven species and the subfamily Spondylidinae by one species.

Inside the Maramureş Mountains Nature Park there were 15 known species of Cerambycidae (Frivaldszky, 1871). Other 26 species have been cited during 1997-2004 (Serafim, 1997, 1998, 2004).

Now, other seven Cerambycidae species are recorded from the Maramureş Mountains Nature Park: *Chlorophorus herbstii*, *Rosalia alpina*, *Stenopterus flavicornis*, *Opsilia coerulescens*, *Leptura aurulenta*, *Stenurella bifasciata* and *Stictoleptura scutellata*.

Stenopterus flavicornis and *Leptura aurulenta* are recorded for the first time in the Maramureş Mountains Nature Park.

The species *Rosalia alpina* is protected both at European level and at national level. According to IUCN status of conservation, this species is included into CR (Critically Endangered) category and in the addenda of Bern Convention, as a rare species, threatened with extinction. In Romania, *Rosalia alpina* is included on the lists of the species from annex number three (species whose conservation requires the designation of special areas of conservation and special protection areas) and from annex number four (species of community interest, species that require strict protection) to the Law 462 (2001, July).

Chlorophorus sartor and *Cerambyx scopolii* are species protected at the European level and also included in the Carpathian List of Endangered species (Pawłowski, 2003).

Nivellia sanguinosa is proposed to be included in the list of species with legal protection status in Romania.

CONCLUSIONS

In the present paper, four species of Coccinellidae and seven Cerambycidae species: *Brumus quadripustulatus*, *Calvia quatuordecimguttata*, *Coccinula quatuordecimpustulata*, *Oenopia conglobata*, *Chlorophorus herbstii*, *Rosalia alpina*, *Stenopterus flavicornis*, *Opsilia coerulescens*, *Leptura aurulenta*, *Stenurella bifasciata* and *Stictoleptura scutellata* are recorded from the studied zone now.

Brumus quadripustulatus, *Oenopia conglobata*, *Stenopterus flavicornis* and *Leptura aurulenta* are mentioned for the first time from the Maramureş County.

Thus, 19 species of Coccinellidae, which represent about 48% of the total species recorded in Maramureş and about 26% of the total species recorded in Romania.

48 species of Cerambycidae are now known from Maramureş Mountains Nature Park, which represent about 58.5% of the total species recorded in Maramureş and about 19% of the total species recorded in Romania.

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THE DIVERSITY OF THE LEAF BEETLES (COLEOPTERA, CHRYSOMELIDAE) IN THE MARAMUREŞ MOUNTAINS NATURE PARK AND SURROUNDINGS (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romania, Maramureş, Coleoptera, Chrysomelidae.

ABSTRACT

Distribution data on 94 chrysomelid species from the Maramureş Mountains Nature Park and neighboring areas (Romanian Eastern Carpathians) are presented, representing about 16% from the Romanian leaf beetles fauna. In addition, the general distribution and the host plants of each species are given. From a zoogeographical point of view, among the European endemics of Halticinae, the following species have been recorded in the Maramureş Mountains Nature Park: *Minota carpathica* Heikertinger, *Orestia aubei* Allard, *Phyllotreta christinae* Heikertinger (wide spread European mountainous endemics species) and *Neocrepidodera transsilvanica* Fuss (endemic species in Carpathian Mountains). *Sclerophaedon carpathicus* Weise (Chrysomelinae) is also a valuable species, endemic to the Eastern Carpathians.

RÉSUMÉ: La diversité des chrysomélides (Coleoptera, Chrysomelidae) dans le Parc Natural des Montagnes de Maramureş et des environs (Maramureş, Roumanie).

Nous présentons dans ce travail des données concernant la distribution de 94 espèces de chrysomélidés sur le territoire du Parc Natural des Montagnes de Maramureş et ses environs (les Carpates Orientales, Roumanie), presque 16% du nombre total des espèces citées en Roumanie. La présentation systématique des espèces est accompagnée d'informations sur la distribution géographique et les plants hôtes. On remarque, du point de vue de la zoogéographie, la présence de suivantes espèces de Halticinae: *Minota carpathica* Heikertinger, *Orestia aubei* Allard, *Phyllotreta christinae* Heikertinger (espèces endémiques de montagnes européennes) et *Neocrepidodera transsilvanica* Fuss (espèce endémique dans les Carpates). *Sclerophaedon carpathicus* Weise (Chrysomélidé) est aussi une espèce endémique dans les Carpates Orientales.

REZUMAT: Diversitatea gândacilor de frunză (Coleoptera, Chrysomelidae) din Parcul Natural Munții Maramureşului şi împrejurimi (Maramureş, România).

Lucrarea prezintă date referitoare la distribuția a 94 specii de crisomelide din Parcul Natural Munții Maramureşului şi împrejurimi, reprezentând circa 16% din numărul speciilor semnalate până în prezent în fauna României. Prezentarea sistematică a speciilor este însoțită de informații privind arealul actual de răspândire, caracterizarea zoogeografică şi plantele gazdă. Din punct de vedere zoogeografic, dintre endemitele europene de Halticinae, se remarcă prezența următoarelor specii: *Minota carpathica* Heikertinger, *Orestia aubei* Allard, *Phyllotreta christinae* Heikertinger (endemite montan europene) şi *Neocrepidodera transsilvanica* Fuss (endemit carpatic). De asemenea, *Sclerophaedon carpathicus* Weise (Chrysomelinae) este o specie valoroasă, endemică în Carpații Orientali.

INTRODUCTION

Until now about 570 species of leaf beetles have been recorded from Romania, most of them being cited in Transylvania, which is the best studied Romanian region regarding the Coleopteran fauna (Maican, 2005). The first information concerning the chrysomelids of Maramureş, especially from the Vaser Valley, Făina, is mentioned in the Adatok Mármaros vármegye faunájához paper (Frivaldszky, 1871). Most of the recordings published between 1871 and 1951 refer mainly to the Rodna Mountains, which were better studied. Recent data, resulted from the study of the material collected by the specialists from "Grigore Antipa" National Museum of Natural History, Bucharest, within the project "Knowledge of the invertebrates of Maramureş", were published by Maican and Serafim (2001, 2004), Maican (2004).

During the research program on the biodiversity of Maramureş, which took place between 1995 and 2004, several collecting expeditions were performed in the following areas (Fig. 1): Maramureş Depression, Igniş Plateau, the basins of the Iza, Mara and Săpânța rivers, Rodna Mountains (Rodna Mountains National Park, Gutâi Mountains, Țibleş Mountains (Sălişte a, Dragomireşti, valley of the Baicu River and the tributaries: the streamlets Pălcuț, Idişor), Maramureş Mountains (Poienile de sub Munte, the valleys of the rivers Vişeu, Hututeanca, Pop-Ivan, Repedea, Cvaşnița, Coşnea, Budescu, Lutoasa, Socolău, Rica, Vaser and Făina).

Over 3,400 leaf beetles specimens were collected and examined within this period.

Gathering the information obtained from the study of the material preserved in the museum's collections with the bibliographical reports, in 2007 Maican has made a synthesis about the distribution of the chrysomelids in the fauna of Maramureş region, including 214 species, belonging to 55 genera, from 11 subfamilies.

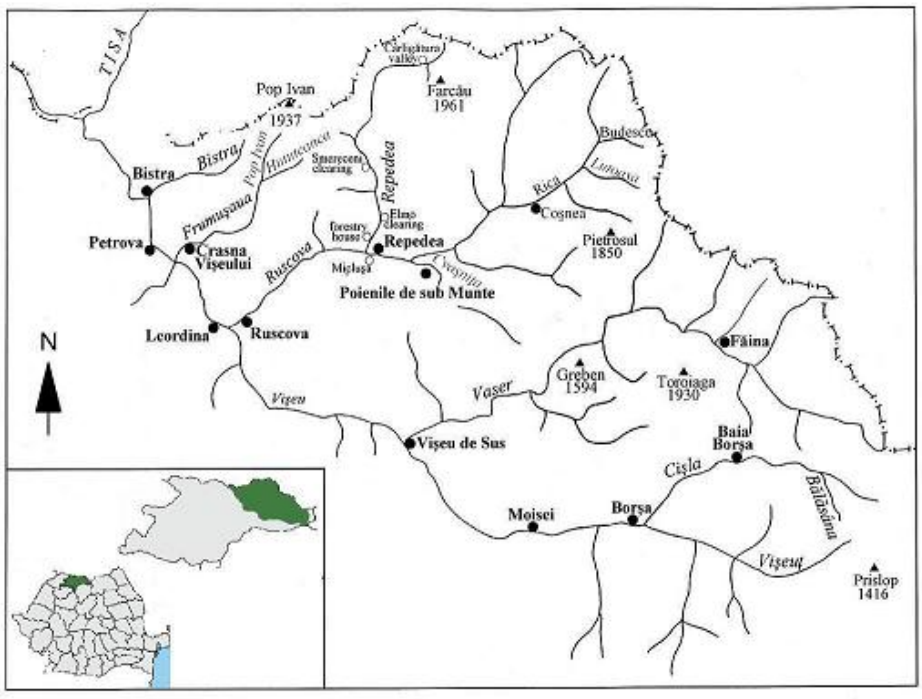

Figure 1: The map of the collecting stations and localities from Maramureş.
Abbreviations: S - Siberian complex (EAP - Euroasiatic Palaearctic: SibE - Siberoeuropean, SSibE - Southsiberoeuropean, TrPal - Transpalaearctic, H - Holarctic, EAAP - Euro-Asiatic-African Palaearctic, HPal - Holopalaearctic); E - European complex (ME - Mideuropean, SbM - Submediterranean, HSbM - Holosubmediterranean, ESbM - Eastsubmediterranean); M - Mediterranean complex (HM - Holomediterranean, EM - Eastmediterranean).

MATERIAL AND METHODS

This paper presents data regarding the leaf beetles fauna from the Maramureş Mountains Nature Park and environs (Eastern Carpathians, northern Romania), based on the material preserved in the collections of "Grigore Antipa" National Museum of Natural History Bucharest and on available information from literature, published between 1871 and 2007.

The species presentation includes information on the collecting sites and dates, and also the bibliographical sources, their general distribution and the identified host plants.

Subfamilies are listed in the presumed phyletic position (Seeno and Wilcox, 1982), and the genera and species in their alphabetical order.

The general distribution and the zoogeographical status of the species are given mainly according to Gruev (2006), and the nomenclature and systematic according to Warchałowski (2003).

RESULTS

Donaciinae Kirby, 1837

Plateumaris consimilis (Schrank, 1781). Mentioned from Făina Valley, Maramureş Mountains (Frivaldszky, 1871). Repedea forestry house, 25.VI. - 26.VII.1997; Bistra, 21.VII.1998; valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 23 - 25.VI.1997; Elma clearing, 2 km upstream Repedea, 29.VI.1997; Poienile de sub Munte, Lutoasa Valley, Coşnea forestry house, 14.VI.2003; Poienile de sub Munte, 500 m upstream the confluence of the rivers Coşnea and Rica, 15.VI.2003; Poienile de sub Munte, Coşnea forestry house, 15 - 16.VI.2003; Poienile de sub Munte, Streamlet Coşnea, 500 m upstream the Coşnea forestry house, 16.VI.2003; valley of the Hututeanca River, 12 km upstream Crasna Vişeului, 17.VI.2003; valley of the Pop Ivan River, 12 km upstream Crasna Vişeului, 17.VI.2003; Poienile de sub Munte, valley of the Coşnea Streamlet, 18.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Palaearctic, from western Europe to Japan. S/EAP/TrPal. Host plants: Cyperaceae (*Carex*), Ranunculaceae (*Caltha palustris*), Juncaceae (*Juncus articulatus*).

Orsodacninae Thomson, 1866

Orsodacne cerasi (Linnaeus, 1758). Valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 23.VI.1997; Elma clearing, 2 km upstream Repedea, 24 - 29.VI.1997; Repedea forestry house, 6.VI.1997, 26.VI.1997; Elma clearing, 2 km upstream Repedea, 29.VI.1997 (Maican and Serafim, 2001, 2004). Distribution: Europe, western Siberia. S/EAP/SibE. Host plants: Oleraceae (*Lygustrum*), Apiaceae (*Heracleum*, *Anthriscus*, *Angelica*), Rosaceae (*Crataegus*).

Criocerinae Latreille, 1807

Lilioceris merdigera (Linnaeus, 1758). Poienile de sub Munte, 500 m downstream the confluence of the rivers Rica and Budescu, 14.VI.2003; Poienile de sub Munte, Coşnea Streamlet, 500 m upstream the Coşnea forestry house, 16 - 18.VI.2003 (Maican and Serafim, 2004). Distribution: from Iberian Peninsula, France and south Norway to Japan. S/EAP/TrPal. Host plants: Liliaceae (*Allium*, *Convallaria*, *Polygonatum* and *Lilium*).

Oulema gallaeciana (Heyden, 1870). Moisei, Izvorul lui Dragoş forestry house, 13.VII.1995; Smereceni clearing, 7 km upstream Repedea, 27.VI.1996; Elma clearing, 2 km upstream Repedea, 24.VI.1997; valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 25.VI.1997; Poienile de sub Munte, 16.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: the most part of Europe, Danube Basin, European Russia, western Siberia. S/EAP/SibE. Host plants: Poaceae.

Oulema melanopus (Linnaeus, 1758). Repedea forestry house, 2.VII.1997 (Maican and Serafim, 2004). Distribution: from Ireland, south Norway and Morocco to Siberia and Mongolia. S/EAP/SibE. Host plants: Poaceae.

Oulema septentrionis (Weise, 1880). Borşa, Rodna Mountains, 1200 m alt. (Szél et al., 1995). Distribution: northern and central Europe; rare in Carpathian Basin. Host plants: unknown.

Clythrinae Kirby, 1837

Clytra laeviuscula (Ratzeburg, 1837). Poienile de sub Munte, the confluence of the rivers Rica and Budescu, 14.VI.2003 (Maican and Serafim, 2004). Distribution: Europe, Caucasus, Asia Minor, Central Asia, Altai. Host plants: Salicaceae (*Salix*), Rosaceae (*Prunus*), Oleaceae (*Fraxinus*).

Clytra quadripunctata (Linnaeus, 1758). Crasna Vişeului, 23.VI.1997; valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 25.VI.1997; Poienile de sub Munte, left bank of the river Rica, 14.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: from Ireland and north Spain to Kazakhstan, Central Asia and Mongolia. S/EAP/SibE. Host plants: Betulaceae (*Betula*), Rosaceae (*Crataegus*, *Prunus*), Fagaceae (*Quercus*), Salicaceae (*Salix*).

Coptocephala unifasciata (Scopoli, 1763). Poienile de sub Munte, the confluence of the rivers Rica and Budescu, 14.VI.2003 (Maican and Serafim, 2004). Distribution: from northern Spain and Belgium to Kazakhstan, Central Asia, Baikal area, Mongolia. S/EAP/SibE. Host plants: Apiaceae (*Echinophora*, *Pastinaca*, *Daucus*, *Ferulago*); xerophilous species.

Labidostomis longimana (Linnaeus, 1761). Moisei, Izvorul lui Dragoş forestry house, 13.VII.1995; valley of Vişeu River, 6 km upstream Moisei, 21.VIII.1997; Vişeul de Jos, 22.VIII.1997; Crasna Vişeului, 23 - 29.VIII.1997; Poienile de sub Munte, 30.VI.1997; Poienile de sub Munte, Lutoasa Valley, Coşnea forestry house, 14.VI.2003; Leordina, 15.VI.2003; valley of the Hututeanca River, 12 km upstream Crasna Vişeului, 17.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: from north Spain and south Italy to Central Russia and Mongolia. S/EAP/SibE. Host plants: Fabaceae (*Lotus*, *Trifolium*).

Smaragdina salicina (Scopoli, 1763). Recorded as *Clytra cyanea* F., from Făina Valley, Maramureş Mountains (Frivaldszky, 1871). Distribution: Europe, from north Spain, Denmark to Volga Basin; Caucasus. E/ME. Host plants: Rosaceae (*Crataegus*), Salicaceae (*Salix*).

Smaragdina xanthaspis (Germar, 1824). Bistra Valley, Bistra, 28.VI.1997; valley of the Hututeanca River, 12 km upstream Crasna Vişeului, 17.VI.2003 (Maican and Serafim, 2004). Distribution: northern Italy, Balkan Peninsula (northern part), basin of Danube, southern Ukraine, Turkey. E/SbM/ESbM. Host plants: Salicaceae (*Salix*), Fagaceae (*Quercus*), Betulaceae (*Betula*), Rosaceae (*Crataegus*).

Cryptocephalinae Gyllenhal, 1813

Cryptocephalus aureolus Suffrian, 1847. Recorded in Făina Valley, Maramureş (Frivaldszky, 1871). Smereceni clearing, 7 km upstream Repedea, 22.VIII.1997 (Maican and Serafim, 2001). Distribution: Europe, Caucasus, Central Asia. Host plants: Asteraceae (*Hieracium*, *Taraxacum*), Ranunculaceae (*Ranunculus*); meadow mesophilous species; polyphagous.

Cryptocephalus bilineatus (Linnaeus, 1767). Leordina, 15.VI.2003 (Maican and Serafim, 2004). Distribution: Europe, Ukraine, Caucasus, Central Asia, Siberia, Korea, Japan. Host plants: Apiaceae (*Daucus*, *Pastinaca*, *Peucedanum*), Asteraceae (*Serratula*, *Centaurea*, *Crepis*, *Leucanthemum*); meadow mesoxerophilous species; polyphagous.

Cryptocephalus bipunctatus (Linnaeus, 1758). Moisei, Izvorul lui Dragoş forestry house, 13.VII.1995; Repedea, 25.VI.1997; Smereceni clearing, 7 km upstream Repedea, 22 - 29.VI. 1997; Leordina, 22.VIII.1997; Elma clearing, 2 km upstream Repedea, 24.VI.1997; Frumuşeaua Valley, 7 km upstream Crasna Vişeului, 25.VI.1997; valley of Bistra River, 28.VI.1997; Poienile de sub Munte, valley of the Cvaşniţa River, 15.VI.2003; Hututeanca Valley, 12 km upstream Crasna Vişeului, 17.VI.2003; Poienile de sub Munte, Coşnea forestry house,

20.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: from Portugal and Ireland to Korea; North Africa. S/EAAP/HPal. Host plants: Salicaceae, Betulaceae, Corylaceae, Fagaceae, Rosaceae, Fabaceae; mesophilous species, associated with the tree layer; polyphagous.

Cryptocephalus hypochoeridis (Linnaeus, 1758). Moisei, Izvorul lui Dragoş forestry house, 13.VII.1996; Elma clearing, Repedea, 24.VI.1997; Repedea, 25.VI.1997; Vişeuţ River, 12 km upsrem Borşa, 20.VIII.1997; Crasna Vişului, 23.VIII.1997; Borşa, 21.VIII.1998; Elma clearing, 2 km upstream Repedea, 24.VI.1997; Repedea, 2.VII.1997; Lutoasa Valley, Coşnea forestry house, Poienile de sub Munte, 14.VI.2003; Leordina, 15.VI.2003; valley of the Pop Ivan River, 12 km upstream Crasna Vişeului, 17.VI.2003; valley of the Hututeanca River, 12 km upstream Crasna Vişeului, 17.VI.2003; Poienile de sub Munte, valley of the Coşnea Streamlet, 18.VI.2003 (Serafim and Maican, 2001, 2004). Distribution: Europe, Caucasus, south Siberia.S/EAP/SSibE. Host plants: Ranunculaceae (*Ranunculus*).

Cryptocephalus imperialis Laicharting, 1781. The confluence of the rivers Rica and Budescu, 14.VI.2003 (Maican and Serafim, 2004). Distribution: northern Spain, France, southern Germany, basin of Danube, Balkan Peninsula, Romania, Ukraine, Turkey. E/ME. Host plants: Corylaceae (*Corylus*), Fagaceaee (*Quercus*), Betulaceae, Rosaceae; polyphagous and mesophilous species, associated with the tree layer.

Cryptocephalus moraei (Linnaeus, 1758). Recorded from Făina Valley (Frivaldszky, 1871). Moisei, Izvorul lui Dragoş forestry house, 13.VII.1996, valley of Bistra River, Bistra, 28.VI.1997; Leordina, 15.VI.2003; Poienile de sub Munte, valley of the Coşnea Streamlet, 15 - 16.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe (excluding the northern parts of Scandinavia). E/ME. Host plants: Guttiferae (probably only on *Hypericum*); meadows mesophilous species; oligophagous.

Cryptocephalus ocellatus Drapiez, 1819. Repedea, Micluşa, 3.VIII.1997; Crasna Vişeului, 12 km upstream Hututeanca, 17.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe, Asia Minor, Iran, Kazakhstan, western Siberia. S/EAP/SibE. Host plants: Salicaceae (*Salix*, *Populus*), Corylaceae (*Corylus*), Fagaceae (*Quercus*), Betulaceae (*Betula*, *Alnus*), Ulmaceae (*Ulmus*); mesohygrophilous species, associated with trees (Sassi and Kismali, 2000).

Cryptocephalus octopunctatus (Scopoli, 1763). Mentioned from Vişeu Valley under the name *Cryptocephalus variabilis* Schneider (Frivaldszky, 1871). Distribution: Europe, Kazakhstan, western Siberia. S/EAP/SibE. Host plants: Salicaceae, Betulacaee, Rosaceae, Fagaceae; mesophilous and polyphagous species.

Cryptocephalus sericeus (Linnaeus, 1758). Borşa, Rodna Mountains, 1200 m alt. (Szél et al., 1995). Moisei, Izvorul lui Dragoş forestry house, 13.VII.1995; Elma clearing, 2 km upstream Repedea, 29.VI.1997; Smereceni clearing, 7 km upstream Repedea, 22.VI.1997; Repedea forestry house, 24 - 29.VI.1997 (Maican and Serafim, 2001, 2004). Distribution: from Europe and Asia Minor to Siberia and western China. S/EAP/SibE. Host plants: Asteraceae, Ranunculaceae and *Knautia*; meadow mesophilous species; polyphagous but oriented to oligophagy (Sassi and Kismali, 2000).

Cryptocephalus violaceus Laicharting, 1781 Poienile de sub Munte, Cvaşniţa Valley, 15.VI.2003; Hututeanca Valley, 12 km upstream Crasna Vişeului, 17.VI.2003 (Maican and Serafim, 2004). Distribution: Europe, Asia Minor. E/SbM/HSbM. Host plants: Salicaceae (*Salix*), Betulaceae (*Alnus*), Rosaceae (*Crataegus*, *Rosa*), Asteraceae (*Leucanthemum*).

Cryptocephalus vittatus Fabricius, 1775. Crasna Vişeului, 23.VIII.1997; Smereceni clearing, 7 km upstream Repedea, 22.VIII.1997; Elma clearing, 2 km upstream Repedea, 24 - 29.VI.1997; Bistra, valley of Bistra River, 28.VI.1997; Leordina, 15.VI.2003; Crasna Vişeului, valley of the Hututeanca River, 12 km upstream Crasna Vişeului, 17.VI.2003; Repedea forestry house, 18.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Iberian Peninsula, France, Central Europe, Danube River basin, Nistru River basin. Host plants: Fabaceae (*Sarothamnus*, *Spartium*), Asteraceae (*Leucanthemum*).

Pachybrachis hieroglyphicus (Laicharting, 1781). Leordina, 15.VI.2003 (Maican and Serafim, 2004). Distribution: Europe, Asia Minor, Kazakhstan, Siberia. S/EAP/SibE. Host plants: Salicaceae (*Salix*, *Populus*), Betulaceae (*Betula*); hygrophilous and polyphagous species.

Pachybrachis sinuatus (Mulsant and Rey, 1859). Repedea forestry house, 26.VI.1997; Bistra Valley, Bistra, 28.VI.1997; Poienile de sub Munte, the confluence of the rivers Rica and Budescu, 14.VI.2003; left bank of the river Rica, 3 km upstream Poienile de sub Munte, 14.VI. 2003; Leordina, 15.VI.2003; Repedea, 500 m upstream Repedea forestry house, 18.VI.2003; Poienile de sub Munte, Coşnea forestry house, 20.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: south France, Central Europe, Balkan Peninsula, Asia Minor. E/ME. Host plants: Tamaricaceae (*Myricaria germanica*), Salicaceae (*Salix*); mesophilous species.

Chrysomelinae Latreille, 1802

Chrysolina coerulans (Scriba, 1791). Borşa, Rodna Mountains, 1200 m alt. (Szél et. al., 1995). Distribution: central and eastern Europe, France, Italy, Asia Minor. E/ME. Host plants: Lamiaceae (*Mentha*).

Chrysolina fastuosa (Scopoli, 1763). Recorded from Făina Valley, Maramureş Mountains (Frivaldszky, 1871). Moisei, Izvorul lui Dragoş forestry house, 13.VII.1995; Vişeul de Jos, 22.VIII.1997; valley of Bistra River, 28.VI.1997; Bistra, 21.VI.1998; Moisei, 21.VIII.1998; Repedea forestry house, 22.VI.1997; Poienile de sub Munte, 500 m upstream the confluence of the rivers Coşnea and Rica, 15.VI.2003; valley of the Hututeanca River, 12 km upstream Crasna Vişeului, 17.VI.2003; valley of the Pop Ivan River, 12 km upstream Crasna Vişeului, 17.VI.2003; Făina, Vaser Valley, 19.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe, Caucasus, Asia Minor, Afghanistan, Kazakhstan, western Siberia. S/EAP/SibE. Host plants: Lamiaceae (*Galeopsis*, *Lamium*).

Chrysolina globipennis (Suffrian, 1851). Recorded from Făina Valley, Maramureş Mountains (Kuthy, 1900). Valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 23.VI.1997; Bistra, 4 km upstream, 26.VIII.1997; Bistra, 21.VII.1998; valley of the Pop Ivan River, 12 km upstream Crasna Vişeului, 17.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Western, Eastern and Southern Carpathians; mountainous species. Host plants: Lamiaceae (*Mentha*, *Salvia*).

Chrysolina haemoptera (Linnaeus, 1758). Moisei, Izvorul lui Dragoş forestry house, 13.VII.1995 (Maican and Serafim, 2001). Distribution: Europe, Caucasus, Asia Minor, Iran. E/ME. Host plants: Plantaginaceae (*Plantago*).

Chrysolina herbacea (Duftschmid, 1825). Recorded in Făina Valley, Maramureş (Frivaldszky, 1871). Repedea forestry house, 26.VI.1997; Bistra, 26.VII.1997, 21.VII.1998; Moisei, 6 km downstream, 21.VIII.1997; Vişeul de Jos, 22.VIII.1997; Frumuşeaua Valley, Crasna Vişeului, 29.VIII.1997; Poienile de sub Munte, 500 m downstream the confluence of the rivers Rica and Budescu, 14.VI.2003; Leordina, 15.VI.2003; Poienile de sub Munte, Luhei, valley of the Coşnea Streamlet, 16.VI.2003; Hututeanca Valley, 12 km upstream Crasna Vişeului, 17.VI.2003; Pop Ivan Valley, 17.VI.2003; Făina, Vaser Valley, 19.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe, Asia Minor, Iran, Afghanistan, Altai, Pamir. S/EAP/SSibE. Host plants: Lamiaceea (*Mentha*, *Calamintha* and *Marrubium*).

Chrysolina marginata (Linnaeus, 1758). Valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 23.VI.1997; Elma clearing, 2 km upstream Repedea, 24.VI.1997; Poienile de sub Munte, 30.VI.1997 (Maican and Serafim, 2001, 2004). Distribution: Europe, Asia Minor, Iran, Afghanistan, Kazakhstan, Central Asia, Siberia, Mongolia, western China, northern Africa. S/EAP/TrPal. Host plants: Asteraceae (*Achillea*, *Artemisia*, *Tanacetum*, *Leucanthemum*).

Chrysolina olivieri (Bedel, 1892)

Chrysolina coerulea (Olivier, 1807). Valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 23.VI.1997 (Maican and Serafim, 2001). Distribution: Alps Mountains, Carpatian Mountains, Balkan Peninsula (excluding Greece). E/ME; mountainous species. Host plants: Lamiaceae (*Mentha* and *Salvia*).

Chrysolina polita (Linnaeus, 1758). Mentioned from Pietrosu Mountain, Maramureş (Frivaldszky, 1871). Bistra, 21.VII.1998; Leordina, 15.VI.2003; Hututeanca Valley, 12 km upstream Crasna Vişeului, 17.VI.2003; Repedea forestry house, 18.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe, Siberia, Mongolia, China, Sakhalin. S/EAP/TrPal. Host plants: Lamiaceae (*Mentha*, *Melissa*, *Lycopus*, *Salvia*, *Origanum*, *Nepeta* and *Glechoma*).

Chrysolina rufa (Duftschmid, 1825). Borşa, Rodna Mountains, 1600 m alt. (Szél et. al., 1995). Bistra, 4 km upstream, 26.VIII.1997 (Maican and Serafim, 2001). Distribution: Alps and Sudeten, Carpathian Mountains; mountainous species. Host plants: Asteraceae (*Petasites*).

Chrysolina sturmi (Westhoff, 1882). Bistra, 21.VII.1998; Poienile de sub Munte, the confluence of the rivers Rica and Budescu, 14.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe, western Asia. E/CE. Host plants: Lamiaceae (*Glechoma*, *Mentha*), Asteraceae (*Cirsium*), Rubiaceae (*Galium*).

Chrysolina umbratilis (Weise, 1887). Borşa, Rodna Mountains, 2000 m alt. (Szél et. al., 1995). Smereceni clearing, 7 km upstream Repedea, 23.VI.1997 (Maican and Serafim, 2001). Distribution: Carpathian Mountains, Sudeten Mountains, Alps Mountains, Dinaric Alps Mountains; mountainous species. Host plants: Asteraceae (*Senecio nemorensis*).

Chrysolina varians (Schaller, 1783). Recorded from Făina Valley, Maramureş Mountains (Frivaldszky, 1871). Borşa, Rodna Mountains, 1200 m alt. (Szél et. al., 1995). Moisei, Izvorul lui Dragoş forestry house, 13.VII.1995; Repedea forestry house, 26.VI.1997; Repedea forestry house, 29.VI.1997; Poienile de sub Munte, Coşnea forestry house, 16.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe, Asia Minor, western Siberia. S/EAP/SibE. Host plants: Guttiferae (*Hypericum*).

Chrysomela collaris Linnaeus, 1758. Smereceni clearing, 7 km upstream Repedea, 22.VIII.1997; Repedea forestry house, 29.VI.1997 (Maican and Serafim, 2001, 2004). Distribution: Europe, Caucasus, Asia Minor, Kazakhstan, Siberia, Mongolia, northeast China. S/EAP/TrPal. Host plants: Salicaceae (*Salix*).

Chrysomela populi Linnaeus, 1758. Recorded from Făina Valley, Maramureş Mountains (Frivaldszky, 1871). Leordina, 15.VI.2003; Poienile de sub Munte, Coşnea forestry house, 15 - 16.VI.2003; Repedea, 18.VI.2003 (Maican and Serafim, 2004). Distribution: Palaearctic. S/EAAP/HPal. Host plants: Salicaceae (*Populus* and *Salix*).

Chrysomela vigintipunctata (Scopoli, 1763). Moisei, Izvorul lui Dragoş, 13.VII.1995; valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 23.VI.1997; Repedea forestry house, 26.VI.1997; Repedea, 23.VI.1997; valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 25.VI.1997 (Maican and Serafim, 2001, 2004). Distribution: from eastern France to Japan. S/EAP/TrPal. Host plants: Salicaceae (*Salix*).

Gastrophysa polygoni (Linnaeus, 1758). Borşa, Rodna Mountains, 1600 m alt. (Szél et al., 1995). Poienile de sub Munte, valley of the Cvaşniţa River, 15.VI.2003; valley of the Hututeanca River, 12 km upstream Crasna Vişeului, 17.VI.2002 (Maican and Serafim, 2004). Distribution: Europe, Caucasus, Asia Minor, Central Asia, Mongolia, Siberia, China, Korea, northern Africa. S/EAAP/HPal. Host plants: Polygonaceae, Chenopodiaceae.

Gastrophysa viridula (De Geer, 1775). Recorded from Pop Ivan Mountain, Maramureş (Kuthy, 1900). Borşa, Rodna Mountains, 1200-1600 m alt. (Szél et al., 1995). Moisei, Izvorul lui Dragoş forestry house, 13.VII.1995; Borşa, 4.VIII.1995; Smereceni clearing, 7 km upstream Repedea, 22.VI. - 23.VIII.1997; Moisei, 6 km downstream, 21.VII.1997; valley of Frumuşeaua River, Crasna Vişeului, 29.VIII.1997; Cârligătura Valley, 27.VI.1997; Poienile de sub Munte, the confluence of the rivers Rica and Budescu, 14.VI.2003; Poienile de sub Munte, 15 - 16.VI.2003; valley of the Pop Ivan River, 12 km upstream Crasna Vişeului, 17.VI.2003; Repedea forestry house, 18.VI.2003; Făina, Vaser Valley, 19.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe, Asia Minor, Caucasus, Central Asia; introduced also in North America. Host plants: Polygonaceae (*Rumex*, *Polygonum*, *Oxyria*).

Gonioctena interposita (Franz and Palmén, 1950). Smereceni clearing, 7 km upstream Repedea, 22.VI.1997 (Maican and Serafim, 2001, 2004). Distribution: Alps and Sudeten, Carpathians; mountainous species. Host plants: Betulaceae (*Alnus*), Rosaceae (*Sorbus*).

Gonioctena linnaeana (Schrank, 1781). Recorded from Făina Valley, Maramureş Mountains (Kuthy, 1900). Distribution: Europe, Asia Minor, Kazakhstan, Siberia, Mongolia, Sakhalin. S/EAP/TrPal. Host plants: Salicaceae (*Salix*).

Gonioctena pallida (Linnaeus, 1758). Recorded at Făina Valley, Maramureş (Frivaldszky, 1871). Distribution: western Palaearctic. Host plants: Rosaceae (*Sorbus aucuparia*).

Gonioctena viminalis (Linnaeus, 1758). Recorded from Făina Valley, (Frivaldszky, 1871). Distribution: Europe, Palaearctic Asia. S/EAP/TrPal. Host plants: Salicaceae (*Salix*).

Hydrothassa glabra (Herbst, 1783). Smereceni clearing, 7 km upstream Repedea, 22.VI.1997 (Maican and Serafim, 2004). Distribution: Europe, western Siberia, Morocco. S/EAP/SibE. Host plants: Ranunculaceea (*Ranunculus*).

Hydrothassa marginella (Linnaeus, 1758). Făina Valley, Maramureş Mountains (Maican, 2007). Distribution: Europe. Host plants*:* Ranunculaceea (*Ranunculus* and *Caltha palustris*).

Leptinotarsa decemlineata (Say, 1824). Borşa, Rodna Mountains, 1200 m alt. (Szél et al., 1995). Frumuşeaua Valley, 7 km upstream Crasna, 23.VI.1997; Moisei, 6 km downstream, 21.VIII. 1997; Smereceni clearing, 7 km upstream Repedea, 22.VIII.1997; Vişeul de Jos, 22.VIII.1997; Repedea forestry house, 22.VI.1997; 12 km upstream Crasna Vişeului, Hututeanca Valley, 17. VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Holarctic region. Host plants: Solanaceae.

Linaeidea aenea (Linnaeus, 1758)

Plagiosterna aenea (Linnaeus, 1758). Recorded from Făina Valley, Maramureş Mountains (Frivaldszky, 1871). Moisei, Izvorul lui Dragoş forestry house, 13.VII.1995; Repedea, 22 - 26.VI.1997; Smereceni clearing, 7 km upstream Repedea, 22 - 27.VI.1997; valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 25.VI.1997; Poienile de sub Munte, 500 m downstream the confluence of the rivers Rica and Budescu, 14.VI.2003; Făina, Vaser Valley, 19.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe, Palaearctic Asia (including Japan). S/EAP/TrPal. Host plants: Betulaceae (*Alnus*).

Oreina coerulea (Olivier, 1790). Poienile de sub Munte, Coşnea forestry house, 16.VI. 2003 (Maican and Serafim, 2004). Distribution: Carpathian and Sudeten mountains, Alps, Dinaric Alps, Tatra; mountainous species. Host plants: Asteraceae (*Centaurea*).

Oreina intricata (Germar, 1824). Borşa, Rodna Mountains, 1600 m alt. (Szél et al., 1995). Distribution: Carpathian Mountains, Sudeten Mountains, Alps Mountains, Balkans. Host plants: Asteraceae (*Senecio nemorensis*).

Oreina virgulata (Germar, 1824). Valley of Pop Ivan River, 12 km upstream Crasna Vişeului, 17.VI.2003 (Maican and Serafim, 2004). Distribution: Carpathian Mountains, Sudeten Mountains, Alps Mountains, Apennines Mountains, Balkans; mountainous species. Host plants: Asteraceae (*Cirsium*, *Carduus*).

Oreina viridis (Duftschmid, 1825). Borşa, Rodna Mountains, 2000 m alt. (Szél et. al., 1995). Distribution: Alps Mountains, Vosges Mountains, Tatra Mountains, Carpathian Mountains. Host plants: Betulaceae (*Alnus viridis*).

Phaedon armoraciae (Linnaeus, 1758). Poienile de sub Munte, valley of the Budescu River, 14.VI.2003; Repedea forestry house, 18.VI.2003 (Maican and Serafim, 2004). Distribution: Europe, Caucasus, Asia Minor, Central Asia, Siberia. S/EAP/TrPal. Host plants: Scrophulariaceae (*Veronica*), Brassicaceae (*Nasturtium, Cochlearia* and *Cardamine*).

Phaedon cochleariae (Fabricius, 1792). Smereceni clearing, 7 km upstream Repedea, 22 - 27.VI.1997, 22.VIII.1997 (Maican and Serafim, 2001, 2004). Distribution: Europe, Palaearctic Asia. S/EAP/TrPal. Host plants: Brassicaceae (*Nasturtium*, *Rorippa*, *Armoracia*, *Brassica* and *Sinapis*), Scrophulariaceae (*Veronica beccabunga*).

Phaedon pyritosus (Rossi, 1792). Recorded from Făina Valley, Maramureş Mountains (Frivaldszky, 1781). Distribution: Europe, Caucasus, Asia Minor, Kazakhstan, Central Asia, North Africa. S/EAP/SibE. Host plants: Ranunculaceae (*Ranunculus repens*).

Phratora vitellinae (Linnaeus, 1758). Recorded at Făina Valley, (Frivaldszky, 1871). Borşa, Rodna Mountains (Csiki, 1951). Repedea forestry house, 26.VI.1997; Crasna Vişeului, 25.VI.1997; Poienile de sub Munte, the confluence of the rivers Rica and Budescu, 14.VI.2003; Leordina, 15.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe, Palaearctic Asia (excluding Japan). S/EAP/TrPal. Host plants: Salicaceae (*Salix*, *Populus*).

Phratora tibialis (Suffrian, 1851). Borşa (Csiki, 1951). Valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 23.VI.1997; Moisei, 21.VIII.1997; Repedea, 29.VI.1997 (Maican and Serafim, 2001, 2004). Distribution: European areas of mixed forests; reported also from Asia Minor. E/ME. Host plants: Salicaceae (*Salix*, *Populus*).

Plagiodera versicolora (Laicharting, 1781). Valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 25.VI.1997; Leordina, 15.VI.2003; Poienile de sub Munte, Coşnea forestry house, 16.VI.2003 (Maican and Serafim, 2004). Distribution: Palaearctic, India, Taiwan. S/EAAP/HPal. Host plants*:* Salicaceae (*Salix*, *Populus*).

Sclerophaedon carpathicus Weise, 1875. Cârligătura Valley, 17 km upstream Repedea, 27.VI.1997 (Maican and Serafim, 2004). Distribution: endemic species to the Eastern Carpathians. Host plants*:* Brassicaceae.

Galerucinae Latreille, 1802

Agelastica alni (Linnaeus, 1758). Crasna Vişeului, 7 km upstream Frumuşeaua, 23.VI.1997; Moisei, 21.VII.1997; Bistra, 4 km upstream, 26.VIII.1997; Smereceni clearing, 7 km upstream Repedea, 22 - 27.VI.1997; valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 25.VI.1997; Repedea forestry house, 29.VI.1997 (Maican and Serafim, 2001, 2004). Distribution: Europe, Caucasus, Asia Minor. E/ME. Host plants: Betulaceae (*Alnus*).

Lochmaea caprea (Linnaeus, 1758). Făina Valley, Maramureş Mountains (Frivaldszky, 1871). Smereceni clearing, 7 km upstream Repedea, 27.VI.1997, 22.VIII.1997 (Maican and Serafim, 2001, 2004). Distribution: from Spain and Ireland to north Norway; Japan. S/EAP/TrPal. Host plants: Salicaceae (*Salix*, *Populus*), Betulaceae (*Betula*).

Galeruca tanaceti (Linnaeus, 1758). Valley of the Pop Ivan Streamlet, 12 km upstream Crasna Vişeului, 17.VI.2003, valley of the Hututeanca River, 12 km upstream Crasna Vişeului, 17.VI.2003 (Maican and Serafim, 2004). Distribution: from Ireland and Portugal to Korea. S/EAP/TrPal. Host plants: Asteraceae (*Achillea* and *Chrysanthemum*), Brassicaceae (*Cardamine*), Caryophyllaceae (*Cerastium*).

Galerucella lineola (Fabricius, 1781). Leordina, 15.VI.2003 (Maican and Serafim, 2004). Distribution: from Ireland to Japan. S/EAP/TrPal. Host plants: Betulaceae (*Alnus*), Salicaceae (*Salix*), Corylaceae (*Corylus*), Primulaceae (*Lysimachia*), Polygonaceae (*Rumex*).

Galerucella pusilla (Duftschmid, 1825). Repedea forestry house, 18.VI.2003 (Maican and Serafim, 2004). Distribution: from Catalonia and the British Isles to Siberia and Mongolia. S/EAP/SibE. Host plants: Lythraceae (*Lythrum*).

Luperus flavipes (Linnaeus, 1767). Elma clearing, Repedea (Maican, 2007). Distribution: Europe, Caucasus, Kazakhstan, Siberia, Mongolia. S/EAP/SibE. Host plants: Betulaceae (*Alnus*, *Betula*), Salicaceae (*Salix*), Corylaceae (*Corylus*, *Ostrya*).

Luperus viridipennis Germar, 1824. Borşa, Rodna Mountains, 1600 m alt. (Szél et al., 1995). Distribution: Alps Mountains, Carpathian Mountains, Balkans, Ural, Central Asia. Host plants*:* Betulaceae (*Alnus*).

Halticinae Newman, 1834

Altica oleracea (Linnaeus, 1758). Moisei, Izvorul lui Dragoş, 13.VII.1995 (Maican and Serafim, 2001). Distribution: Europe, Palaearctic Asia. S/EAP/TrPal. Host plants: Polygonaceae, Ericaceae, Onagraceae, Lythraceae, Cistaceae, Rosaceae, Scrophulariaceae, Betulaceae, Fagaceae; polyphagous species.

Aphtona atrovirens (Förster, 1849). Recorded at Baia Borşa, 22 - 26.VII.1924 (Gruev et al., 1993). Distribution: Europe, Caucasus, Turkey. E/ME. Host plants: Linaceae (*Linum*).

Batophila rubi (Paykull, 1799). Recorded from Făina Valley, Maramureş Mountains (Frivaldszky, 1871). Distribution: Europe, Caucasus, western Siberia. S/EAP/SibE. Host plants: Rosaceae (*Rubus*, *Fragaria*).

Chaetocnema semicoerulea (Koch, 1803). Moisei, 21.VIII.1997 (Maican and Serafim, 2001). Distribution: Central and South Europe, Caucasus, Asia Minor, Kazakhstan, Siberia, Baikal area. S/EAP/SibE. Host plants: Salicaceea (*Salix*).

Crepidodera aurata (Marsham, 1802). Repedea forestry house, 26.VII.1997; Poienile de sub Munte, 30.VI.1997; Bistra, 21.VII.1998; Poienile de sub Munte, the confluence of the rivers Rica and Budescu, 14.VI.2003; Leordina, 15.VI.2003; Coşnea forestry house, Poienile de sub Munte, 15 - 16.VI.2003; valley of the Hututeanca River, 12 km upstream Crasna Vişeului, 17.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe, Palaearctic Asia (excluding Japan), Morocco. S/EAAP/HPal. Host plants: Salicaceae.

Dibolia occultans (Koch, 1803). Recorded from Baia Borşa, 22 - 26.VII.1924 (Gruev et al., 1993); the specimens are preserved in the collection of Hungarian Natural History Museum, Budapest. Distribution: Europe, Caucasus, Asia Minor, northwest Africa. E/ME. Host plants: Lamiaceae (*Mentha*).

Hippuriphila modeeri (Linnaeus, 1761). Leordina, 15.VI.2003; Poienile de sub Munte, Coşnea forestry house, 16.VI.2003 (Maican and Serafim, 2004). Distribution: Europe, Caucasus, Asia Minor, Siberia, Mongolia. S/EAP/TrPal. Host plants: Equisetaceae (*Equisetum*).

Longitarsus parvulus (Paykull, 1799). Borşa, Rodna Mountains, 1600 m alt. (Szél et al., 1995). Distribution: from Europe to Central Siberia and Sayan Mountains; Canary Isls. S/EAP/SibE. Host plants: Linaceae (*Linum*).

Longitarsus pinguis Weise, 1888. Recorded from Pop Ivan Mountains, Maramureş Mountains (Gruev et al., 1993). Distribution: mountains of Central Europe. Host plants: Boraginaceae (*Pulmonaria*).

Minota carpathica Heikertinger, 1911. Borşa, Rodna Mountains, 1600 m alt. (Szél et al., 1995). Distribution: European mountainous endemic species (Carpathian Mountains, Sudeten Mountains, Alps Mountains). Host plants: Ericaceae (*Vaccinium myrtillus*), Bryophyta.

Mniophila muscorum (Koch, 1803). Borşa, Rodna Mountains, 1600 m alt. (Szél et al., 1995). Distribution: Europe, Caucasus. E/ME. Host plants: Bryophyta.

Neocrepidodera transsilvanica (Fuss, 1864). Recorded from Pop Ivan Mountain, Maramureş Mountains (Kuthy, 1900). Borşa, Rodna Mountains, 1600 m alt. (Szél et al. 1995). Distribution: endemic species to the Carpathian Mountains (Poland, Romania, Slovakia, Ukraine). Host plants: Fabaceae (*Lathyrus vernus*).

Neocrepidodera transversa (Marsham, 1802). Valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 23.VI. - 29.VIII.1997; Moisei, 6 km downstream, 21.VIII.1997; Poienile de sub Munte, the confluence of the rivers Rica and Budescu, 14.VI.2003; Leordina, 15.VI.2003; valley of the Hututeanca River, 11 km upstream Crasna Vişeului, 17.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe, Caucasus, Asia Minor, Cyprus, Iran. E/ME. Host plants: Asteraceae (*Cirsium*).

Orestia aubei Allard, 1859. Recorded from the Pop Ivan Mountain, Maramureş Mountains (Kuthy, 1900). Distribution: European mountainous endemic species (Carpathians, Balkans). Host plants: no data were found in the available literature.

Phyllotreta atra (Fabricius, 1775). Recorded from the Pop Ivan Mountain, Maramureş Mountains (Gruev et al., 1993). Borşa, Rodna Mountains, 1600 m alt. (Szél et al., 1995). Moisei, Izvorul lui Dragoş, 13.VII.1995 (Maican and Serafim, 2004). Distribution: Europe, Palaearctic Asia (excluding Japan), Morocco. S/EAAP/HPal. Host plants: Brassicaceae, Resedaceae.

Phyllotreta christinae Heikertinger, 1941. Borşa, Rodna Mountains, 1600 m alt. (Szél et al., 1995). Distribution: European mountainous endemic species. Host plants: Brassicaceae (*Cardamine*).

Phyllotreta striolata (Fabricius, 1803). Repedea forestry house, 23.VI.1997 (Maican and Serafim, 2004). Distribution: Europe, Asia, Indonesia. S/EAP/TrPal. Host plants: Brassicaceae.

Phyllotreta undulata (Kutschera, 1860). Recorded from the Pop Ivan Mountain, Maramureş Mountains (Gruev et al., 1993). Repedea forestry house, 26.VI.1997; valley of Frumuşeaua River, Crasna Vişeului, 23.VI.1997; valley of Hututeanca River, 12 km upstream Crasna Vişeului, 17.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Europe, Palaearctic Asia (excluding Japan). S/EAP/TrPal. Host plants: Brassicaceae.

Phyllotreta vittula (Redtenbacher, 1849). Mentioned from the Pop Ivan Mountain, Maramureş Mountains (Gruev et al., 1993). Borşa, Rodna Mountains, 1600 m alt. (Szél et al., 1995). Distribution: Europe, Palaearctic Asia (excluding Japan). S/EAP/TrPal. Host plants: Poaceae, Brassicaceae, Asteraceae, Chenopodiaceae and Cyperaceae.

Psylliodes glaber (Duftschmid, 1825). Recorded from the Pop Ivan Mountain, Maramureş Mountains (Kuthy, 1900). Distribution: Alps Mountains, Carpathian Mountains, Dinaric Alps Mountains. Host plants: no data were found in the available literature.

Cassidinae Gyllenhal, 1813

Cassida murraea Linnaeus, 1767. Repedea forestry house, 22 - 26.VI.1997; Repedea, Elma clearing, 27.VI.1997; Poienile de sub Munte, Coşnea forestry house, 15 - 16.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Palaearctic (excluding North Africa). S/EAP/TrPal. Host plants: Asteraceae, Lamiaceae, Scrophulariaceae.

Cassida prasina Illiger, 1798. Elma clearing, Repedea (Maican, 2007). Distribution: from Europe to Siberia and western China. S/EAP/SibE. Host plants: Asteraceae (*Achillea*, *Matricaria*, *Anthemis* and *Chrysanthemum*).

Cassida rubiginosa Müller, 1776. Repedea forestry house, 25 - 26.VI.1997; Frumuşeaua Valley, 7 km upstream Crasna Vişeului, 25.VI.1997; Repedea forestry house, 27. VI.1997; Poienile de sub Munte, the confluence of Rica and Budescu, 14.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Palaearctic; Taiwan. S/EAAP/HPal. Host plants: Asteraceae.

Cassida sanguinolenta Müller, 1776. Valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 23.VI.1997 (Maican and Serafim, 2001). Distribution: from Europe to Kamchatka. S/EAP/TrPal. Host plants: Asteraceae (*Achillea*, *Tanacetum*).

Cassida vibex Linnaeus, 1767. Vişeul de Jos, 22.VIII.1997; Smereceni clearing, 7 km upstream Repedea, 22 - 27.VI.1997; Elma clearing, 2 km upstream Repedea, 29.VI.1997; Cvaşniţa Valley, Poienile de sub Munte, 15.VI.2003; Coşnea forestry house, Poienile de sub Munte, 16.VI. 2003 (Maican and Serafim, 2001, 2004). Distribution: from Europe to Japan. S/EAP/TrPal. Host plants: Asteraceae (*Cirsium*, *Carduus*, *Centaurea*, *Arctium*, *Tanacetum*, *Achillea*).

Cassida viridis Linnaeus, 1758. Recorded from Tisa Valley, Făina Valley (Frivaldszky, 1871). Valley of Frumuşeaua River, 7 km upstream Crasna Vişeului, 23.VI.1997; Repedea, Elma clearing, 24.VI.1997, 27.VII.1997; Repedea forestry house, 26.VI.1997; Smereceni clearing, 7 km upstream Repedea, 22 - 27.VI.1997; Elma clearing, 2 km upstream Repedea, 24 - 29.VI.1997; Repedea forestry house, 29.VI.1997; Poienile de sub Munte, the confluence of the rivers Rica and Budescu, 14.VI.2003; valley of the River Budescu, 14.VI.2003; Coşnea forestry house, 16.VI.2003; valley of the Hututeanca River, 12 km upstream Crasna Vişeului, 17.VI.2003; valley of the Pop Ivan River, 12 km upstream Crasna Vişeului, 17.VI.2003; Repedea, 18.VI.2003; Făina, Vaser Valley, 19.VI.2003 (Maican and Serafim, 2001, 2004). Distribution: Palaearctic S/EAAP/HPal. Host plants: Lamiaceae (*Stachys*, *Mentha*, *Galeopsis*, *Lycopus* and *Salvia*); hygro-mesophylous species.

Until now, 94 chrysomelid species belonging to 42 genera are known from the Maramureş Mountains Nature Park and environs, representing about 16% of the Romanian leaf beetles fauna, and 44% from the total number of species recorded in the Maramureş area.

They are distributed in nine subfamilies: Donaciinae (one species), Orsodacninae (one), Criocerinae (four), Clythrinae (six), Cryptocephalinae (13), Chrysomelinae (36), Galerucinae (seven), Halticinae (20) and Cassidinae (six).

Among them, 49 species were found in the material collected in 1995-2004 within the program of researches in Maramureş, 23 species being mentioned only in the older papers.

Among previously cited species, were found again: *Plateumaris consimilis*, *Cryptocephalus aureolus*, *C. moraei*, *C. sericeus*, *Chrysolina fastuosa*, *C. globipennis*, *C. herbacea*, *C. polita*, *C. rufa*, *C. umbratilis*, *C. varians*, *Chrysomela populi*, *Gastrophysa polygoni*, *G. viridula*, *Leptinotarsa decemlineata*, *Linaeidea aenea*, *Phratora vittelinae*, *P. tibialis*, *Lochmaea caprea*, *Phyllotreta atra*, *P. undulata* and *Cassida viridis*.

Species such *Plateumaris consimilis*, *Labidostomis longimana*, *Cryptocephalus bipunctatus*, *C. hypochoeridis*, *C. moraei*, *C. violaceus*, *Pachybrachis sinuatus*, *Chrysolina herbacea*, *C. fastuosa*, *C. varians*, *Gastrophysa viridula*, *Linaeidea aenea*, *Crepidodera aurata* and *Cassida viridis* are frequent in the investigated area.

Oulema septentrionis is little known, being often confused with *Oulema erichsonii*. It is a rare species in the Carpathian Mountains, more frequent in Transylvania. It was reported by Szél et al. (1995) from Borşa, Rodna Mountains, 1200 m altitude. The general areal includes central and northern Europe, from Spain and Ireland to Finland, northern Russia and Volga River basin (Warchalowski, 2003).

One notices the occurrence of some mountainous species, especially with an Alpine-Carpathian distribution: *Chrysolina globipennis*, *C. rufa*, *C. umbratilis*, *Gonioctena interposita*, *Oreina coerulea*, *O. intricata*, *O. virgulata*, *O. viridis*, *Psylliodes glaber*, etc.

Minota carpathica, *Orestia aubei* and *Phyllotreta christinae* (Halticinae) are endemic species in the mountains of Europe, being widely spread in Carpathians, Sudetes, Alps and Balkans. Also, *Neocrepidodera transsilvanica* is an endemic species to the Carpathian Mountains (Romania, Poland, Slovakia and Ukraine).

Among Chrysomelinae, *Sclerophaedon carpathicus* (collected in 1997 from Cârligătura Valley, 7 km upstream Repedea) is a valuable species, endemic to the Eastern Carpathians.

CONCLUSIONS

94 chrysomelid species, belonging to 42 genera, from nine subfamilies are recorded so far in the Maramureş Mountains Nature Park and environs, based on the material collected between 1995 and 2004, during the "Knowledge of the invertebrates of Maramureş" project, and on the bibliographical reports.

They represent about 16% of the Romanian leaf beetles fauna and 44% from the total number of species recorded from Maramureş area.

The most abundant subfamily is Chrysomelinae, with 36 species, followed by Halticinae (20), Cryptocephalinae (13), Galerucinae (seven), Clythrinae and Cassidinae (each of them with six), Criocerinae (four species), Donaciinae and Orsodacninae, with one species.

From a zoogeographical point of view, among the European endemics of Halticinae, the following have been recorded in the fauna of Maramureş Mountains Nature Park: *Minota carpathica*, *Orestia aubei*, *Phyllotreta christinae* (wide spread European mountainous endemic species) and *Neocrepidodera transsilvanica* (endemic species to the Carpathian Mountains).

We mention the presence of *Sclerophaedon carpathicus*, an endemic species to the Eastern Carpathians, and of *Oulema septentrionis*, a rare species in Carpathians chain.

As the chrysomelids diversity is strongly related to the diversity of vegetation, it is very necessary to perform new researches in other habitats from the Maramureş Mountains Nature Park and neighbouring areas, in order to complete this inventory of leaf beetles fauna.

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THE ROVE BEETLE FAUNA (COLEOPTERA, STAPHYLINIDAE) OF THE MARAMUREŞ COUNTY (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, Iza, Săpânţa, Vişeu basins, Rodna Mountains, rove beetles, faunistical data, ecological categories, endemic species.

ABSTRACT

This paper presents a synthesis of the previously published data regarding the rove beetle fauna of Maramureş County (Iza, Săpânţa, Vişeu basins, Rodna Mountains) begining with 1871 up to 2006. 413 rove beetle species are known from this area, that means 33.3% from the total number of staphylinids species mentioned from Romania, as yet. A few rove beetle ecological categories based on the investigated habitats and microhabitats during the period 1995-1998, 2003-2004 are mentioned. Three species *Niphetodes semicarinatus* Zerche, *N. schoenmanni* Zerche and *Tectusa rodnaensis* Zerche are endemic from Rodna Mountains.

RÉSUMÉ: La faune des staphylinidés (Coleoptera, Staphylinidae) du département de Maramureş (Maramureş, Roumanie).

Ce travail présente une synthèse des données sur la faune de coléoptères staphylinides du département de Maramureş (bassins des rivières Iza, Săpânţa et Vişeu, montagnes des Rodnei) à partir des travaux de spécialité publiées depuis 1871 et jusqu'à 2006. On présente 413 espèces de staphylinides, représentant 33,3% du total des espèces connues pour la faune de Roumanie jusqu'à présent. On a identifié quelques catégories écologiques de coléoptères staphylinides à partir des habitats et microhabitats étudiés entre 1995-1998 et 2003-2004. Les espèces *Niphetodes semicarinatus* Zerche, *N. schoenmanni* Zerche et *Tectusa rodnaensis* Zerche sont endémiques pour les montagnes des Rodnei.

REZUMAT: Fauna de stafilinide (Coleoptera, Staphilinidae) a judeţului Maramureş (Maramureş, România).

Această lucrare prezintă o sinteză a datelor referitoare la fauna de coleoptere stafilinide a judeţului Maramureş (bazinele Iza, Săpânţa, Vişeu, Munţii Rodnei), pe baza lucrărilor de specialitate, publicate începând cu anul 1871 şi până în 2006. Sunt prezentate 413 specii de stafilinide, ce reprezintă aproximativ 33,3% din totalul speciilor cunoscute în fauna României până în prezent. Au fost identificate câteva categorii ecologice de stafilinide pe baza habitatelor şi a microhabitatelor investigate în perioada 1995-1998, 2003-2004. Speciile *Niphetodes semicarinatus* Zerche, *N. schoenmanni* Zerche şi *Tectusa rodnaensis* Zerche sunt endemice pentru Munţii Rodnei.

INTRODUCTION

The Rove beetle fauna of the Maramureş County is rather poorly known. The faunistical data are very old and the recent investigations (1995-1998, 2003-2004) where made only in a few areas. First data belong to Frivaldszky (1871) who cited rove beetle species from the Maramureş Mountains (Făina Valley, Vaser Valley, Toroioaga Mountain, Gutâi Mountain and Kuthy (1897) who mentioned different species from Sighetul Marmaţiei, Bocicoiu Mare Mountain, Maramureş Mountains (Făina Valley, Pop Ivan Mountain, Pietrosu Mountain). During the period 1938-1940, a lot of rove beetles species were mentioned in Székessy's papers (1938 a, b; 1939 a, b, c, d; 1940, 1943) from the former regions and Rodna Mountains. The rove beetle fauna of Rodna Mountains was better known being underlined in several papers: Bielz (1887), Ganglbauer (1896), Deubel (1910), Petri (1912, 1925). In Csiki's paper (1951) we find out a large part of the previous records for Rodna Mountains and the author's own collections which refer to valley of Roşu Rivulet, Saca Valley, Măriilor Valley, Corongiş Mountain, Ineu Mountain, Omu Mountain, Roşu Mountain, Rodna locality. In 1995, Szél and collaborators's paper (1995) presents a few species collected from Borşa and Rona de Sus. Stan's papers (2002, 2004, 2006) have brought new data regarding the rove beetle fauna from Iza, Săpânţa and Vişeu basins based on the collectings made by the "Grigore Antipa" National Natural History Museum's team between 1995-1998 and 2003-2004 and a part of Deubel Collection which is preserved in the same museum.

MATERIAL AND METHODS

The faunistic papers (1871-2006) were studied to achieve a synthesis of rove beetle species which are known for Maramureş County. This paper presents an updating of the species nomenclature, taken over from Assing and Schulke's paper (2007). The order of the subfamilies within Family Staphylinidae is the phylogenetic order suggested by Lawrence and Newton (1995). For each species the collecting sites are mentioned abbreviated in the table 1, but the detailed information is presented below the table. The collecting sites were divided in four large areas: Iza Basin - IB, Săpânţa Basin - SB, Vişeu Basin - VB and Rodna Mountains - RM. Each area was divided in two parts: record (r) and material (m) which means old data and recent data. For each species was mentioned the paper's number from the references.

Table 1: Rove beetle species from the Maramureş County.

Family Staphylinidae	Collecting sites	IB		SB		VB		RM		reference
		r	m	r	m	r	m	r	m	
Subfamily Omaliinae Mac Leay, 1825										
Eusphalerum alpinum alpinum (Heer, 1839)	V9, R1, R7, R3, RM, I5	+					+	+	+	2, 4, 9, 11
Eusphalerum anale (Erichson, 1840)	R7, R3, RM							+		2, 4, 6, 19
Eusphalerum longipenne (Erichson, 1839)	R7, RM, R3, V18					+		+	+	2, 4, 8, 11
Eusphalerum luteum (Marsham, 1802)	R7, RM							+		2, 6, 8, 11
Eusphalerum minutum (Fabricius, 1792)	R7, R4, RM, I5	+						+	+	2, 9
Eusphalerum primulae (Stephens, 1834)	RM							+		2
Eusphalerum sorbi (Gyllenhal, 1810)	R7, S1				+			+	+	2, 8, 11
Eusphalerum tenenbaumi (Bernhauer, 1932)	R3							+		3, 4, 12
Acrulia inflate (Gyllenhal, 1813)	RM							+		2, 12
Dropephylla ioptera (Stephens, 1834)	I16	+						+		4, 12
Phyllodrepa floralis (Paykull, 1789)	RM							+		2, 6
Phyllodrepa nigra (Gravenhorst, 1806)	V3					+				12
Hapalaraea pygmaea (Paykull, 1800)	V3					+				4, 12
Omalium caesum Gravenhorst, 1806	RM							+		2

Omalium deubeli Bernhauer, 1915	RM							+		2, 6, 12
Omalium excavatum Stephens, 1834	RM							+		2, 6, 12
Omalium ferrugineum Kraatz, 1857	RM								+	10
Omalium funebre Fauvel, 1871	RM							+		6, 12
Omalium oxyacanthae Gravenhorst, 1806	RM							+		2, 6, 12
Omalium rivulare (Paykull, 1789)	RM							+		2
Phloeostiba lapponica (Zetterstedt, 1838)	R7							+		2
Xylostiba monilicornis (Gyllenhal, 1810)	RM							+		2, 6, 12
Phloeonomus pusillus (Gravenhorst, 1806)	R6							+		2
Xylodromus depressus (Gravenhorst, 1802)	V3					+				4, 13
Anthobium atrocephalum (Gyllenhal, 1827)	V3					+				4, 13
Anthobium melanocephalum (Illiger, 1794)	V3					+				4, 13
Olophrum assimile (Paykull, 1800)	I16	+								4, 13
Olophrum consimile (Gyllenhal, 1810)	R3							+		4, 13
Amphichroum canaliculatum (Erichson, 1840)	S1, S3, S2, I20		+		+			+		2, 6, 8
Acidota crenata (Fabricius, 1792)	R3, RM, I20						+	+		2, 4, 6
Lesteva longoelytrata (Goeze, 1777)	I16, R3, RM, R7	+						+		2, 4, 6, 13
Geodromicus nigrita (Müller, 1821)	V1						+			19
Geodromicus plagiatus (Fabricius, 1798)	R7									2
Anthophagus alpestris Heer, 1839	R3, RM, V9, S1, V2						+	+		2, 4, 6, 8, 14
Anthophagus alpinus (Paykull, 1790)	V1, RM, V29						+	+		2, 3, 6, 19
Anthophagus angusticollis (Mannerheim, 1830)	R7, I7		+							2, 9
Anthophagus bicornis (Block, 1799)	S1				+					8
Anthophagus caraboides (Linnaeus, 1758)	R7							+		2
Anthophagus sudeticus Kiesenwetter, 1846	V9, RM						+	+		2, 4, 14
Niphetodes semicarinatus Zerche, 1990	R3, RM, R2								+	10
Niphetodes schoenmanni Zerche, 1990	R3, RM, R1, R2								+	10
Pareudectus eppelsheimi (Ganglbauer, 1896)	R3, R1, R2							+	+	10
Hypsonothrus deubeli (Ganglbauer, 1896)	R3, RM, R2							+	+	10
Subfamily Proteininae Erichson, 1839										
Megarthrus bellevoyei Saulcy, 1862	R1							+		2, 6
Megarthrus depressus (Paykull, 1789)	RM, R7, I20, V22		+				+	+		2, 6, 10
Megarthrus hemipterus (Illiger, 1794)	V3, V11					+	+			10, 11
Proteinus brachypterus (Fabricius, 1792)	V20					+				4, 11
Proteinus ovalis Stephens, 1834	R7							+		2
Subfam. Micropeplinae Leach, 1815										
Micropeplus porcatus (Fabricius, 1789)	I16	+								4, 11
Subfam. Phloeocharinae Erichson, 1839										
Phloeocharis subtilissima Mannerheim, 1830	RM							+		2
Subfam. Olisthaerinae Thomson, 1858										
Olisthaerus substriatus (Paykull, 1790)	RM							+	+	2, 7, 10
Subfam. Tachyporinae Mac Leay, 1825										
Mycetoporus angularis Mulsant and Rey, 1853	RM							+		2, 6
Mycetoporus clavicornis (Stephens, 1832)	RM							+		2, 6
Mycetoporus corpulentus Luze, 1901	RM							+		2
Mycetoporus despectus Strand, 1969	RM								+	10
Mycetoporus erichsonanus Fagel, 1965	RM, R3							+	+	2, 6, 10
Mycetoporus lepidus (Gravenhorst, 1806)	RM							+		2
Mycetoporus maerkelii Kraatz, 1857	RM								+	10
Mycetoporus monticola Fowler, 1888	RM							+		2
Mycetoporus mulsanti Ganglbauer, 1895	RM							+	+	2, 6, 10

Mycetoporus piceolus Rey, 1883	RM, R2							+		2, 6
Mycetoporus punctus (Gravenhorst, 1806)	RM							+		2, 6
Ischnosoma splendidum (Gravenhorst, 1806)	RM							+		2
Bryophacis maklini (Sahlberg, 1871)	RM								+	10
Bryophacis rufus (Erichson, 1839)	R6							+		2
Bryophacis rugipennis (Pandelle, 1869)	R7, RM, R6							+		2, 4
Lordithon exoletus (Erichson, 1839)	RM							+	+	2, 6, 10
Lordithon speciosus (Erichson, 1839)	RM							+		2, 6
Lordithon thoracicus (Fabricius, 1777)	RM, V11, V22						+	+		2, 6, 10
Lordithon trinotatus (Erichson, 1839)	RM, V11, V12						+	+		6, 9, 10
Bolitobius castaneus (Stephens, 1832)	RM, R2, V20					+		+		2, 3, 4
Bolitobius inclinans (Gravenhorst, 1806)	V29					+				3
Sepedophilus immaculatus (Stephens, 1832)	RM							+		6
Sepedophilus littoreus (Linnaeus, 1758)	RM							+	+	6, 10
Sepedophilus testaceus (Fabricius, 1793)	RM, I11, V26		+				+	+		2, 3, 10
Tachyporus abdominalis (Fabricius, 1781)	I16	+								4
Tachyporus chrysomelinus (Linnaeus, 1758)	R3, RM, V11, V22				+		+	+		2, 3, 8, 10
Tachyporus dispar (Paykull, 1789)	V11, V14, V15						+			9, 10
Tachyporus nitidulus (Fabricius, 1781)	RM							+		2
Tachyporus obtusus (Linnaeus, 1767)	V3, V20, S1				+	+				3, 4
Tachyporus pusillus Gravenhorst, 1806	RM							+		2
Tachyporus ruficollis Gravenhorst, 1802	I16	+								4
Tachyporus solutus Erichson, 1839	V3, RM					+		+		2, 4
Tachinus bipustulatus (Fabricius, 1793)	RM							+		6, 10
Tachinus corticinus Gravenhorst, 1802	R3, V20, RM, S4, V14				+	+	+	+		2, 3, 6, 8, 9
Tachinus elongates Gyllenhal, 1810	MR, R2							+	+	2, 6, 10
Tachinus fimetarius Gravenhorst, 1802	MR							+		2
Tachinus humerali Gravenhorst, 1802	MR, I15		+					+		2, 6, 9
Tachinus laticollis Gravenhorst, 1802	MR, R6, V1, V32					+	+	+	+	2, 10, 19
Tachinus marginellus (Fabricius, 1781)	MR, V32, I15		+				+	+	+	2, 6, 8, 10
Tachinus pallipes Gravenhorst, 1806	RM, R4, R5, R6, I15, V13, V21, V32		+				+	+		2, 6, 8, 9, 10
Tachinus proximus Kraatz, 1855	RM, V29							+		2, 6
Tachinus rufipes (Linneaeus, 1758)	RM							+	+	2, 6, 10
Cilea silphoides (Linnaeus, 1767)	RM							+	+	2, 6, 10
Subfamily Aleocharinae Fleming, 1821										
Myllaena intermedia Erichson, 1837	V22, V2, V19						+			10
Encephalus complicans Stephens, 1832	RM, R2, R6							+		2, 6
Gyrophaena fasciata (Marsham, 1802)	V32						+			10
Gyrophaena gentiles Erichson, 1839	RM, R6, V22						+	+		2, 6, 10
Gyrophaena joyi Wendeler, 1924	V22						+			10
Gyrophaena joyioides Wüsthoff, 1937	V11, V22, V32						+			10
Gyrophaena polita (Gravenhorst, 1802)	I16, RM, R7	+						+		2, 4, 6
Gyrophaena strictula Erichson, 1839	V32						+			10
Placusa tachyporoides (Waltl, 1838)	RM, R7							+		2, 6
Homalota plana (Gyllenhal, 1810)	RM, R7							+		2, 6
Leptusa alpicola Brancsik, 1874	V9, RM, R2, R6					+		+	+	2, 4, 6, 10
Leptusa carpathica Weise, 1877	V9, RM, R2, R6, V1					+		+	+	2, 4, 6, 10, 19
Leptusa eximia Kraatz, 1856	R6, R2							+		2
Leptusa flavicornis (Brancsik, 1874)	RM, R2, R6							+		2, 6, 7
Leptusa fumida (Erichson, 1839)	RM, R2, R6							+		2, 6
Leptusa koronensis Ganglbauer, 1896	R1, R2, R6							+	+	2, 4, 6, 10

Leptusa pulchella (Mannerheim, 1830)	RM, R2, R6							+		2, 6
Leptusa sudetica Lokay, 1900	RM							+		2
Euryusa brachelytra Kiesenwetter, 1851	I16	+								4
Bolitochara mulsanti Sharp, 1875	RM							+		2
Bolitochara oblique Erichson, 1837	RM, V32						+	+		2, 10
Bolitochara pulchra (Gravenhorst, 1806)	V3, V22					+	+			4, 10
Autalia rivularis (Gravenhorst, 1802)	RM, V22, V4						+	+		2, 6, 10
Tachyusa coarctata Erichson, 1837	V3, V20					+				2, 3, 4
Ischnopoda umbratica (Erichson, 1837)	I16, V32, V30	+					+			4, 10
Callicerus rigidicornis (Erichson, 1839)	V14						+			9
Aloconota cambrica (Wallaston, 1855)	V4, V22						+			10
Aloconota currax (Kraatz, 1856)	V3, RM					+		+		2, 4, 6
Aloconota insecta (Thomson, 1856)	RM							+		2, 6
Amischa analis (Gravenhorst, 1802)	RM							+		6
Amischa nigrofusca (Stephens, 1832)	RM							+		6
Nehemitropia lividipennis (Mannerheim, 1831)	RM, V11, V21						+	+		6, 9, 10
Dinaraea angustula (Gyllenhal, 1810)	V20					+				4
Plataraea brunnea (Fabricius, 1798)	RM, V12, V14						+	+		2, 6, 9, 10
Plataraea nigrifrons (Erichson, 1839)	RM							+		2
Liogluta alpestris (Heer, 1839)	V3, RM					+			+	4, 10
Liogluta granigera (Kiesenwetter, 1850)	RM							+	+	2, 6, 10
Liogluta longiuscula (Gravenhorst, 1802)	RM							+		2, 6
Liogluta microptera Thomson, 1867	RM, R6, V18, I13, V22		+				+	+		2, 6, 8, 9, 10
Acrotona atterima (Gravenhorst, 1802)	RM							+		2, 6
Acrotona parvula (Mannerheim, 1830)	R6							+		2
Atheta aegra (Heer, 1841)	RM							+		2, 6
Atheta aeneipennis (Thomson, 1856)	I16, RM	+						+		2, 4
Atheta brunneipennis (Thomson, 1852)	RM							+		2, 6
Atheta castanoptera (Mannerheim, 1830)	vpS, V17						+			10
Atheta cauta (Erichson, 1837)	V1						+			19
Atheta celata (Erichson, 1837)	RM							+		2, 6
Atheta cinnamoptera (Thomson, 1856)	RM							+		6
Atheta coriaria (Kraatz, 1856)	RM							+	+	2, 6
Atheta corvine (Thomson, 1856)	RM							+		2, 6
Atheta crassicornis (Fabricius, 1793)	RM, V17, V32						+	+		2, 6, 10
Atheta cribrata (Kraatz, 1856)	RM							+		2, 6
Atheta elongatula (Gravenhorst, 1802)	RM							+		2, 6
Atheta europaea Likovsky, 1984 = *Atheta livida* (Mulsant and Rey, 1852)	V20					+				4
Atheta excellens (Kraatz, 1856)	RM							+	+	2, 6, 10
Atheta fallaciosa (Sharp, 1869)	RM							+		2, 6
Atheta fungi (Gravenhorst, 1806)	RM							+		2, 6
Atheta fungicola (Thomson, 1852)	V22, V17						+			10
Atheta gagatina (Baudi di Selve, 1848)	I16, V22, V17		+				+			4, 10
Atheta laticeps (Thomson, 1856)	RM							+		2, 6
Atheta leonhardi Bernhauer, 1911	RM							+		2, 7
Atheta liturata (Stephens, 1832)	V17						+			10
Atheta longicornis (Gravenhorst, 1802)	RM, V25						+	+		2, 6, 10
Atheta luridipennis (Mannerheim, 1830)	I16	+								4
Atheta myrmecobia (Kraatz, 1856)	RM							+		2, 6

Atheta nigritula (Gravenhorst, 1802)	RM, V17, V32						+	+		2, 6, 10
Atheta occulta (Erichson, 1839)	V20						+			4
Atheta orbata (Erichson, 1837)	RM							+		2, 6
Atheta orphana (Erichson, 1837)	RM							+		2, 6
Atheta pallidicornis (Thomson, 1856)	V22						+			10
Atheta picipes (Thomson, 1856)	RM							+	+	2, 6, 10
Atheta pilicornis (Thomson, 1852)	RM							+		2, 6
Atheta putrida (Kraatz, 1856)	V3					+				4
Atheta setigera (Sharp, 1869)	RM								+	10
Atheta sodalist (Erichson, 1837)	V22						+			10
Atheta spatula (Fauvel, 1878)	RM							+		2, 6
Atheta tibialis (Heer, 1839)	V9, MR					+		+		2, 4, 7
Atheta trinotata (Kraatz, 1856)	RM							+		2, 6
Atheta vaga (Heer, 1839) = *Atheta nigricornis* (Thomson, 1852)	R1							+		2, 6
Alevonota gracilenta (Erichson, 1839)	RM							+		2, 6
Thamiaraea cinnamomea (Gravenhorst, 1802)	RM							+	+	2, 10
Drusilla canaliculata (Fabricius, 1787)	RM, I9, I4		+					+		2, 3, 8
Pella cognate (Märkel, 1842)	R3, I16,	+						+		2, 3, 4
Pella limbata (Paykull, 1789)	I1, I4, I13		+							8
Ilyobates mech (Baudi di Selve, 1848)	S2				+					8
Ilyobates nigricollis (Paykull, 1800)	I16, V18	+					+			4, 8
Tectusa rodnaensis Zerche, 2007	RM							+		20
Ocalea badi Erichson, 1837	RM, R2, R6							+		2, 6
Oxypoda annularis (Mannerheim, 1830)	RM, R2, R6							+	+	2, 6, 10
Oxypoda bicolour Mulsant and Rey, 1853	V3					+				4
Oxyoda brachyptera (Stephens, 1832)	RM							+		2, 6
Oxypoda brevicornis (Stephens, 1832)	RM, V22						+	+		2, 6, 10
Oxypoda exoleta Erichson, 1839	RM							+		6
Oxypoda filiformis Redtenbacher, 1849	RM							+		2, 6
Oxypoda haemorrhoa (Mannerheim, 1830)	RM, R2, R6							+	+	2, 6, 10
Oxypoda opaca (Gravenhorst, 1802)	RM, V20					+		+		2, 3
Oxypoda skalitzkyi Bernhauer, 1902	RM							+		2, 6
Oxypoda soror Thomson, 1855	RM, R2, R6							+	+	2, 6, 10
Homoeusa acuminate (Märkel, 1842)	RM							+	+	2, 6, 10
Haploglossa marginalis (Gravenhorst, 1806)	I16	+								4
Tinotus morion (Gravenhorst, 1802)	RM							+		6
Aleochara bilineata Gyllenhal, 1810	RM							+		2, 6
Aleochara bipustulata (Linnaeus, 1760)	RM, R2, V4						+	+	+	2, 6, 10
Aleochara brevipennis Gravenhorst, 1806	I16	+								4
Aleochara curtula (Goeze, 1777)	S2				+					8
Aleochara erythroptera Gravenhorst, 1806	V15						+			MGAB
Aleochara intricata Mannerheim, 1830	RM							+		2, 6
Aleochara laevigata Gyllenhal, 1810	RM							+		2, 6
Aleochara lanuginosa Gravenhorst, 1802	RM, I15, V21, V32, V25		+				+	+		10
Aleochara moesta Gravenhorst, 1802	V29						+			3
Aleochara tristis Gravenhorst, 1806	RM, V11						+	+		2, 6, 9
Aleochara villosa Mannerheim, 1830	R7							+		2
Subfam. Oxytelinae Fleming, 1821										
Syntomium aeneum (Müller, 1821)	RM, I16, R1, R6	+						+	+	2, 6, 10, 14
Deleaster dichrous (Gravenhorst, 1802)	R7, S2, V18, I14, V11		+		+		+	+		2, 8, 9, 14

Coprophilus striatulus (Fabricius, 1793)	RM								+	10
Thinodromus dilatatus (Erichson, 1839)	R7							+		2, 6
Carpelimus corticinus (Gravenhorst, 1806)	R3, R7, V17						+	+		2, 10
Aploderus caesus (Erichson, 1839)	V20, RM					+		+		2, 4, 14
Oxytelus laqueatus (Marsham, 1802)	RM, R6, R7, R4, V11, V13, V32, V21, V22, V25						+	+		2, 6, 9, 10, 15
Oxytelus piceus (Linnaeus, 1767)	RM, SS	+						+		2, 9
Oxytelus sculptus Gravenhorst, 1806	R7							+		2
Anotylus affinis (Czwalina, 1871)	RM								+	10
Anotylus clypeonites (Pandelle, 1867)	RM							+		2
Anotylus complanatus (Erichson, 1839)	V13						+			9
Anotylus hamatus (Fairmaire and Laboulbène, 1856)	RM							+		2, 6
Anotylus mutator (Lohse, 1963)	I8, V21, V22, V25		+				+			9, 10
Anotylus nitidulus (Gravenhorst, 1802)	RM, R2, R7							+	+	2, 6, 10, 16
Anotylus politus (Erichson, 1840)	R2							+		2
Anotylus rugosus (Fabricius, 1775)	I9	+								3, 8
Anotylus sculpturatus (Gravenhorst, 1806)	R, V10						+			2, 8
Anotylus tetracarinatus (Block, 1799)	RM, I15, V11, V22, V32, V25, V4	+					+	+		2, 9, 10
Platystethus arenarius (Fourcroy, 1785)	RM, R7, I8, I7, V32, V11, V13, I15, V21, V22, V25, V4		+				+	+		2, 9, 10, 16, 19
Platystethus capito Heer, 1839	RM							+		2, 6
Platystethus cornutus (Gravenhorst, 1802)	RM, V11						+	+		2, 6, 10
Platystethus laevis Märkel and Kiesenwetter, 1848	RM							+		2, 6, 16
Platystethus nitens (Sahlberg, 1832)	RM							+		2
Platystethus nodifrons (Mannerheim, 1830)	RM							+		2, 6
Bledius subterraneus Erichson, 1839	V21, V32						+			10
Thinobius brigitteae Schülke, 1998	V6, V7, V24					+	+			5
Thinobius ciliatus Kiesenwetter, 1844	V30					+				5
Thinobius crinifer Smetana, 1959	V6, V7, V24, V30					+	+			5
Thinobius helveticus Scheerpeltz, 1966	V7, V30					+				5
Thinobius petzi Bernhauer, 1908	V7					+				5
Subfam. Oxyporinae Fleming, 1821										
Oxyporus maxillosus Fabricius, 1793	V32						+		+	10
Oxyporus rufus (Linnaeus, 1758)	I20, V10	+					+			2
Subfam. Steninae Mac Leay, 1825										
Stenus argus Gravenhorst, 1806	V3					+				4
Stenus asphaltinus Erichson, 1840	V3					+				4, 17
Stenus ater Mannerheim, 1830	I13		+							8
Stenus bifoveolatus Gyllenhal, 1827	I14	+								19
Stenus biguttatus (Linnaeus, 1758)	I20, R7	+						+		2
Stenus bimaculatus Gyllenhal, 1810	I16, R7, V22, V32	+					+	+		2, 4, 10, 17
Stenus boops Ljungh, 1810	V11, V30						+			9, 10
Stenus brunnipes Stephens, 1833	RM, R2							+		2, 6, 17
Stenus carpathicus Ganglbauer, 1896	RM, R2							+		2, 17
Stenus cautus Erichson, 1839	I16	+								4, 17
Stenus circularis Gravenhorst, 1802	I4		+							3, 8
Stenus clavicornis (Scopoli, 1763)	I16, RM, R2, S2, I4	+	+		+			+		2, 4, 8, 17
Stenus comma Le Conte, 1863	R7, V32						+	+		2, 10

Stenus eumerus Kiesenwetter, 1850	I16, R7	+						+		2, 4, 17
Stenus flavipes Stephens, 1833	I16, V25	+					+			4, 9, 17
Stenus fossulatus Erichson, 1840	R3, R4, R5, V30, V28, I4		+				+	+		2, 4, 10, 17
Stenus glacialis Heer, 1839	RM							+		2, 6
Stenus gracilipes Kraatz, 1857	R6, R4, R2							+		2
Stenus guttula Müller, 1821	I16, R7, R6, R4	+						+		2, 4
Stenus humilis Erichson, 1839	V20, I16, RM	+				+		+		2, 3, 4, 17
Stenus incanus Erichson, 1839	V3, R4, V32, V4, V22					+	+			4, 10
Stenus juno (Paykull, 1789)	I9		+							8
Stenus kolbe Gerhardt, 1893	RM							+		2, 6, 17
Stenus longipes Heer, 1839	V3, R7, V18					+	+			2, 4, 9, 17
Stenus ludyi Fauvel, 1886	RM								+	2, 10, 17
Stenus maculiger Weise, 1875	R7, V2						+	+		2, 10, 17
Stenus morio Gravenhorst, 1806	RM							+		2, 6
Stenus nanus Stephens, 1833	RM							+		2, 6
Stenus obscuripes Ganglbauer, 1896	RM, V1					+		+	+	2, 6, 10, 17, 19
Stenus ochropus Kiesenwetter, 1858	RM							+		2, 6
Stenus pallipes Gravenhorst, 1802	V20					+				3, 4, 17
Stenus pallitarsis Stephens, 1833	V20					+				4
Stenus phyllobates Penecke, 1901	RM, R7							+		2, 6, 17
Stenus providus Erichson, 1839	R3, R7, I2, V11, V4		+				+	+		2, 3, 6, 8, 9, 10
Stenus pusillus Stephens, 1833	R2							+		2
Stenus reitteri Weise, 1875	R6							+		2, 6
Stenus similes (Herbst, 1784)	V9, RM, I11	+				+		+	+	2, 4, 10, 17, 19
Stenus Sylvester Erichson, 1839	RM							+		2, 6
Stenus tarsalis Ljungh, 1804	I16, I9, V4, V26	+	+				+			4, 8, 10, 17
Stenus transsilvanicus Bernhauer, 1900	RM							+	+	2, 6, 10, 17
Stenus vastus L. Benick, 1925	RM, S2				+			+		2, 17
Dianous coerulescens (Gyllenhal, 1810)	R7, R2, RM							+	+	2, 6, 10
Subfam. Euaesthetinae Thomson, 1859										
Euaesthetus ruficapillus (Lacordaire, 1835)	RM, R2							+		2, 6
Subfam. Paederinae Fleming, 1821										
Paederidus rubrothoracicus (Goeze, 1777)	V20, R7, I3, R6, I18, I4, V11, V25, V22, V26, V18, V32, V30, R4, V4	+				+	+	+		2, 4, 8, 9, 10
Paederidus ruficollis (Fabricius, 1781)	V20, V3, R7, I20,V5, V11, V26, V25, V18, V32, SS, I6, V2, V30, R4, V4, V26		+			+	+	+		2, 3, 4, 9, 10
Paederus brevipennis Lacordaire, 1835	RM, R7, V17						+	+	+	2, 6, 10
Paederus fuscipes Curtis, 1826	RM, R7, I9		+					+	+	2, 6, 8, 10, 18
Paederus limnophilus Erichson, 1840	V3, RM, V2, R7, V30, I14, I4, V11, V25, V18, V19, V26, V22	+	+			+	+	+	+	2, 4, 6, 8, 9, 10, 18, 19
Paederus littoralis Gravenhorst, 1802	RM, I9, I12		+					+		2, 8
Scopaeus gracilis (Sperk, 1835)	RM							+	+	6, 18
Scopaeus laevigatus (Gyllenhal, 1827)	R7									2

Scopaeus sulcicollis (Stephens, 1833)	RM							+	+	10
Sunius melanocephalus (Fabricius, 1793)	RM, R7							+		2
Medon brunneus (Erichson, 1839)	R7							+		2
Medon fusculus (Mannerheim, 1830)	I16	+								4
Rugilus angustatus (Geoffroy, 1785) = *Rugilis fragilis* (Gravenhorst, 1806)	V20					+				4
Rugilus erichsonii (Fauvel, 1867)	I9, I1, V18, I4, V14, V16		+				+			8, 9
Rugilus rufipes Germar, 1836	R7, V13						+	+		2, 9
Platydomene angusticollis (Lacordaire, 1835)	V20					+				3, 4
Tetartopeus angustatus (Lacordaire, 1835)	RM, R7, R6							+		2, 6, 18
Tetartopeus quadratus (Paykull, 1789)	R7							+		2
Tetartopeus terminatus (Gravenhorst, 1802)	I16	+								4, 18
Lathrobium castaneipenne Kolenati, 1846	V3, RM, R7, R6					+		+		2, 4, 6, 18
Lathrobium elongatum (Linnaeus, 1767)	I11	+								3
Lathrobium fulvipenne (Gravenhorst, 1806)	V20, I16	+				+				3, 4
Lathrobium laevipenne Heer, 1839	RM, R7, R6, R4							+		2, 6, 18
Lathrobium geminum Kraatz, 1857	RM, V18						+	+		2, 6, 8, 18
Ochthephilum fracticorne (Paykull, 1800)	RM							+		2, 6, 18
Subfam. Staphylininae Latreille, 1802										
Nudobius lentus (Gravenhorst, 1806)	V3, RM, I10		+			+		+		2, 4, 6
Gyrohypnus angustatus Stephens, 1833	I16, RM, V11, V32, I8	+	+				+	+		2, 4, 6, 9
Gyrohypnus atratus (Heer, 1839)	RM, R6, R4, R2							+		2, 6
Gyrohypnus punctulatus (Paykull, 1789)	V20, MR, V17					+	+	+		2, 10
Leptacinus batychrus (Gyllenhal, 1827)	V32, V17						+			10
Hypnogyra angularis (Ganglbauer, 1895)	I16	+								4
Xantholinus linearis (Olivier, 1795)	R3, I11, I1		+					+		2, 3, 8
Xantholinus tricolour (Fabricius, 1787)	V2						+			10
Atrecus affinis (Paykull, 1789)	V9					+				4
Atrecus longiceps (Fauvel, 1873)	R6							+		2
Othius angustus Stephens, 1833	V3, RM					+		+		2, 4, 6
Othius brevipennis Kraatz, 1857	R3							+		3, 4
Othius lapidicola Märkel and Kiesenwetter 1848	V9, RM					+		+		2, 4, 6
Othius permutatus Assing, 1997	RM								+	10
Othius subuliformis Stephens, 1833	R3							+		4
Othius transsylvanicus Ganglbauer, 1895	RM, R2, V1, V13					+	+	+		2, 6, 19, MGAB
Neobisnius procerulus (Gravenhorst, 1806)	V20					+				2
Neobisnius prolixus (Erichson, 1840)	RM, R7, V4						+	+		2, 6, 10
Bisnius cephalotes (Gravenhorst, 1802)	V3					+				4
Bisnius fimetarius (Gravenhorst, 1802)	RM, R6, V13, I8, I15, V21, V4, V22		+				+	+		2, 6, 9, 10
Bisnius puella (Nordmann, 1837)	V32						+			10
Philonthus addendus Sharp, 1867	V13						+			9
Philonthus alpinus Eppelsheim, 1875	V17						+			10
Philonthus atratus (Gravenhorst, 1802)	V20, R6, I9, V3, I15, V32		+			+	+	+		2, 3, 4, 8, 9
Philonthus carbonarius (Gravenhorst, 1802)	V20, I1, S2, I4		+		+	+	+			2, 3, 8, 9
Philonthus caerulescens (Lacordaire, 1835)	V20, RM, V18, R4, V32, V4, V26, V22, V30					+	+	+		2, 4, 9, 10

Philonthus cognatus Stephens, 1832	I1, S2		+		+					8
Philonthus concinnus (Gravenhorst, 1802)	RM, R4							+		2, 6
Philonthus coprophilus Jarrige, 1949	I15		+							9
Philonthus cruentatus (Gmelin, 1790)	R6, V11, I15		+				+	+		2, 9
Philonthus cyanipennis (Fabricius, 1793)	V3					+				4
Philonthus debilis (Gravenhorst, 1802)	RM, V17						+	+		6, 10
Philonthus decorus (Gravenhorst, 1802)	V20, R4, I9, V18, I13, V12		+			+	+	+		2, 3, 8, 9
Philonthus ebeninus (Gravenhorst, 1802)	V20, RM					+		+		2, 3
Philonthus fumarius (Gravenhorst, 1806)	V3					+				4
Philonthus laevicollis (Lacordaire, 1835)	RM, R2							+		2, 6
Philonthus laminatus (Creutzer, 1799)	I16, RM, R4	+						+		2, 4, 6
Philonthus longicornis Stephens, 1832	V3, V11					+	+			4, 9
Philonthus mannerheimi Fauvel, 1869	RM, I9		+					+		2, 6, 8
Philonthus marginatus (Müller, 1764)	R2, V32, I8, I15		+				+	+		2, 9
Philonthus micantoides Benick and Lohse, 1956	I1, I9, S2		+		+					8
Philonthus montivagus Heer, 1839	R3, RM, R2							+	+	2, 3, 4, 6, 10
Philonthus parvicornis (Gravenhorst, 1802)	RM							+		2, 6
Philonthus politus(Linnaeus, 1758)	RM, V1					+		+		2, 19
Philonthus pseudovarians Strand, 1941	V25						+			10
Philonthus quisquiliarius (Gyllenhal, 1810)	RM							+		2
Philonthus rotundicollis (Ménétries, 1832)	V20					+				4
Philonthus rubripennis Stephens, 1832	V20, RM, I1, I4, V27		+			+	+	+		2, 3, 8, 9
Philonthus splendens (Fabricius, 1793)	R6, R5, V2, V13, I15, V22		+				+	+		2, 8, 9, 10
Philonthus spinipes Sharp, 1874	V17						+			10
Philonthus succicola Thomson, 1860	V13, I15		+				+			9
Philonthus tenuicornis Mulsant and Rey, 1853	RM, R6, V32						+	+		2, 9, 10
Philonthus varians (Paykull, 1789)	RM, V25, V30						+	+		6, 10
Philonthus ventralis (Gravenhorst, 1802)	RM							+		2
Rabigus pullus (Nordmann, 1837)	V20, MR, V3					+		+		2, 3, 4, 6
Rabigus tenuis (Fabricius, 1793)	V20, I1, I4		+			+				2, 3, 8
Gabrius appendiculatus Sharp, 1910	I4	+								MGAB
Gabrius astutus (Erichson, 1840)	I16	+								4
Gabrius exiguous (Nordmann, 1837)	RM							+		2, 6
Gabrius nigritulus (Gravenhorst, 1802)	RM							+		2, 3
Gabrius trossulus (Nordmann, 1837)	RM, R2							+		2, 6
Heterothops dissimilis (Gravenhorst, 1802)	RM							+		2, 6
Quedius alpestris (Heer, 1839)	V9, MR					+		+	+	2, 3, 4, 6, 10
Quedius cincticollis Kraatz, 1857	RM, V1					+		+		2, 4, 19
Quedius cinctus (Paykull, 1790)	R6							+		2
Quedius collaris Erichson, 1840	V20, I16, RM, R5, V18, I19, V17	+	+			+	+	+		2, 3, 4, 6, 8, 10
Quedius fuliginosus (Gravenhorst, 1802)	RM, I13, V13, V17		+				+	+	+	2, 8, 9, 10
Quedius fulvicollis (Stephens, 1833)	RM, V17						+	+		6, 10
Quedius fumatus (Stephens, 1833)	I16	+								4
Quedius infuscatus Erichson, 1840	I16	+								4
Quedius limbatus (Heer, 1839)	V13						+			9
Quedius lucidulus Erichson, 1839	RM							+	+	2, 10
Quedius maurus (Sahlberg, 1830)	I17		+							8
Quedius m. mesomelinus (Marsham, 1802)	RM							+		2
Quedius molochinus (Gravenhorst, 1806)	S2				+					8

Quedius nitipennis (Stephens, 1833)	V20, I9		+			+				3, 8
Quedius obscuripennis Bernhauer, 1901	RM, V1, V12						+	+		2, 6, 9, 19
Quedius ochripennis (Ménétries, 1832)	RM							+		6
Quedius ochropterus Erichson, 1840	V20, RM					+		+		2, 3, 4, 6
Quedius paradisianus (Heer, 1839)	RM, R5, I13, R4, V12, V13, V14, V17		+				+	+	+	2, 6, 8, 9, 10
Quedius plagiatus Mannerheim, 1843	RM, R5, I10		+					+	+	2, 6, 8, 10
Quedius molochinus (Gravenhorst, 1806)	S2				+					8
Quedius nitipennis (Stephens, 1833)	V20, I9		+			+				3, 8
Quedius obscuripennis Bernhauer, 1901	RM, V1, V12						+	+		2, 6, 9, 19
Quedius ochripennis (Ménétries, 1832)	RM							+		6
Quedius ochropterus Erichson, 1840	V20, RM					+		+		2, 3, 4, 6
Quedius paradisianus (Heer, 1839)	RM, R5, I13, R4, V12, V13, V14, V17		+				+	+	+	2, 6, 8, 9, 10
Quedius plagiatus Mannerheim, 1843	RM, R5, I10		+					+	+	2, 6, 8, 10
Quedius punctatellus (Heer, 1839)	RM, R2, R3, V1					+		+	+	2, 3, 4, 6, 10
Quedius scribae Ganglbauer, 1895	RM, R5							+	+	2, 6, 10
Quedius suturalis Kiesenwetter, 1845	V19						+			10
Quedius transsylvanicus Weise, 1875	I16, RM, V1	+				+		+	+	2, 4, 10, 19
Quedius umbrinus Erichson, 1839	V20, V14					+	+			3, 4, 9
Quedius xanthopus Erichson, 1839	I16	+								4
Ontholesthes haroldi (Eppelsheim, 1884)	R7, R5							+		2
Ontholesthes murinus (Linnaeus, 1785)	R7							+		2
Ontholesthes tessellates (Geoffroy, 1785)	R7							+		2
Abemus chloropterus (Panzer, 1796)	RM							+		2, 6
Platydracus fulvipes (Scopoli, 1763)	R7, V14, RM						+	+	+	2, 9, 10
Platydracus latebricola (Gravenhorst, 1806)	S2				+					8
Platydracus stercorarius (Olivier, 1795)	I4, I14, 13		+							8
Dinothenarus pubescens (De Geer, 1774)	RM, R7							+		2, 6
Staphylinus dimidiaticornis Gemminger, 1851	R4, R5, I9, V8		+				+	+		2, 8
Staphylinus erythropterus Linnaeus, 1758	R7, R4, I9, V30, I1, S2, I4, V14, V18, V16, I13		+		+		+	+		2, 3, 8, 9
Ocypus aeneocephalus (De Geer, 1774)	V20, RM					+		+		2, 4
Ocypus fulvipennis Erichson, 1840	V3					+				4
Ocypus fuscatus (Gravenhorst, 1802)	V20, RM, S2, I13		+		+	+		+	+	2, 3, 4, 8, 9
Ocypus macrocephalus (Gravenhorst, 1802)	R7, R6, V18, I13, V12, V25, RM		+				+	+	+	2, 8, 9, 10
Ocypus nitens (Schrank, 1781)	R3							+		3
Ocypus olens (Müller, 1764)	RM							+		2
Ocypus ormayi (Reitter, 1887)	RM							+		2
Ocypus picipennis (Fabricius, 1793)	I11	+								3
Tasgius winkleri (Bernhauer, 1906)	V16						+			9

IB - Iza Basin, I1 - Bârsana, I2 - Tătaru Dam, on Mara River, Ocna Şugatag, I3 - Corneşti, Coşeu Stream right bank, I4 - Deseşti, 2 km upstream Mara Village, on Runcu Rivulet, forest range Colnic, I5 - Dragomireşti, forest range Baicu, Pârâul lui Pălcuț clearing, I6 - Dragomireşti, Idişor-Baicu confluence, I7 - Dragomireşti, forest range Baicu, Țibleş Mts. at the feet, I8 - Dragomireşti forest range Baicu, Țibleş Mts., 900 m alt, gallery IV, I9 - Ieud, I10 - Izvoare Resort (Deseşti, 1 km downstream the resort), I11 - Gutâi Mts., I12 - Năneşti (Bârsana), I13 - Ocna Şugatag - Pleşca chalet, I14 - Rona de Sus, I15 - Sălişte a de Sus, near Idişor Stream, I 16 - Sighetul Marmaţiei, I17 - Valea Brazilor, 900 m, I18 - Vadu Izei, I19 - Ştedea Valley (Deseşti), I20 - Țibleş Mts.

SB - Săpânța Basin, S1 - Săpânța, forest range Nireş, 800 m, S2 - Săpânța, forest range Colibi, 880 m, S3 - Săpânța, Săpâncioara Valley, 880 m, S4 - Săpânța, Săpânța Valley.

RM - Rodna Mts., R1 - Corongiş Peak, R2 - Ineu Peak, R3 - Pietrosul Rodnei Peak, R4 - Roşu Valley, R5 - Băilor Valley, R6 - Saca Valley, R7 - Vinului Valley.

VB - Vişeu Basin, V1 - Borşa, V2 - Bistra, V3 - Bocicoiu Mare Mt., V4 - confluence Hututeanca-Pop Ivan (Crasna Vişeului), 630 m, (47°52.496'N; 24°18.495'E), V5 - Leordina (railway station), V6 - Maramureş Mts., Berdani, Tomnatecul, 600 m, V7 - Petrova, confluence Frumuşeaua-Vişeu, 380 m, V8 - Elmo Clearing, 2 km upstream locality Repedea, V9 - Pop-Ivan Mt., V10 - Poiana Smereceni, 7 km upstream locality Repedea, along Repedea Stream, V11 - Poienile de sub Munte, Coşnea Valley (close to the Coşnea chalet), V12 - Poienile de sub Munte, small village Luhei, 7 km upstream chalet Coşnea, on the Rica Stream, at the confluence of the streams Rica and Budescu Mare, in a mixed forest: beech and spruce fir bushes; altitude of about 800 m, V13 - Poienile de sub Munte, small village Luhei, 6 km upstream chalet Coşnea, on the Rica Stream, at the confluence of the streams Rica and Lutoasa; at the edge of the spruce fir forest, altitude of about 800 m, V14 - Poienile de sub Munte, small village Luhei, at 500 m upstream chalet Coşnea, on the Coşnea Stream, in a mixed forest, beech and spruce fir trees, altitude of about 800 m, V15 - Poienile de sub Munte, small village Luhei, chalet Coşnea, in an unmowed hayfield with *Hypericum perforatum*, *Dianthus* sp., *Trifolium pratense*, *T. repens*, *Campanula* sp., *Prunella vulgaris*, *Astragalus* sp., *Chrysanthemum leucanthemum;* altitude of about 800 m, V16 - Poienile de sub Munte, small village Luhei, 500 m upstream chalet Coşnea, in a humid hayfield with *Juncus* sp., *Carex* sp., *Potentilla* sp., *Eriophorum* sp., *Orchis* sp., *Epipactis* sp., *Polygonum hydropiper*, altitude of about 800 m, V17 - Poienile de sub Munte, Coşnea Valley, 780 m (47°50.914'N; 24°30.617'E), V18 - Repedea, forest range, V 19 - Şenderschi Stream (tributary of Vişeu), 490 m, 47°52.296'N; 24°12.099'E, V20 - Făina Valley, V21 - Făina, 795 m, (47°47.525'N; 24°41.724'E), V22 - Socolău Valley (Poienile de sub Munte, 5 km upstream by the confluence Rica-Socolău, 740 m, V23 - Bălăsâna Valley, 4 km upstream Baia Borşa, V24 - Vişeu de Sus, stony bank of Vaser, 4 km ENE by the confluence with Vişeu, 500 m, V25 - Hututeanca Valley (Crasna Vişeului, 11 km upstream on the Frumuşeaua), (47°52.702'N; 24°19.474'E), V26 - Pop Ivan Stream valley (Crasna Vişeului, 11 km upstream on the Frumuşeaua), 686 m, (47°52.909'N; 24°18.334'E), V27 - Rica Valley, Poienile de sub Munte, 600 m, (47°51.401'N; 24°31.627'E), V28 - Şuligu Valley (tributary of Vaser, Făina), V29 - Toroioaga Peak (Maramureş Mts.), V30 - Vişeu Valley, 360 m, (47°54.741'N; 24°08.813'E), V31 - Vaser Valley, V32 - Vaser Valley - Făina, 795 m, (47°47.361'N; 24°41.780'E).

ref - references, r - record, m - material, MGAB - "Grigore Antipa" National Museum of Natural History Bucharest.

RESULTS AND DISCUSSIONS

413 rove beetles species are known from Maramureş County up to now. These species belong to the following 13 subfamilies: Omaliinae (42), Proteininae (5), Micropeplinae (1), Phloeocharinae (1), Olisthaerinae (1), Tachyporinae (43), Aleocharinae (112), Oxytelinae (31), Oxyporinae (2), Steninae (42), Euaestethinae (1), Paederinae (25) and Staphylininae (107).

The most rove beetle species were recorded from the Rodna Mountains being in the same time the oldest data. Vişeu Basin was the best researched, we have data from 32 sites, 24 were investigated recently. 20 collecting sites were studied on the Iza Basin 16 recently.

The collecting trips made in 2003 and 2004 in the Vişeu and Iza basins allow us to achieve observations on the bionomics of different rove beetle species. The most rove beetle are hygrophilous and prefer humid habitats.

From the stony banks with sandy beaches of the following running waters: Vişeu, Vaser, Coşnea, Rica, Lutoasa, Socolău, Pop Ivan, Hututeanca, Idişor, psammophilous, ripicolous and paludicolous species were collected: *Carpelimus corticinus*, *Paederidus rubrothoracicus*, *P. ruficollis*, *Paederus limnophilus*, *Stenus incanus*, *S. comma*, *S. longipes*, *S. maculiger*, *Neobisnius prolixus*, *Philonthus caerulescens*, *P. rubripennis*.

From the beech litter a lot of humicolous, silvicolous species were collected: *Tachyporus chrysomelinus*, *T. dispar*, *T. obtusus*, *Liogluta microptera*, *Plataraea brunnea*, *Stenus clavicornis*, *Ocypus macrocephalus*, *Platydracus fulvipes*, *Quedius fuliginosus*, *Q. fulvicollis*, *Q. limbatus*, *Q. plagiatus*, *Q. paradisianus*, *Q. obscuripennis*, *Q. umbrinus*, *Staphylinus erythropterus*, *Xantholinus tricolour* and *X. linearis*.

Coprophilous, stercoricolous species were found in the pasture in cow and horse dung: *Tachinus marginellus*, *T. humeralis*, *Aleochara lanuginosa*, *A. intricata*, *A. tristis*, *Anotylus mutator*, *A. tetracarinatus*, *Oxytelus piceus*, *O. laqueatus*, *Platystethus arenarius*, *Bisnius fimetarius*, *Gyrohypnus punctulatus*, *Leptacinus batychus*, *Philonthus coprophilus*, *P. debilis*, *P. longicornis*, *P. marginatus*, *P. spinipes*, *P. splendens*, *P. varians* and *P. pseudovarians*.

Mycetophilous species were collected from the mushroom gills from beech and mixed (beech-spruce fir) forests: *Megarthrus hemipterus*, *Lordithon thoracicus*, *Atheta castanoptera*, *A. crassicornis*, *A. fungicola*, *Gyrophaena fasciata*, *G. gentilis*, *G. joyi* and *G. joyioides*.

Only a few floricolous species were found on flowers and shrubs: *Eusphalerum alpinum*, *E. minutum* and *Anthophagus angusticollis*.

Niphetodes semicarinatus, *N. schoenmanni* and *Tectusa rodnaensis* are endemic species from the Rodna Mountains, *Pareudectus eppelsheimi* (Ganglbauer) and *Hypsonothrus deubeli* (Ganglbauer) are alpine species endemic from the Carpathians (from Cernahora Mountains to Făgăraş Mountains) with discontinuous areal. *Quedius transsilvanicus* Weise, *Leptusa carpathica* (Weise) and *Leptusa eximia* Kraatz are endemic from the Carpathians.

CONCLUSIONS

The rove beetle fauna of the Maramureş County is relatively well known comparatively with other areas of Romania. New researches in Maramureş to complete the faunistical list with others species and new collecting sites are necessary. The high ecological plasticity of the group and the relief and climate variety made us to consider that the number of rove beetle species is much higher.

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SPECIES DIVERSITY OF THE BEETLE FAUNA, A SENSITIVE PARAMETER FOR ECOLOGICAL MONITORING. MARAMUREŞ MOUNTAINS NATURE PARK (ROMANIA)

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KEYWORDS: Romania, Maramureş, Maramureş Mountains Nature Park, Coleoptera, species diversity.

ABSTRACT

In the periods of 11-20 June and 11-20 August, 2007 we carried out quantitative and qualitative faunal samplings in all the habitat types existent in the Maramureş Mountains Nature Park: caves, alpine meadows or meadows from high altitude mountain areas, peat-bogs, springs and peri glacial lakes, bushes with *Juniperus* and *Pinus mugo* and sub alpine pastures, beech forests and spruce forest, mountain pastures.

157 species of Coleoptera belonging to 26 families were identified.

Among the protected species by Habitat Directive, Annex II we identified *Carabus variolosus, Lucanus cervus, Rosalia alpina (*exoskeleton fragments*)*. Other two protected species, formerly recorded in the Maramureş Mountains Nature Park: *Pseudogaurotina excellens* and *Carabus zawadszkyi* were not observed by us but their presence in the area is still possible. Among the xylobionte species we mention the *Sinodendron cylindricum* Linnaeus, 1758, (Fam. Lucanidae), the very rare sapro-xylophagous species *Melandrya dubia* Schall. - bioindicators for very old deciduous forests and the xylophagous species *Buprestis rustica* (Buprestidae), a rare species characteristic for old coniferous forests.

The quantitative sampling data were used to compute the informational diversity index Shannon (H') and the evenness index (E) for each type of habitat investigated with quantitative methods. They varied from H' = 0.286 (E = 0.34) in Coman - Vaser riparian microhabitats to H' = 1.12 (E = 0.86) in the litter of beech forest of Tocarnia. Their significance correlated with species number is further discussed.

Among the characteristic species, indicated for the monitoring are the big predacious ground beetle species (taking into consideration their top position in the trophic net of the edaphic ecosystems): *Carabus coriaceus, Carabus obsoletus, Carabus violaceus* and *Carabus cancellatus* - for the soil habitat in deciduous forests; *Carabus variolosus, Carabus violaceus, Carabus arcensis*, *Carabus auronitens escherii* - for the mixed forests and spruce forests.

ZUSAMMENFASSUNG: Artendiversität der Käferfauna - ein sensibler Parameter für ökologisches Monitoring. Naturpark Maramurescher Gebirge (Maramuresch, Rumänien).

In der Zeispanne vom 11-20 Juni und dem 11-20 August wurden alle Habitattypen des Naturparks Maramuresch Gebirge quantitativ und qualitativ untersucht: Höhlen, alpine Matten, montane Wiesen, Moore, Quellen und periglaziale Seen, Latschengebüsche, montane und subalpine Weiden, Buchen- und Fichtenwälder. Dabei wurden 157 Käferarten zugehörig zu 26 Familien festgestellt. Von den im Anhang II der Habitatrichtlinie als geschützt aufgeführten wurden *Carabus variolosus, Lucanus cervus* und *Rosalia alpina* (Chitinreste) festgestellt. Andere zwei Arten *Pseudogaurotina excellens* und *Carabus zawadszkyi*, die für die Maramuresch Berge angegeben wurden, konnten nicht wiedergefunden werden, ihr Vorkommen im Naturpark ist jedoch gegenwärtig nicht auszuschließen.

Von den xylobionten Arten sind zu erwähnen *Sinodendron cylindricum* Linnaeus, 1758, (Fam. Lucanidae), die sehr seltene sapro-xylophage Art *Melandrya dubia* Schall. - Bioindikatoren für Buchen-Urwälder und die xylophage Art *Buprestis rustica* (Buprestidae), eine seltene, für alte Fichtenwälder charakteristische Art.

Der Diversitätsindex Shannon (H'), der parallel mit dem der Gleichmäßigkeit (E) berechnet wurde, ergaben Werte von H' = 0,286 (E = 0,34) in den Ufer Mikrohabitaten des Gebietes Coman - Vaser/Wasser, bis zu H' = 1,12 (E = 0,86) im Saum der Buchenwälder im Tocarnia Gebiet. Ihr Wert und ihre Bedeutung unter Berücksichtigung der Artenzahlen, werden analysiert.

Zu den charakteristischen Arten, die für das ökologische Monitoring benannt sind, gehören die großen Carabidenarten (berücksichtigt man ihre Stellung als Räuber im edaphischen Nahrungsnetz): *Carabus coriaceus, Carabus obsoletus, Carabus violaceus, Carabus cancellatus* - für das Habitat der Laubwälder; *Carabus variolosus, Carabus violaceus, Carabus arcensis*, *Carabus auronitens escheri* - für Misch- und Fichtenwälder.

REZUMAT: Diversitatea specifică a faunei de coleoptere, un parametru sensibil în monitoringul ecologic. Parcul Natural Munţii Maramureşului (Maramureş, România).

În perioadele 11-20 iunie şi 11-20 august, au fost investigate calitativ şi cantitativ toate tipurile de habitate existente în Parcul Natural Munţii Maramureşului: peşteri, pajişti alpine, pajişti montane, turbării, izvoare şi lacuri periglaciare, jnepenişuri, păşuni subalpine şi montane, păduri de fag şi molid. Au fost identificate 157 specii de coleoptere, aparţinând la 26 de familii. Dintre speciile protejate prin Directiva Habitate, Anexa II, au fost semnalate *Carabus variolosus, Lucanus cervus, Rosalia alpina* (fragmente exoscheletice). Alte două specii citate anterior ca prezente în Munţii Maramureşului: *Pseudogaurotina excellens* şi *Carabus zawadszkyi* nu au fost regăsite, dar prezenţa lor în parc nu este exclusă actualmente.

Dintre speciile xylobionte menţionăm *Sinodendron cylindricum* Linnaeus, 1758 (Fam. Lucanidae), specia sapro-xylofagă foarte rară *Melandrya dubia* Schall. - bioindicatori pentru păduri bătrâne (virgine) de foioase şi specia xilofagă *Buprestis rustica* (Buprestidae), o specie rară caracteristică pentru păduri bătrâne de conifere.

Indicele de diversitate Shannon (H'), calculat în paralel cu cel de uniformitate (E) au prezentat valori de la H' = 0.286 (E = 0.34) în microhabitatele ripariene din zona Coman - Vaser până la H' = 1.12 (E = 0.86) în liziera pădurilor de fag din zona Tocarnia. Valorile şi semnificaţia acestora, ţinând cont de numărul de specii, sunt analizate în lucrare.

Dintre speciile caracteristice, indicate pentru monitoringul ecologic, sunt speciile mari de carabide (luând în considerare poziţia lor de prădători în reţeaua trofică edafică): *Carabus coriaceus, Carabus obsoletus, Carabus violaceus, Carabus cancellatus* - pentru habitatul edafic din păduri de foioase; *Carabus variolosus, Carabus violaceus, Carabus arcensis*, *Carabus auronitens escherii* - pentru păduri mixte şi de conifere.

INTRODUCTION

The papers treating the beetles fauna of the Maramureş Mountains are old, obsolete or fragmentary (with reference only to a particular genera, tribes or families), Kuthy (1896), Ieniştea (1968, 1970, 1973, 1974, 1975 a, b; 1979), Stan (2002). Our preliminary studies, due to the very short time - 20 days in June and August, will be able to give a prime overview on the beetles fauna in this area with references on most important ecological associations - soil fauna in riparian-sylvan, sylvan (including xylophilic, and phytofilic coenoses), aquatic habitats, for all Coleoptera families observed in the area in a specific period of time.

In the year 2007 only two periods of faunal investigation were selected in June and August when most of beetle species are present in the imago activity stage. Despite of the very short time of investigation that we have at our disposal, this was rigorously partitioned to allow some quantitative sampling beside the qualitative ones. During the investigations we took into consideration the verifying and renewing of the old faunal list especially the data concerning the species included in the Habitat Directive, annex II-III *(Cucujus cinaberinus, Lucanus cervus, Rosalia alpina, Pseudogaurotina excelens, Carabus variolosus, Carabus zawadszkyi).*

MATERIAL AND METHODS

Two investigating campaigns were carried out with the purpose to inventory the species diversity of the coleopterans in the Maramureş Mountains Nature Park: during the period 11-20 June - one campaign in the northeastern part of the Maramureş Mountains; during the period 11-20 August - one campaign in the east-south - eastern part of the park. The sampling was adapted to the time available and to the goals, covering: alpine meadows or meadows from high altitude, peat-bogs, springs and peri glacial lakes, bushes with *Juniperus* and *Pinus mugo* and sub alpine pastures, beech forests and spruce forest, mountain pastures.

The qualitative sampling (with tweezers and exhauster) was completed with quantitative sampling using Winkler method and also placing 60 sampling units (Barber traps) on the established transects. The quantitative sampling using Barber traps was carried out placing five sampling units (S. U.) (Barber traps) for each 25 square meters sampling area (probe area or sampling area). For each Barber trap a specific attractant was used. As conservant in situ we used the ethylene-glycol. The samples were picked up every four days, fixed with methyl and ethylic alcohol, labeled, transferred in tight recipients and transported in this condition to be sorted and identified in laboratory. Most of the sampled areas were documented with pictures.

The quantitative sampling data were used to compute the informational diversity index Shannon (H') and the evenness index (E) for each type of habitat investigated with quantitative methods. It is worth noticing that the values of the diversity indexes are estimative and the values of the diversity indexes from the first sampling campaign can not be compared with the values of the indexes from the second campaign for ecological interpretations and the obtained values of abundances and species number should not be used together in a same cluster analysis or correspondence analysis. For a suitable comparison between all investigated habitats (from northern and southern parts of the park) the sampling campaigns should carried out in the same period of the year (season) (bi annual investigations) both in the northeastern and southeast parts. Thus, during the period of the first campaign (11-20 of June) the most soil species were caught in full period of the activity as imago (adult) stage (the only development stage that allows us to identify species). In the second campaign (11-20 of August) the majority of species were in nymposis stage (an inactive stage impossible to be captured with Barber traps, or in larval stage unsuitable for identification at the species level).

During the faunal investigations carried out in the year 2007, 157 species of Coleoptera were identified. They are presented in the table 1 (genera and species in alphabetic order for families).

Table 1: Species of Coleopterans collected and identified (11-20.VI.2007 and 11-20.VIII) in the Maramureş Mountains Nature Park.

	Taxa	Romanian site's name
	Fam. Carabidae	
1.	*Abax parallelepipedus* (Piller et Mitterpacher, 1783)	Tocarnia Peak, Tocarnia. Beech forest, litter. 11. VI. 2007, under Certina-lizirera, meadow (47° 51' 44", N, 24° 22' 04" E, 1075 m), 13. VI. (riparian, meadow)
2.	*Abax parallelus* Duftschmid, 1812	Tocarnia meadow, litter 11. VI. 2007
3.	*Abax (Abacopercus) schuppeli* Palliardi, 1825	Tocarnia, beech forest, outskirts 11. VI. 2007
4.	*Agonum sexpunctatum* (Linnaeus, 1758)	18. VI. Căldarea Bardău 47° 49' 47" N, 24° 36' 26" E, 1618 m-Bucovinca 47° 50'06" N, 24°35'53" E, 1609 m; Sîlhoi-riparian 11. VIII. 2007; V. Vaserului-Coman, 13 - 14. VIII. 2007; Comanul Mic-Ştevioara, 16. VIII. 2007; Măcârlău-Făina, 19. VIII. 2007
5.	*Agonum viduum* (Panzer, 1797)	Tăul Roşu, 18. VI. 2007; V. Vaserului-Coman, 13 - 14. VIII. 2007; Măcârlău-Poiana Miraj, 18. VIII. 2007
6.	*Amara aenea* (Degeer, 1774)	Toroioaga Mare Peak, 18. VIII. 2007
7.	*Amara (Bradytus) consularis* (Duftschmid, 1812)	V. Vaserului-Coman, 13 - 14. VIII. 2007; Măcârlău-Făina, 19. VIII. 2007
8.	*Amara famelica* Zimmerman, 1832	Tinovul Băiţei - Muncelaşu, 16. VI. 2007
9.	*Amara familiaris* (Duftschmid, 1812)	Tinovul Băiţei - Muncelaşu, 16. VI. 2007
10.	*Amara (Zezea) fulvipes* Serville, 1821	Park limit Tocarnia, lawn, 11. VI. 2007
11.	*Amara montivaga* Sturm, 1825	under Certina (47°51'44" N, 24°22'04" E, 1075 m), 13. VI. 2007
12.	*Anysodactilus binotatus* (Fabricius, 1787)	Tinovul Băiţei - Muncelaşu, 16. VI. 2007; Măcârlău - Făina, 19. VIII. 2007; Piatra Arsă, 17. VIII. 2007
13.	*Bembidion (Testedium) bipunctatum* (Linnaeus, 1761)	Căldarea Bardău 47°49'47" N, 24°36'26" E, 1618 m-Bucovinca 47°50'06" N, 24°35'53" E, 1609 m
14.	*Bembidion (Peryphanes) dalmatinum* Dejean, 1831	Bistra Valley, 12. VI. 2007; Pietrosul Bardău-Bucovinca, 18. VI. 2007
15.	*Bembidion (Sinechostictus) doderoi* Ganglbauer, 1891	Piatra Arsă, 17. VIII. 2007
16.	*Bembidion (Bembidionetolitzkya) geniculatum* Heer, 1837	Tocarnia, ripicul-sylvicultural habitat in beech forest, 11. VI. 2007; Căldarea Bardău 47°49'47" N, 24°36'26" E, 1618 m-Bucovinca 47°50' 06" N, 24°35'53" E, 1609 m; Valea Şesuri 47°36´17.1" N, 24°57´31.8" E; Ripic at the Stâncăriile de la Sîlhoi, 11. VIII. 2007; Izvorul lui Bozoancă-Tîslişoara (ripiculo-silvic), 12. VIII. 2007; V. Vaserului-Coman, 13 - 14. VIII. 2007; Măcîrlău-Jnepănul Hânchii, 15. VIII. 2007
17.	*Bembidion (Metallina) lampros* (Herbst, 1784)	Bardau-Bucovinca, 18. VI. 2007
18.	*Bembidion (Bembidionetolitzkya) tibiale* (Duftschmid, 1812)	Bardău-Bucovinca, 18. VI. 2007; Şesuri Valley 47°36´17.1" N, 24°57´31.8" E; V. Vaserului-Coman, 13 - 14. VIII. 2007; Vaser-Coman, 14. VIII. 2007
19.	*Calathus fuscipes* (Goeze, 1777)	Măcârlău-Făina, 19. VIII. 2007
20.	*Calathus metallicus* Dejean, 1828	Poloninca, 12. VI. 2007; Grohot (47°51'10" N, 24°34'12" E, 968 m) 18. VI. 2007; Fîntâna Stanchii, 13. VIII. 2007; Comanul Mic-Ştevioara, 16. VIII. 2007

	Taxa	Romanian site's name
21.	*Calathus melanocephalus* (Linnaeus, 1758)	Fîntâna Stanchii, 13. VIII. 2007
22.	*Calathus micropterus* (Duftschmid, 1812)	Toroioaga Mare Peak, 18. VIII. 2007
23.	*Carabus* sp. larva	Spruce forest - Coman, 13 - 16. VIII. 2007
24.	*Carabus arcensis carpathus* Born, 1902 (= arvensis Herbst, 1784)*, *Arvensis in Fauna Romaniei, Panin, 1955	Piciorul Poloninca, 12. VI. 2007; under Ceritna Glade, 13. VI. 2007, Tinovul Băiţei-Muncelul, 16. VI. 2007; Coşnea, 19. VI. 2007
25.	*Carabus auronitens escherii* Palliardi, 1825	Bistrei Valley, 12. VI. 2007, Şaua Poloninca, 12. VI. 2007, Tinovul Băiţei-Muncelul, 16. VI. 2007; Grohot (47^{0}51'10" N, 24^{0}34'12" E, 968 m) 18. VI. 2007; Vaser-Coman, 14. VIII. 2007
26.	*Carabus cancellatus* Illiger, 728	Tocarnia, clearing, 11. VI. 2007; under Certina clearing, 13. VI. 2007; V. Vaserului-Coman, 13 - 14. VIII. 2007; Măcârlău-Poiana Miraj, 18. VIII. 2007
27.	*Carabus coriaceus* Linnaeus, 1758	Coşnea, 19. VI. 2007
28.	*Carabus irregularis* Fabricius, 1792	Poloninca, 12. VI. 2007
29.	*Carabus linnei* Panzer, 1812	under Certina (47^{o}51'44" N, 24^{o}22'04" E, 1075 m), 13. VI.; Pietrosul Bardău, 18. VI. 2007; Coşnea 19. VI. 2008
30.	*Carabus obsoletus* Sturm, 1815	Coşnea, 19. VI. 2007
31.	*Carabus variolosus* Fabricius, 1787	Tocarnia, riparian sylvan habitat. In beech forest, 11. VI. 2007, Preluca lui Glodeanu, 12. VI. 2007, under Certina (47 ^{0}51'44" N, 24^{0}22'04" E, 1075 m), 13. VI, Vaser-Coman, 14. VIII. 2007 (exoscheleton).
32.	*Carabus violaceus* Linnaeus, 1758	Tocarnia, riparian - sylvan habitat, 13. VI. 2006, Smereca, 15. VI. 2007; Piatra Arsă, 17. VIII. 2007; Toroioaga Mare Peak, 18. VIII. 2007
33.	*Cicindella silvicola* Dejean, 1822	Bistrei Valley, forestry road, 12. VI. 2007
34.	*Ciccindela (Cylindera) campestris* Linnaeus, 1758	Sehleanu Glade, 13. VI. 2007, Smereca, 15. VI. 2007
35.	*Cychrus caraboides* Linne, 1758	Tocarnia, beech forest, litter, 11. VI. 2007, forest outskirt' clearing, 11 - 13. VI.; Coşnea - 19. VI. 2007; Vaser-Coman, 14. VIII. 2007 (exoscheleton)
36.	*Elaphrus cupreus* Duftschmid, 1812	Căldarea Bardău 47^{0}49'47" N, 24^{0}36'26" E, 1618 m - Bucovinca 47^{0}50'06" N, 24^{0}35'53" E, 1609 m; Tăul Roşu. Coord.: 47^{0}50'04.4" N, 24^{0}36'54.1" E, 1580 m: 58% relative humidity, 25.5 ^{O}C, watter pH 5-5.5
37.	*Harpalus progrediens* Schauberger, 1922	Valea Şesuri - forest 47°36´17.1" N, 24°57´31.8" E
38.	*Leistus piceus* Frölich, 1799 (ripiculosilvic)	Tocarnia, riparian sylvan, 11. VI. 2007; V. Vaserului-Coman, 13 - 14. VIII. 2007
39.	*Limnodromus assimilis* (Paykull, 1790)	Tocarnia, riparian sylvan, 11. VI. 2007, Bistrei Valley, 12. VI. 2007, Tinovul Tăul Băiţei-Muncelaşu, 16.VI.2007; Vaser-Coman, 14.VIII.2007
40.	*Molops piceus* (Panzer, 1793)	Tocarnia, riparian sylvan, 11. VI. 2007, Socalau-Ulohe -47^{0}52'28" N, 24^{0}30'03" E, 932 m. alt.
41.	*Nebria brevicollis* (Fabriucius, 1792)	Tocarnia ripan sylvan, 11. VI. 2007
42.	*Nebria gyllenhali* Schönherr, 1806	Şesuri Valley 47°36´17.1" N, 24°57´31.8" E
43.	*Nebria jockischi* Sturm, 1815	Riparian on "Stâncăriile de la Sîlhoi" 11. VIII. 2007

	Taxa	Romanian site's name
44.	*Nebria rufescens* (= gyllenhali) Stroem, 1768	Preluca Ulohe; 47^{0}52'28" N, 24^{0}30'03" E, 932 m. alt, - meadow, spring in forest (850 m alt.); Grohot (47^{0}51'10" N, 24^{0}34'12" E, 968 m) 18. VI. 2007
45.	*Nebria transsylvanica* Germar, 1824	Fîntâna Stanchii, 13. VIII. 2007
46.	*Notiophilus biguttatus* (Fabricius, 1779)	Şaua Poloninca, 12. VI. 2007, Tinovul Tăul Băiţei-Muncelaşu, 16. VI. 2007; Grohot (47^{0}51'10" N, 24^{0}34'12" E, 968 m) 18. VI. 2007; Valea Şesuri 47°36´17.1"N, 24°57´31.8" E; Stâncăriile de la Sîlhoi, 11. VIII. 2007; Măcârlău-Poiana Miraj, 18. VIII. 2007
47.	*Paranchus albipes* (Fabricius, 1796)	Tocarnia, ripiculo-sylvic habitat in beech forest, 11. VI. 2007
48.	*Poecilus sericeus* Fischer de Waldheim, 1823	Piciorul Poloninca, 12. VI. 2007
49.	*Poecilus szepligetii* Csiki, 1908	V. Vaserului-Coman, 13 - 14. VIII. 2007
50.	*Poecilus versicolor* (Surm, 1824) (*coerulescens* auct. non L.)	Măcârlău-Făina, 19. VIII. 2007
51.	*Pseudophonus griseus* (Panzer, 1797)	Măcârlău-Făina, 19. VIII. 2007
52.	*Pseudophonus rufipes* (De Geer, 1774)	Tinovul Tăul Băiţei-Muncelaşu, 16. VI. 2007; Comanul Mic-Ştevioara, 16. VIII. 2007; Măcârlău-Făina, 19. VIII. 2007
53.	*Pterostichus (Steropus) cordatus* Letzner, 1847	Jneapănul Hânchii, 15. VIII. 2007
54.	*Pterostichus (Pseudosteropus) elongatus* (Duftschmid, 1812)	Riparian at "Stâncăriile de la Sîlhoi" 11. VIII. 2007; Şesuri Valley 47°36´17.1" N, 24°57´31.8" E
55.	*Pterostichus (Petrophilus) foveolatus* (Duftschmid, 1812)	Sub certina- poiana, 13. VI. 2007; Grohot (47^{0}51'10" N, 24^{0}34'12" E, 968 m) 18. VI. 2007; Şesuri Valley 47°36´17.1" N, 24°57´31.8" E; Riparian at "Stâncăriile de la Sîlhoi", 11. VIII. 2007; Coman., spruce forest, 13 - 16. VIII. 2007
56.	*Pterostichus jurinei* (Panzer, 1805)	Tinovul Tăul Băiţei-Muncelaşu, 16. VI. 2007; Grohot (47^{0}51'10" N, 24^{0}34'12" E, 968 m) 18. VI. 2007; Fîntâna Stanchii, 13. VIII. 2007; Valea Şesuri 47°36´17.1" N, 24°57´31.8" E; V. Vaserului-Coman, 13-14. VIII. 2007; Comanul Mic-Ştevioara, 16. VIII. 2007; Piatra Arsă, 17. VIII. 2007
57.	*Pterostichus (Omaseus) melanarius* (Illiger, 1798)	Tocarnia, beech forest. 11. VI. 2007
58.	*Pterostichus (Bothriopterus) oblongopunctatus* (Fabricius, 1787)	Tocarnia, beech forest. 11. VI. 2007; Şesuri Valley 47°36´17.1" N, 24°57´31.8" E; V. Vaserului-Coman, 13 - 14. VIII. 2007
59.	*Pterostichus (Platysma) niger* (Schaller, 1783)	Şesuri Valley 47°36´17.1" N, 24°57´31.8" E; V. Vaserului-Coman, 13-14. VIII. 2007; Comanul Mic-Ştevioara, 16. VIII. 2007
60.	*Pterostichus (Pseudomaseus) nigrita* (Paykull, 1790)	V. Vaserului-Coman, 13 - 14. VIII. 2007; Măcârlău-Făina, 19. VIII. 2007
61.	*Pterostichus (Phonias) ovoideus* (Sturm, 1824)	Tocarnia, outskirt, 11. VI. 2007
62.	*Pterostichus (Calopterus) pilosus* (Host, 1789)	Tocarnia, beech forest. 11. VI. 2007, under Certina (47^{0}51'44" N, 24^{0}22'04" E, 1075 m), 13. VI. (outskirt, glade); Grohot (47^{0}51'10" N, 24^{0}34'12" E, 968 m) 18. VI. 2007; V. Vaserului-Coman, 13 - 14. VIII. 2007
63.	*Pterostichus (Steropus) rufitarsis* (Dejean)	Tocarnia, beech forest. 11. VI. 2007, Smereca Glade - Ulohe (47^{0}51' 32" N, 24^{0}30'10" E, 765 m), Tinovul Tăul Băiţei-Muncelaşu, 16. VI. 2007¸ Şesuri Valley 47°36´17.1" N, 24°57´31.8" E; V. Vaserului-Coman, 13 - 14. VIII. 2007; Comanul Mic-Ştevioara, 16. VIII. 2007
64.	*Pterostichus (Argutor) strenuus* (Panzer, 1797)	Vaser-Coman, ripic alder trees, 13 - 16. VIII. 2007; Vaser-Coman, ripic alder trees, 13 - 16. VIII. 2007

	Taxa	Romanian site's name
65.	*Pterostichus (Haptoderus) unctulatus* (Duftschmid, 1812)	Tăul Băiței-Muncelaşu; Grohot (47^{0}51'10" N, 24^{0}34'12" E, 968 m) 18. VI. 2007; Fîntâna Stanchii, 13. VIII. 2007; Şesuri Valley 47°36´17.1" N, 24°57´31.8" E; Țîslişoara Valley, 12. VIII. 2007; Piatra Arsă, 17. VIII. 2007; Toroioaga Mare Peak, 18. VIII. 2007
66.	*Trechus latus* Putzeys, 1847	Ulohe-Socălău forest, 15. VI. 2007 - 47^{0}52'28" N, 24^{0}30'03" E, 932 m. alt, Tinovul Tăul Băiței-Muncelaşu, 16. VI. 2007, 16. VI. 2007; Fîntâna Stanchii, 13. VIII. 2007; Stâncăriile Sîlhoi, 11. VIII. 2007; Măcârlău-Poiana Miraj, 18. VIII. 2007.
67.	*Trechus striatulus* Putzeys, 1847	Coman., Pădure molid, 13 - 16. VIII. 2007; Țîşlişoara Valley, 12. VIII. 2007
	Fam. Dytiscidae	
68.	*Acilius sulcatus* (Linnaeus, 1758)	Preluca Broştenilor, 15. VIII. 2007 (aquatic)
69.	*Agabus bipustulatus* Linneus, 1767	Tinovul Tăul Băiței-Muncelaşu, 16. VI. 2007
70.	*Agabus (Dichonectes) guttatus* (Paykull, 1798	Aquatic at Stâncăriile Sîlhoi 11. VIII. 2007; Sîlhoi Rivulet, 11. VIII. 2007
	Fam. Staphylinidae	
71.	*Aleochara (Xenochara) puberula* Klug, 1833	Piatra Arsă, 17. VIII. 2007
72.	*Anotylus sculpturatus* Gravenhorst	Tocarnia, beech forest, litter, 11. VI. 2007
73.	*Astilbus (Drusilla) canaliculata* (Fabricius)	Tocarnia litter, meadow, 11. VI. 2007, under Certina - meadow (47^{0}51'44" N, 24^{0}22'04" E, 1075 m), Tocarnia 13. VI.
74.	*Atheta* sp.	Tocarnia beech forest, litter, 11. VI. 2007, under Certina, Fîntâna Stanchii, 13. VIII. 2007; Vaser-Coman, riverine alder trees, 13 - 16. VIII. 2007; Coman, spruce forest, 13 - 16. VIII. 2007; Piatra Arsă, 17. VIII. 2007
75.	*Autalia longicornis* Scheerp.	Tocarnia beech forest, 11. VI. 2007
76.	*Bolitobius pulchellus* Mannerheim	Piatra Arsă, 17. VIII. 2007
77.	*Chilopora rubicunda* (Er.)	Vaser-Coman, riparian, 13 - 16. VIII. 2007
78.	*Gabrius femoralis* (Hochh)	Tocarnia, beech forest, 11. VI. 2007, under Certina (47 ^{0}51'44" N, 24^{0}22'04" E, 1075 m), 13. VI.
79.	*Geodromicus plagiatus* (Fabricius)	Valea Şesuri - ripic, 47°36´17.1" N, 24°57´31.8" E
80.	*Megarthrus nitidulus* Kr.	Tocarnia, beech forest, 11. VI. 2007
81.	*Micetophorus corpulentus* Luze	under Certina (47 ^{0}51'44" N, 24^{0}22'04" E, 1075 m), 13. VI.
82.	*Ocypus (Goerius) macrocephalus* Grav.	Măcârlău-Făina, 19. VIII. 2007
83.	*Ocypus olens* (Müller)	Tocarnia riparian sylvan habitat in beech forest, 11. VI. 2007
84.	*Omalium validum* Kr.	Tocarnia riparian sylvan in beech forest, 11. VI. 2007
85.	*Oxytelops tetracarinatus* (Block)	Tocarnia, beech forest, skirt 11 .VI. 2007
86.	*Paederus litoralis* Grav.	Vişeu's bank 11. VI. 2007, under Certina (47 ^{0}51'44" N, 24^{0}22'04" E, 1075 m), 13. VI. 2007

	Taxa	Romanian site's name
87.	*Philonthus decorus* Grav.	Tocarnia, beech forest, 11. VI. 2007, under Certina (47^{0}51'44" N, 24^{0}22'04" E, 1075 m), 13. VI. 2007
88.	*Quedius (Microsaurus) brevicornis* Thom.	Tocarnia, beech forest, 11. VI. 2007
89.	*Quedius (Raphirus) dubius* (Heer)	Under Certina, meadow, 13. VI. 2007, under Certina - meadow (47 ^{0}51'44" N, 24^{0}22'04" E, 1075 m), 13. VI. 2007
90.	*Quedius (Quedionuchus) cinctus* Payk.	Vaser-Coman, 14. VIII. 2007
91.	*Quedius (Raphirus) fumatus* Steph.	Fîntâna Stanchii, 13. VIII. 2007
92.	*Quedius (Microsaurus) maurus* (Sahlb.)	Piatra Arsă, 17. VIII. 2007
93.	*Quedius (Microsaurus) mesomelinus* Marsham, 1802	Vaser-Coman, riverine alder trees, 13 - 16. VIII. 2007; Măcârlău-Făina, 19. VIII. 2007
94.	*Quedius* (s. str.) *meridiocarpathicus* Smethana	Vaser-Coman, riparian, 13 - 16. VIII. 2007
95.	*Quedius umbrinus* Er.	Tocarnia litter 13. VI. 2007
96.	*Proteinus brachypterus* Fabr.	Coman., spruce forest, 13 - 16. VIII. 2007;
97.	*Stenus fossulatus* Er.	Bistra Valley, 12. VI. 2007
98.	*Tachinus pallipes* Gravenhorst, 1806	Aquatic at Stâncăriile Sîlhoi 11. VIII. 2007
99.	Subfam. Pselaphinae *Trimium carpathicum* Saulcy	Tocarnia litter of beech forest, 13. VI. 2007
100.	Staphylinidae, Xannolynini *Xyantolynus distans* Muls. Rey	Vaser-Coman, riparian, 13 - 16. VIII. 2007
	Fam. Leiodidae	
101.	*Apocatops nigrita* Erichson, 1837	Coman, spruce forest, 13 - 16. VIII. 2007
102.	*Catops picipes* (Fabricius)	Tocarnia, spruce forest, 11. VI. 2007
103.	*Catops tristis* (Panzer, 1794)	Coman, spruce forest, 13 - 16. VIII. 2007
104.	*Ptomaphagus sericatus* Chaudoir	Tocarnia litter, 11. VI. 2007
105.	*Sciodrepoides watsoni* Spencer	Tocarnia, beech forest, 11. VI. 2007
	Fam. Silphidae	
106.	*Necrophorus vespiloides* Herbst.	V. Vaserului-Coman, 13 - 14. VIII. 2007; Preluca Broştenilor, 15. VIII. 2007
107.	*Silpha carinata* Herbst.	Tocarnia, meadow, 11. VI. 2007, Claia Peak, 12. VI. 2007, under Certina - meadow (47^{0}51'44" N, 24^{0}22'04" E, 1075 m), 13. VI.; Grohot (47^{0}51'10" N, 24^{0}34'12" E, 968 m) 18. VI. 2007; Coşnea, 19. VI. 2007
	Fam. Elateridae	
108.	*Ctenicera cuprea* (Fabricius, 1775)	Poloninca, Şerban (subalpine-alpine), 12. VI. 2007; Tăul Băiţei, 16. VI. 2007; Grohot (47^{0}51'10" N, 24^{0}34'12" E, 968 m) 18. VI. 2007
	Fam. Buprestidae	
109.	*Buprestis rustica* Linnaeus, 1758	Măcârlău-Făina, 19. VIII. 2007
	Fam. Lycidae	
110.	*Lygistopterus sanguineus* (Linnaeus, 1758)	Bistra Valley, 12. VI. 2007, Smereca (Poiana) - 47^{0}51'32" N, 24^{0}30'10" E, 765 m, 15. VI. 2007

	Taxa	Romanian site's name
	Fam. Lampyridae	
111.	*Phosphaenus hemipterus* Geoffr.	Tocarnia litter of beech forest, 11. VI. 2007
	Fam. Mycetophagidae	
112.	*Typhaea stercorea* (Linnaeus, 1758)	Tocarnia litter 13. VI. 2007
	Fam. Cleridae	
113.	*Trichodes apiarius* Linnaeus, 1758	Smereca (Poiana) - 47^{0}51'32" N, 24^{0}30'10" E, 765 m, 15. VI. 2007
	Fam. Nitidulidae	
114.	*Cychramnus luteus* (Fabricius)	Tocarnia litter, 13. VI. 2007, Bistra Valley, 12. VI. 2007
	Fam. Geotrupidae	
115.	*Anoplotrupes stercorosus* Scriba, 1791	Tocarnia Peak, beech forest, litter, 11.VI.2007, under Certina (47^{0}51'44" N, 24^{0}22'04" E, 1075 m), 13.VI., litter, lawn; Tinovul Băiţei-Muncelaşu, 16. I.007; Grohot (47^{0}51'10" N, 24^{0}34'12" E, 968 m) 18.VI.2007; Coşnea, 19. I.2007; Fîntâna Stanchii, 13.VIII.2007; Coman., spruce forest, 13-16.VIII. 007; Comanul Mic-Ştevioara, 16.VIII.2007; Vaser-Coman, 14.VIII.2007
	Fam. Scarabeidae	
116.	Aphodiinae *Agolius (=Aphodius) abdominalis* Bonelli, 1812 *(=Aphodius mixtus* Villa. 1833)	Poloninca, 12. VI. 2007
117.	*Acrossus (=Aphodius) depressus* Kugelan, 1792	Piciorul Poloninca, 12. VI. 2007; Grohot (47^{0}51'10" N, 24^{0}34'12" E, 968 m) 18. VI. 2007; Bardău-Bucovinca, 18. VI. 2007
118.	*Phyllopertha horticola* Linnaeus, 1758	Tocarnia, lawn, 14. VI. 2007, Poiana Zătismena 12. VI. 2007, Bistra Valley, Poiana Sehleanu, 13. VI. 2007; Grohot 18. VI. 2007
119.	*Trichius fasciatus* Linnaeus, 1758	Lawn, 13. VI. 2007, Măcârlău-Făina, 19. VIII. 2007
	Fam. Valginae	
120.	*Valgus hemipterus* Linnaeus, 1758	Smereca (Poiana - 47^{0}51'32" N, 24^{0}30'10" E, 765 m, 15. VI. 2007)
	Fam. Cetoniidae	
121.	*Cetonia aurata* Linnaeus, 1761	Poiana Sehleanu, 13. VI. 2007, Smereca (Poiana - 47^{0}51'32" N, 24^{0}30'10" E, 765 m
122.	*Protetia (=Potosia) cuprea* Fabricius, 1775	Smereca (Poiana-47^{0}51'32" N, 24^{0}30'10" E, 765 m, 15. VI. 2007)
123.	*Epicometis hirta* Poda, 1761	Smereca (Poiana-47^{0}51'32" N, 24^{0}30'10" E, 765 m, 15. VI. 2007)
	Fam. Lucanidae	
124.	*Dorcus parallelepipedus* Linnaeus, 1758	Repedea, 13. VI. 2007
125.	*Lucanus cervus* Linnaeus, 1758	Repedea, 13. VI. 2007
126.	*Sinodendron cylindricum* Linnaeus, 1758	Piciorul poloninca on beech, 12. VI. 2007
	Fam. Hydrophilidae	
127.	*Helophorus flavipes* Fabricius, 1792 (= *viridicollis* Steph.) Steph.	Tinovul Băiţei-Muncelaşu, 16. VI. 2007; Căldarea Bardău 47^{0}49'47" N, 24^{0}36'26" E, 1618 m - Bucovinca 47^{0}50'06" N, 24^{0}35'53" E, 1609 m; Tăul Roşu Coord: 47^{0}50'04.4" N, 24^{0}36'54.1" E, 1580 m; phisico-chemical parameters: 58% U. R., 25.5 ^{o}C, water pH 5-5.5.

	Taxa	Romanian site's name
128.	*Helophorus nivalis* Giraud, 1851	Sîlhoi, 11. VIII. 2007
129.	*Dryops striatopunctatus* Heer	Tocarnia River, 11. VI. 2007 (acvatic)
	Fam. Byrrhidae	
130.	*Byrrhus glabratus* Heer, 1841	Tinovul Băiței-Muncelaşu, 16. VI. 2007; Bardău-Bucovinca, 18. VI. 2007
131.	*Carpathobyrrhulus transsilvanicus* Suffrian, 1848.	Şaua Poloninca (subalpine), 12. VI. 2007; Grohot ($47^0$51'10" N, $24^0$34'12" E, 968 m) 18. VI. 2007
	Fam. Pyrochroidae	
132.	*Pyrochroa coccinea* Linnaeus	Tinovul Băiței 16. VI. 2007
	Fam Meloidae	
133.	*Meloe violaceus* Marsh.	Tinovul Băiței-Muncelaşu, 16. VI. 2007
	Fam. Mordellidae	
134.	*Curtimorda bisignata* (Redtenbacher, 1849).	Jneapănul Hânchii, 15. VIII. 2007
	Fam. Melandryidae	
135.	*Melandrya dubia* Schall.	Şaua Vijii, 13. VI. 2007
	Fam. Cerambycidae	
136.	*Callidium violaceum* Linnaeus 1758	Grohot, $47^0$51'10" N, $24^0$34'12" E, 968 m
137.	*Gaurotes virginea* Linnaeus, 1758	Bistra Valley, Preluca Glodeanu, 12. VI. 2007, Smereca (Poiana) - $47^0$51'32" N, $24^0$30'10" E, 765 m
138.	*Hylotrupes bajulus* Linnaeus	Săpânța, 17. VI. 2007
139.	*Leptura fulva* Degeeer, 1775	Tocarnia, lawn, 11. VI. 2007, Poiana Sehleanu, 13. VI. 2007
140.	*Leptura sanguinolenta* Linneus, 1761	Poiana Zatismena, Preluca Glodeanu, 12. VI. 2007
141.	*Leptura rubra* Linnaeus, 1758	Valley Vaserului-Coman, 13 - 14. VIII. 2007; Măcârlău-Făina, 19. VIII. 2007
142.	*Lepturobosca virens* (Linnaeus, 1758	Grohot, $47^0$51'10" N, $24^0$34'12" E, 968 m; Stâncăriile Sîlhoi, 11. VIII. 2007
143.	*Monochamus sartor* Fabricius 1787	Tinovul Băiței-Muncelaşu, 16. VI. 2007; Valley Vaserului-Coman, 13 - 14. VIII. 2007; Măcârlău-Făina, 19. VIII. 2007
144.	*Monochamus sutor* Linnaeus, 1756	Grohot, $47^0$51'10" N, $24^0$34'12" E, 968 m
145.	*Oxymirus cursor* Linnaeus, 1758	Măcârlău-Poiana Miraj Valley, 18. VIII. 2007
146.	*Pidonia* lurida Fabricius, 1792	Bistrei Valley, 12. VI. 2007
147.	*Prionus coriarius* Linnaeus, 1758	Cataramă Valley, 13. VIII. 2007; Măcârlău-Făina, 19. VIII. 2007
148.	*Rhagium inquisitor* Linnaeus, 1758	Piciorul Poloninca, 12 .VI. 2007
149.	*Tetropium castaneum* Linnaeus, 1758	Piciorul Poloninca, 12. VI. 2007; Tinovul Băiței-Muncelaşu, 16. VI. 2007; Grohot, $47^0$51'10" N, $24^0$34'12" E, 968 m
	Fam. Chrysomelidae	
150.	*Apteropeda orbiculata* Marsh.	Tocarnia, lawn at the park limit, 11. VI. 2007

	Taxa	Romanian site's name
151.	*Crioceris merdigera* Linnaeus	Piatra Arsă, 17. VIII. 2007
152.	*Cryptocephalus cristula* Duft.	Poiana Sehleanu, 13 .VI. 2007, Poiana Smereca, 15. VI. 2007, 15. VI. 2007
153.	*Melasoma vigintipunctata* Scoipoli	Park limit Tocarnia, pe Salix, 11. VI. 2007
153.	*Chrysolina herbacea* Duft. (*menthastri* Suff.)	Smereca (Poiana) - $47^0$51'32" N, $24^0$30'10" E, 765 m
	Fam. Curculionidae	
155.	*Omiamimas* cf. *rufipes* Boh.	Tocarnia, forest, skirt 11. VI. 2007, under Certina (47 ^{0}51'44" N, $24^0$22'04" E, 1075 m), 13. VI. 2007
156.	*Omiamimas hanaki* Frivald.	Socălău-Ulohe, $47^0$52'28" N, $24^0$30'03" E, 932 m. alt; Fîntâna Stanchii, 13. VIII. 2007
157.	*Otiorrhynchus pulverulentus* Germ.	Grohot ($47^0$51'10" N, $24^0$34'12" E, 968 m.)

Using the informational index of diversity, our main objective was to try to measure the amount of order (or disorder) contained in a system (Margalef, 1958; Krebs, 1989) (Tab. 2). Four types of information might be collected regarding order in the community: (1) the number of species, (2) the number of individuals in each species, (3) the places occupied by individuals in each species, (4) the places occupied by individuals as separate individuals.

The informational theory try to quantify how difficult is to appreciate the probability to collect a species reported to the total number of individuals belonging to all present species in a studied habitat. Information content is a mesure of the amount of uncertainity, so the larger the value of H', the higher the uncertainity. A message as bbbbb (or a comunity with one species in it) has no uncertainity in it and H' = 0. The H' increase with the number of spcies in the community. The value of H' is influenced by the number of exemplares per species and for this reason must be interpreted after the comuting the eveness index - a measure of the heterogenity degree. The eveness index will take the maximum value when all the species from the studied coenosis will be reperesented by equal abundances and decrease toward zero when the species are represented by a very different number of individuals. H' = 0 if and only if is one species in the sample, and H' is maximum only when all S species are represented by the same number of individuals, that is, a perfectly even distribution of abundances (Ludwig and Reynolds, 1988).

Table 2: Diversity (H' = Shannon) and eveness (E) indexes reported at species number per habitat.

Habitat	H'	E	sp. no.
Tocarnia, Riparian-sylvan	0.9398	0.9849	9
Tocarnia, beech forest	0.9126	0.7579	16
Tocarnia litter of beech forest	1.1250	0.8647	20
Tocarnia meadow	0.8011	0.9479	7
Certina riparian-sylvan	1.0003	0.9269	12
Certina glade	0.8335	0.7724	12
Fîntana Stanchii - alpine meadow and glade	0.9186	0.9186	10
Coman - Vaser Valleys	0.2866	0.3414	7
Coman - Vaser edaphic in spruce forest	0.7346	0.8135	8

CONCLUSIONS

In the beech forest the highest diversity seems to be in the litter area, this particular habitat needing a special attention in monitoring and protection. The riparian-sylvan habitats present relatively high values of the diversity indexes comparatively with the other investigated habitats and also a relatively even distribution of abundances, being also important habitats for the local coleopteran diversity. The diversity of the beech forest is higher comparative with spruce forest, but this fact is obviously induced also by the different periods of sampling (as we already mentioned in the chapter material and methods). Surpassingly is the very low diversity in the riparian associations with *Alnus* and *Telekia* on the Vaser River valley, the Shannon index being also influenced by the eudominant species *Chilopora rubicunda.*

The characteristic species indicated for the monitoring are the big Carabidae (ground beetle) predacious species, important ecological bioindicators for the local diversity, taking into consideration their top position in the trophic net of the edaphic ecosystems and the facile way to identify them by the rangers. For the beech forests, in the riparian-sylvan micro habitat the characteristic species is *Carabus variolosus*, a big predacious, hygrophilic species protected in Europe by Habitat Directive, Annexes II and III.

For the soil habitat in deciduous forests: *Carabus coriaceus, C. obsoletus, C. violaceus, C. cancellatus.* Among the xylobionte species we mention the very rare species bioindicator for very old deciduous forests *Sinodendron cylindricum* Linnaeus, 1758, (Fam. Lucanidae). Also belonging to Lucanidae family *Lucanus cervus* (observed by us in the Repedea area) is strictly protected in Europe. An other sapro-xylophagous species very rare in Europe since 1900 and indicating very old, unaltered deciduous forests is *Melandrya dubia* Schall recorded by us in Şaua Vijii.

In mixed and spruce forests, the characteristic species recommended for monitoring are *Carabus violaceus, C. arcensis*, *C. auronitens escherii*, and among the xylophagous species *Buprestis rustica,* a very rare species characteristic for old coniferous forests (recorded at Faina).

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DIPTERA (INSECTA) OF THE MARAMUREŞ MOUNTAINS NATURE PARK (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, Maramureş Mountains Nature Park, dipterans, new mentions, species diversity, management.

ABSTRACT

The dipterans collected in the research campaign, in June and August 2007 are presented in this paper.

The results consist in 204 identified species, 35 being new mentions for all historical Maramureş area. Until present time, 1053 species are cited from the entire basin.

The structure of the supraspecific and specific diversity and some recommendations for the park management are also given.

RÉSUMÉ: Diptères dans le Parc Naturel Maramureş Monts (Maramureş, Roumanie).

On présent les diptères collectées en juillet et auguste 2007 pendant la campagne de recherche dans le Parc Naturel Maramureş Monts.

La liste systématique comprend 204 espèces, parmi quelle, 35 sont mentionnées pour la première fois dans le Maramureş. Jusqu'à présent, 1053 espèces sont connues dans toute la région dépressionnaire.

La diversité macro taxonomique et spécifique et quelques recommandations pour le management du parc sont aussi données.

REZUMAT: Diptere din Parcul Natural Munţii Maramureşului (Maramureş, România).

Sunt prezentate rezultatele campaniei de colectare din iunie şi august 2007, în cuprinsul Parcului Natural Munţii Maramureşului.

Se dă o listă de 204 specii, dintre care 35 sunt semnalate pentru prima dată din tot Maramureşul istoric. Până acum se cunosc 1053 de specii din toată depresiunea.

De asemenea se face o apreciere a diversităţii macrotaxonomice şi specifice şi se fac recomandări pentru managementul parcului.

INTRODUCTION

From Frivaldszky's (1871) contribution, till 1997, in the Maramureş Depression, 17 authors published data on 140 species, of 30 families. From 1998 to 2007 the number of mentioned species encreased to 1018 (55 families). With the present contribution (35 species being at first mention in Maramureş), the number of dipteran species is 1053.

Our research on the Diptera in Maramureş Depression began in 1995 (Găldean and Pârvu, 1997) and continuated till 2007 (Pârvu, 1997 a, b; 1998, a, b; 1999, 2001 a, b; 2002, a, b; 2003, 2004, 2006, 2007 and Brădescu and Pârvu, 2001).

MATERIALS AND METHODS

Betwen 11-22 June and 11-22 August 2007, two areas were prospected in the Maramureş Mountains Nature Park: the western one, from Vişeu River (at Bistra) and the Vaser River and the eastern, from Vaser River to the confluence of the Şesuri - Sâlhoi rivers. The samples were taken with an entomological net and the sites was marked with the G. P. S.

RESULTS

The results, consists in: the list of the collecting sites with fenological data, the altitude and G.P.S. position; the taxonomic and distribution list; the analysis of the specific diversity of the identified dipterans; the analysis of the supraspecific diversity at family level; and recommendations for the management in the Maramureş Mountains Nature Park.

The abbreviations of the collecting sites of the researching campaignes used in the taxonomic list are: Bărdău Lake = Căldarea Pietrosul Bardău - Bucovinca, 1618 m. altitude, 18. VI. N: 47°49"47', E: 24°36"24'; Bardău springs = Căldarea Pietrosul Bardău - Bucovinca, 18. VI. N: 47°50"60'; E: 24°35"53'; Certina = under Certina glade 13. VI. N: 47°51"53'; E: 24°21"19'; Luhei = the glade under the Luhei Mountain, 765 m., 15. VI. N: 47°51"32'; E: 24°30"10'; Pietricea = under Pietricea glade, 1002 m, 14. VI. N: 47°52"44,7'; E: 24°24"97,6'; Poloninca = Piciorul Polonincăi glade, 12. VI; Preluca Glodeanu = 632 m. N: 47°52"35'; E: 47°16"14', 12. VI; Reviaca = Reviaca Mare, 18. VI. 1098 m; N: 47°50°98', E: 47°6"55'; Sehleanu = Şaua Sehleanu, 13. VI. N: 44°52"22'; E: 24°21"03'; Şerban = Şerban Mountain 1264 m, 12. VI; Tabaica = Tabaica Glade 1532 m, 16. VI. N: 47°48"30.8'; E: 24°35"11.1'; Tocarnea = Peak, 11. VI. - transect from the river to the peak and back; Ulohe = Ulohe Glade, 932 m 15. VI. N: 47°52"28'; E: 24°30"03'; Viji = Viji Glade, 1158 m, 13. VI., 1158 m N: 47°51"40'; E: 24°21"39.4'; Vinderel = Vinderel Lake, 14 VI.; Stanchi Şesuri = Stanchi Şesuri Glade. 11. VIII. 1109 m N: 47°36"275'; E: 24°57"536'; Stanchi, limestone spring = Stanchi Glade, 11. VIII. 1083 m N: 47°37"020'; E: 24°57"043'; Stanchi, streamlet = Stanchi Glade. 11. VIII. 1223 m N: 47°39"00'; E: 24°58"'44'; Sâlhoi = Stâncăriile Sălhoi, 11. VIII., 1221 m. 12. VIII. N: 47°39"41,5'; E: 24.57.30; Stanchi Well = Stanch Gladei. Fântâna Stanchi. 1676 m N: 47°40"561'; E: 24°52"368'; Comanu = Comanu Cabin, 15. VIII., 963 m N: 47°44"617'; E: 24°48"766'; Izvorul Boului = idem 15. VIII. 1066 m. N: 47°44"302' E: 24°50"519'; Vaser - Catarama = Confluence Vaser - Catarama, 15. VIII., 985 m N: 47°44"663', E: 24°48"149'; Catarama = Catarama River, 15. VIII. G. P. S. idem Vaser - Catarama; Tăul Prislopul Cataramei, 1643 m 15. VIII. N: 47°43"005' E: 24°49"55', 6. Alpine land; Preluca Jnepenişul Hânchi 15. VIII., 1520 m N: 47°43"08', 9, E: 24°51"14'; Preluca Măgura Cataramei. 15. VIII. 1532 m. N: 47°42"52,5'; E: 24°51"01'1 Clearing with *Nardus*; Tăul of Preluca Jneapănul Hânchi. 15. VIII. 1597 m N: 47°42"57.3'; E: 24°51"58.1'; Comanu - Măcârlău, 16. VIII. transect at 963 m - 841 m; Măcârlău - Făina (and back). 17. VIII. transect at 841 m - 776 m; Făina: 776 m N: 47°47"415'; E: 24°41"798'; Măcârlău River 18. VIII. N: 47°45"219'; E: 24°44"596'; Toroiaga Peak 18. VIII. 1923 m N: 47°44"013'; E: 24°43"107'. Alpine land.

Taxonomic and distribution list; ● = species at first mention in the historical Maramureş. ●● = species at first mention in the Romanian fauna.

Limoniidae

Dicranota (Rhaphidolabina) lucidipennis (Edwards): Măcârlău - Făina; ● *Phylidorea* (s. str.) *squalens* (Zett. [1838]): 4 ♂♂, Bardău Lake; *Eloeophila maculata* (Meigen, 1804): 2 ♂♂, Certina, 6 ♂♂, Bardău springs; *Symplecta (Psiloconopa) stictica* (Meigen, 1818): 1 ♂, Tocarnea; *Epiphragma ocellare* (Linnaeus, 1761): 1 ♀, Sehleanu; ● *Limonia nigropunctata* (Schummel, 1929): 4 ♂♂, 2 ♀♀, Şerban.

Tipulidae

Nephrotoma submaculosa Edwards, 1928: 1 ♂, Luhei; *Tipula (Pterelachisus) austriaca* (Pokorny, 1887): 1 ♂, 1 ♀, Tocarnea; *T. (Lunatipula) fascingulata* Mannheims, 1966: 10 ♂♂, Şerban.

Bibionidae

● *Bibio clavipes* Meigen, 1818: 1 ♀, Poloninca; *Dilophus femoratus* Meigen, 1804: 1 ♂, Şerban.

Mycetophilidae

Mycomya (s. str.) *cinerascens* (Macquart, 1826): 1 ♂, Şerban.

Ptychopteridae

Ptychoptera contaminata (Linnaeus, 1758): 3 ♂♂, Preluca Glodeanu, 2 ♂♂ Tocarnea.

Simuliidae

Simulium sp.: 1 ♂ Certina, 1 ♀, Poloninca.

Rhagionidae

Rhagio tringarius (Linnaeus, 1758): 2 ♂♂ Reviaca, 3 ♂♂ Viji, 2 ♂♂ Şerban, 2 ♂♂ Sehleanu; *R. scolopaceus* (Linnaeus, 1758): 1 ♂, Luhei; *Chrysopilus helvolus* (Meigen, 1820): 3 ♂♂, Luhei; *C. splendidus* (Meigen, 1820): 1 ♂, Luhei.

Tabanidae

Hibomitra distinguenda (Verrall, 1909: 1 ♀, Certina; *Tabanus bromius* Linnaeus, 1758: 1 ♂, Preluca Glodeanu.

Stratiomyidae

● *Beris chalybata* Forster, 1771: 1 ♀, Sehleanu; *Stratyomys chamaeleon* (Linnaeus, 1758): 1 ♀, Luhei.

Asilidae

Machimus sp.: 1 ♂, 1 ♀ Luhei, 3 ♂♂, 2 ♀♀, Pietricea, 3 ♂♂ Sehleanu, 4 ♂♂, 2 ♀♀, Preluca Glodeanu; *Dioctria harciyniae* Loew, 1844: 1 ♂ Viji, 1 ♂, Poloniuca; *D. rufipes* (De Geer, 1776): 1 ♂ Reviaca, 3 ♂♂, Sehleanu; *Laphria flava* (Linnaeus, 1761): 1 ♂, 1 ♀, Poloninca; *Choerades* sp.: 1 ♂, Ulohe.

Empididae

Hilara chorica (Fallén, 1816): 1 ♂,. Certina; *Hilara intermedia* (Fallén, 1816): 1 ♀ Reviaca, 1 ♀, Sehleanu, 3 ♀, Preluca Glodeanu, Certina, Poloninca; *Hilara* sp.: 3 ♀♀, Măcârlău - Făina; *Chelifera precabunda* Collin: 1 ♂, Măcârlău - Făina; *C. (Kowartia*) *tibiella* Mik: 1 ♂, 3 ♀♀, Măcârlău - Făina; *Dolichocephala irrorata* Fall.; 1 ♂, Stanchi. Şesuri; *Clinocera appendiculata* (Zett.): 1 ♂, 1 ♀, Stanchi. Limestone spring; *E. (Coptophlebia) albinervis* Meigen, 1822: 2 ♂♂, Bardău. Springs, 1 ♂ Şerban; *E. (C.) hyalipennis* (Fallén): 1 ♂, Măcârlău - Făina; *E. (Xanthempis) semicinerea* Loew, 1867: 1 ♂, Sehleanu; *Rhamphomyia (Lundstroemiella) hybotina* (Zetterstedt [1838]): 1 ♂, Ulohe, 1 ♂ Preluca Glodeanu; ● *R. (Pararhamphomyia) atra* Meigen, 1822: 2 ♂♂, Tabaica, 2 ♂♂, Reviaca, 1 ♂, Ulohe; ● *Driodromia testacea* Rondani, 1856: 1 ♂, Preluca Glodeanu.

Hybotidae

● *Trichina elongata* Hal., 1833: 1 ♂, Tabaica; *Bicellaria intermedia* Lundbeck: 1 ♀, Stanchi. Limestone spring; *Bicellaria nigra* Mg., 1824: 1 ♀, Poloninca, 1 ♀, Vinderel; *Platypalpus* sp.: 1 ♂, Preluca Glodeanu, 1 ♂, Bardău Lake, 1 ♂, Tabaica; ●● *P. excisus* (Becker): 1 ♂, Sâlhoi. Tibia III curved; at *P. nigitarsis* = fusiform; *Hybos femoratus* (Müller): 1 ♂, 1 ♀, Catarama River.

Dolichopodidae

● *Achalcus flavicollis* (Meigen): 1 ♂, Stanchi. Şesuri; *Argyra discedens* Becker: 1 ♂, Măcârlău - Făina; *Rhaphium appendiculatum* (Zetterstedt): 2 ♂♂, Măcârlău - Făina; *Rhaphium* sp.: ♀, 1 ♀, Bardău Lake; *Campsicnemus curvipes* (Fallén, 1823): 1 ♂, Certina; *C. magius* Loew, 1845: 1 ♂, Bardău Lake; *C. umbripennis* Loew: 1 ♂, Măcârlău - Făina; *Chrysotus cilipes* Meigen, 1824: 2 ♂♂, Ulohe, 5 ♂♂, Tocarnea; *C. gramineus* (Fallén, 1823): 5 ♂♂, Sehleanu, 5 ♂♂, 5 ♀♀, Bardău Lake, 1 ♂ Certina, 5 ♂♂, Tocarnea; *C. laesus* (Wiedemann, 1871): 6 ♂♂, Sehleanu, 5 ♂♂, Tocarnea; *C. obscuripes* Zetterstedt, 1838: 10 ♂♂, Poloninca, 2 ♂♂, Ulohe, 1 ♂ Viji, 5 ♂, Tocarnea; ● *C. pennatus* Lichthwardt: 1 ♂, Stanchi. Limestone spring; *C. pulchellus* Kowarz, 1874: 1 ♂, Pietricea; *Dolichopus atripes* Meigen: 1 ♂, Măcârlău - Făina; *D. cilifemoratus* Macquart: 1 ♂, 1 ♀, Stanchi. Limestone spring; ● *Dolichopus cruralis* Wahlberg, 1850: 1 ♂, Bardău Lake; *D. ungulatus* (Linnaeus, 1758): 1 ♂, Preluca Glodeanu; *D. pennatus* Meigen, 1824: 1 ♂, Preluca Glodeanu; *D. plumipes* (Scopoli): 1 ♂, Măcârlău - Făina; *D. picipes* Meigen: 1 ♂, Comanu - Măcârlău; *D. salictorum* Loew: 3 ♂♂, l ♀, Stanchi. Şesuri; *Hercostomus aerosus* (Fallén, 1823): 2 ♂♂, Preluca Glodeanu, 1 ♂, 1 ♀ Tocarnea; *H. brevicornis* (Staeger): 1 ♀, Catarama River, 1 ♂, Măcârlău River; *H. celer* (Meigen, 1824): 2 ♂♂, Preluca Glodeanu, 1 ♂, 1 ♀, Tocarnea; *H. longiventris* (Loew, 1857): 1 ♂, Certina,1 ♂, Catarama River; *H. nigrilamellatus* (Macquart: 1 ♂, Comanu - Măcârlău; *Hydrophorus balticus* (Meigen): 10 ♂♂, Stanchi. Limestone spring, 2 ♂, 2 ♀, Măgura Cataramei, 1 ♀, Stanchi. Well, 1 ♀, Tăul Hânchi; ● *Hydrophorus bipunctatus* Lehmann, 1822: 1 ♀, Bardău Lake; *H. viridis* (Meigen, 1824): 20 ♂♂, 15 ♀♀, Bardău sprigs; *Neurigona pallida* (Fallén, 1823): 1 ♂, Tocarnea; *Sympycnus cirrhipes* (Haliday). 1 ♂, Stanchi spring, 1 ♂, Stanchi Well, 2 ♂♂, Comanu - Măcârlău; *Syntormon silvianum* Pârvu, 1989: 1 ♂, Măcârlău - Făina; *S. sulcipes* (Meigen): 1 ♂, Stanchi Well; *Teuchophorus nigricosta* (von Roser): 1 ♂, Măcârlău - Făina; Microphoridae; *Microphor intermedius* Collin, 1961: 1, Preluca Glodeanu.

Phoridae

Phora atra (Meigen, 1804): 1 ♀ Vinderel, 1 ♂ Tabaica, 1 ♂, Vaser - Catarama; *Megaselia campestris* (Wood, 1908): 1 ♂ Certina, 1 ♂ Preluca Glodeanu, 1 ♂ Tabaica, 1 ♂ Vinderel; *Megaselia* sp. 1 ♂, Măcârlău River; *Conicera* sp.: 1 ♂, Măcârlău - Făina.

Lonchopteridae

Lonchoptera lutea Panzer, 1809: 2 ♀♀, Poloninca, 1 ♀, Reviaca, 1 ♀ Sehleanu, 1 ♀ Certina, 1 ♂, 1 ♀, Sâlhoi, 1 ♂, Măcârlău River 1 ♂, Toroiaga, 2 ♀♀, Stanchi Well; *L. strobli* De Meijere, 1906: 1 ♂, 1 ♀, Poloninca, 1 ♂, 1 ♀, Sâlhoi; *L. scutellata* Stein, 1890: 1 ♂ Ulohe, 3 ♂♂, Bardău springs, 1 ♂, Viji.

Syrphidae

● *Epistrophe diaphana* (Zetterstedt, 1843): 1 ♀, Tocarnea; *E. eligans* (Harris): 1 ♀, Stanchi. Limestone spring; *E. grossulariae* Meigen, 1822: 1 ♀, Tocarnea; *Epysyrphus balteatus* (De Geer, 1776): 3 ♂♂, 3 ♀♀, Tocarnea, 1 ♀, Măcârlău - Făina, 1 ♂, Stanchi spring, 1 ♂, Comanu; *Eupeodes* (s. str.) *corollae* Fabricius, 1794: 1 ♀, Luhei, 1 ♀, Măcârlău River; *Leucozona lucorum* (Linnaeus, 1758): 1 ♀, Sehleanu; *Scaeva pyrastri* (Linnaeus, 1758): 1 ♂, Sehleanu, 1 ♂, Certina; *S. selenitica* (Meigen, 1822): 1 ♂ Certina, 1 ♀ Măcârlău River; *Sphaerophoria scripta* (Linnaeus, 1758): 5 ♂♂, 5 ♀♀, Tocarnea, 4 ♂♂, 2 ♀♀ Luhei, 1 ♂ Sehleanu, 2 ♂♂ Viji, 3 ♂♂, 3 ♀♀, Viji, 3 ♀♀, Măcârlău - Făina, 1 ♂, Stanchi. Limestone spring, 5 ♂♂, Comanu 4 ♀, Vaser - Catarama, 1 ♀, Izvorul Boului, 3 ♀♀, Preluca Jnepenişul Hânchi; *S. taeniata* (Meigen, 1822): 3 ♂♂, 3 ♀♀, Luhei, 1 ♀, Vaser - Catarama; *Syrphus torvus* Osten - Sacken, 1875: 1 ♂ Tocarnea, 1 ♀ Luhei, 1 ♂ Sehleanu, 1 ♀, Stanchi Well; *S. ribesii* (Linnaeus, 1758): 1 ♂, Sehleanu; *S. vitripennis* Meigen: 1 ♀, Comanu, 1 ♀, Izvorul Boului; ● *Xanthogramma festivum* (Linnaeus, 1758): 1 ♀, Tocarnea; *Chrysotoxum arcuatum* (Linnaeus, 1751): 1 ♂, Reviaca;

C. intermedium Meigen: 1 ♀, Stanchi Well, 1 ♀, Măcârlău - Făina; *Melanostoma mellinum* (Linnaeus, 1758): 10 ♂♂, 7 ♀♀ Preluca Glodeanu, 3 ♂♂ Sehleanu, 1 ♂, 1 ♀, Bardău Lake, 1 ♂, Poloninca, 1 ♀ Ulohe, 1 ♂, Stanchi limestone spring, 1 ♀, Stanchi Well, 3 ♀♀, Comanu, 2 ♀, Măcârlău - Făina; *M. scalare* (Fabricius, 1794): 2 ♀♀ Tabaica, 1 ♂ Poloninca, 2 ♀♀, Măcârlău River, 2 ♀♀, Comanu - Măcârlău; *Platycheirus albimanus* (Fabricius, 1781): 1 ♂, Tocarnea, 1 ♂ Luhei, 1 ♂ Preluca Glodeanu, 1 ♂ Sehleanu, 1 ♂, Ulohe, 1 ♀ Stanchi limestone spring, 1 ♀, Stanchi Well, 1 ♀, Comanu, 1 ♀, Măgura Cataramei, 1 ♂, 1 ♀, Măcârlău - Făina *P. clypeatus* (Meigen, 1822): 1 ♂, Tocarnea1 ♂, Stanchi. Şesuri, 1 ♀, Măcârlău River; *P. scambus* (Staeger, 1843): 1 ♂, Tocarnea, 1 ♀, 1 ♂, Măcârlău - Făina, 1 ♀, Comanu; *P. scutatus* (Meigen, 1822): 1 ♂ Tocarnea, 1 ♀, Catarama River; *Pipiya bimaculata* Meigen: 1 ♀, Toroiaga; *P. lugubris* Fabricius: 1 ♀, Măcârlău - Făina; ● *Pipiza noctiluca* Linnaeus, 1758: 1 ♀, Viji; *Pipizella virens* (Fabricius, 1805): 1 ♂, Poloninca; *Cheilosia* sp.: 1 ♂ Preluca Glodeanu, 4 ♀, Comanu, 10 ♂♂, 10 ♀♀, Măcârlău - Făina; *C. canicularis* (Panzer): 1 ♀, Comanu; *Volucella bombylans* (Linnaeus, 1758): 1 ♂ Sehleanu, 1 ♂, Reviaca, 1 ♂, Viji; *V. pellucens* (Linnaeus): 1 ♀, Măcârlău - Făina; *Neoascia tenur* (Harrig, 1780): 1 ♂ Poloninca, 1 ♀, Izvorul Boului, 1 ♀, Comanu; *N. interrupta* (Meigen): 1 ♀, Comanu, 1 ♀, Comanu - Măcârlău, 1 ♀, Măcârlău - Făina, 1 ♀, Măcârlău River; *N. podagrica* (Fabricius): 1 ♀, Comanu; *Sphegina clunipes* (Fallén, 1816): 1 ♂ Preluca Glodeanu, 1 ♂, Reviaca, 1 ♀, Stanchi, limestone spring, 1 ♀, Stanchi Well, 1 ♀, Comanu, 2 ♀♀, Măcârlău - Făina, 1 ♀, Măcârlău River; *S. elegans* Schummel, 1843: 1 ♂, Preluca Glodeanu, 2 ♀♀, Măcârlău - Făina; *S. latifrons* Egger, 1865: 1 ♂ Certina, 1 ♂ Preluca Glodeanu; *Sericomyia lappona* (Linnaeus, 1758): 1 ♂, Reviaca, 1 ♀, Certina; *S. Silenitis* (Harris): 1 ♀, Stanchi, limestone spring; *Eristalis abusivus* Collin: 1 ♀, Măcârlău River; *E. alpinus* (Panzer): 1 ♀, Măcârlău - Făina, 1 ♂, Stanchi, limestone spring, 1 ♀, Comanu, 1 ♀, Sâlhoi, 1 ♀, Izvorul Boului, 1 ♀, Măcârlău River; *Eristalis arbustorum* (Linnaeus, 1758): 1 ♂ Preluca Glodeanu, 1 ♂, Stanchi Şesuri, 1 ♀, Stanchi limestone spring, 1 ♂, Sâlhoi, 1 ♀, Comanu - Măcârlău, 1 ♀, Măcârlău - Făina, 1 ♀, Măcârlău River; *E. cryptarum* (F.): 1 ♀, Măcârlău - Făina; *E. interruptus* (Poda, 1761): 1 ♂, Sehleanu, 1 ♂, Viji, 1 ♂, Ulohe; *E. pertinax* (Scopoli): 1 ♀, Stanchi, limestone spring, 1 ♀, Măcârlău - Făina; *E. rupium* F.: 1 ♀, Comanu - Măcârlău; *E. tenax* (Linnaeus): 10 ♂, 7 ♀, Măcârlău - Făina, 1 ♀, Comanu, 1 ♀, Măcârlău River, 1 ♀, Vaser - Catarama, 1 ♀, Comanu - Măcârlău, 1 ♀, Sâlhoi; *Myathropa florea* (Linnaeus, 1758): 1 ♀, Luhei; *Arctophila bombyformis* (Fallén, 1810): 1 ♂, Certina, 1 ♀, Izvorul Boului, 1 ♀, Măcârlău - Făina; *Blera fallax* (Linnaeus, 1758): 2 ♂♂, Poloninca - collected on the resin; ● *Calliprobola speciosa* (Rossi, 1790): 1 ♂, Poloninca; *Syritta pipiens* (Linnaeus, 1758): 2 ♂♂, Luhei, 1 ♂ Preluca Glodeanu, 2 ♀♀, Stanchi, limestone spring, 2 ♀♀, Comanu, 2 ♀, Vaser - Catarama, 7 ♂♂, Comanu - Măcârlău, 10 ♂♂, Măcârlău - Făina, 3 ♂♂, Măcârlău River, 1 ♀, Toroiaga; *Xylota coeruleiventris* Zetterstedt: 1 ♀, Comanu, 1 ♀, Măcârlău River; *X. segnis L.*: 1 ♀, Comanu; *Xylota tarda* Meigen, 1822: 1 ♂, Preluca Glodeanu; *Pyrophaena rosarum* (F.) 1 ♀, Măcârlău - Făina; *Helophilus trivittatum* (F.): 2 ♀, Stanchi, limestone spring, 2 ♀, Sâlhoi, 2 ♂, Comanu, 2 ♂♂,Vaser - Catarama, 2 ♀♀, Măcârlău River; *Rhingia rostrata* (L.): 1 ♀, Catarama River; *Meliscaeva cinctella* (Zett.): 1 ♀, Comanu; *Bacha obscuripennis* Meigen: 1 ♀, Catarama River; *Ischirosyrphus glaucius* (L.): 1 ♀, Catarama River; *Paragus* sp.: 1 ♀, Măcârlău - Făina; ● *Eupeodes nielseni* (Dušek and Laska, 1976):1 ♀, Toroiaga. Very rare in Romania mentioned only from Piatra Craiului and Hârşova; *Ceriana conopsoides* (L.): 1 ♂, Comanu; Micropezidae *Micropeza corrigiolata* (Linnaeus, 1767): 2 ♂♂, Preluca Glodeanu; *Calobata petronella* (Linnaeus, 1761): 2 ♂♂, Ulohe.

Psilidae

Psila fimetaria (L.): 1 ♀, Măgura Cataramei; *Loxocera aristata* Panzer, 1801: 4 ♀♀ Bardău Lake, 1 ♀ Bardău springs, 1 ♀, Stanchi. Well.

Conopidae

Conops flavipes L.: 1 ♂, Stanchi, limestone sping, 1 ♀, Izvorul Boului, 1 ♂, Măcârlău - Făina; ● *Thecophora distincta* Wiedemann in Meigen, 1824: 1 ♂, Luhei; *T. longirostris* Lyneborg: 1 ♂, Sehleanu; *Sicus ferrugineus* (L.): 1 ♂, Măcârlău - Făina.

Platistomatidae

Rivellia syngenesiae (Fabricius, 1781): 2 ♂♂, 2 ♀♀ Luhei, 2 ♂♂, Preluca Glodeanu.

Heleomyzidae

Suillia nemorum (Meigen): 2 ♂♂, Stanchi Well, 1 ♂, Toroiaga; ● *S. vaginata* (Loew): 1 ♂, Stanchi Well. Mentioned in Romania from Valea Putnei (Suceava County).

Tephritidae

Ditrycha guttularis (Meigen, 1826): 2 ♂♂, 1 ♀ Şerban; *Oxyna flavipennis* (Loew, 1844): 1 ♂, Ulohe; *Paroxyna tessellata* (Loew, 1844): 2 ♂♂, Tocarnea, 2 ♂♂, Ulohe, 1 ♂, Stanchi, limestone spring, 1 ♂, Vaser - Catarama, 2 ♀♀, Măcârlău River; *Orellia falcata* (Scopoli, 1763): 2 ♂♂, Tocarnea; ● *O. punctata* (Schrank, 1781): 1 ♂, 2 ♀♀, Tocarnea; ● *Xyphosia miliaris* (Schrank, 1781): 2 ♂♂, Tocarnea, 2 ♂♂, 1 ♀, Sehleanu; ● *Tephritis arnicae* (L.): 3 ♂♂, 4 ♀♀, Toroiaga. Very rare; *Tephritis leontodontis* (De Geer, 1776): 2 ♂♂, Pietricea, 3 ♂♂, 2 ♀♀ Sehleanu; *Chaetorellia jaceae* (Robineau-Desvoidy): 2 ♀, Măcârlău River.

Lauxaniidae

Lauxania cylindricornis (Fabricii, 1794): 1 ♀, Pietricea; *Lyciella affinis* (Zetterstedt, 1794): 1 ♀ Serban, 4 ♂♂, Certina, 1 ♀, Catarama River; *L. illota* (Loew, 1847): 1 ♀, Ulohe; *L. rorida* (Fallén, 1820): 1 ♀ Viji, 1 ♀, Comanu - Măcârlău; *L.* sp.: 2 ♂♂, Sehleanu; *Minettia longipennis* (Fabricius, 1794): 1 ♂ Poloninca, 1 ♂ Ulohe, 1 ♂ Tocarnea; *Minettia lupulina* (Fabricius, 1787): 2 ♂♂, Şerban; *Tricholauxania praeusta* (Fll.): 1 ♀, Comanu - Măcârlău.

Sciomyzidae

Limnia unguicornis (Scopoli, 1763): 4 ♂♂, Preluca Glodeanu, 2 ♂♂ Tocarnea, 2 ♂♂, Ulohe, 1 ♂, Certina, 1 ♂, Stanchi, limestone spring, 1 ♂, Comanu, 1 ♂, Vaser - Catarama, 1 ♂, Măcârlău; *Pherbina intermedia* Verbeke, 1948: 2 ♂♂, Bardău springs; *Trypetoptera punctulata* Fallén, 1823: 2 ♂♂, Tocarnea; ●● *Dichaetophora finlandica* Verbecke: 1 ♂, Izvorul Boului; *D. obliterata* (F.): 1 ♀, Izvorul Boului*; Tetanocera elata* (F.): 1 ♀, Stanchi. Şesuri, 1 ♀, Comanu - Măcârlău, 1 ♀, Măcârlău - Făina; *T. hyalipennis* von Roser: 1 ♀, Măcârlău River.

Sepsidae

Nemopoda nitidula (Fallén, 1820): 2 ♂♂, Bardău springs; *Sepsis cynipsea* (Linnaeus, 1758): 1 ♂, Ulohe, 1 ♂, Măcârlău River, 1 ♂, Stanchi, limestone spring, 1 ♂, Stanchi, Well; *S. flavimana* Meigen, 1826: 1 ♂ Viji, 1 ♂, Măcârlău River; *S. punctum* (Fabricius, 1794): 1 ♂, Bardău Lake, 1 ♂ Viji, 1 ♂, Vaser - Catarama, 1 ♂, Măcârlău - Făina, 1 ♂, Măcârlău River; *S. fulgens* Meigen, 1826: 1 ♂ Bardău Lake, 1 ♂ Viji, 1 ♂, Stanchi, limestone spring, 1 ♂, Sâlhoi, 1 ♂, Stanchi, Well, 1 ♂, Vaser - Catarama, 1 ♂, Măcârlău - Făina; *S. violacea* Meigen, 1826: 1 ♂, Şerban, 1 ♂ Reviaca, 1 ♂, Stanchi Şesuri; *Themira annulipes* (Meigen): 2 ♂♂, Sâlhoi.

Opomyzidae

Geomyza tripunctata Fallén, 1823: 1 ♂, Ulohe, 1 ♂, Bardău springs, 4 ♂♂, Certina; *Opomyza florum* (Fabricius, 1794): 1 ♂ Sehleanu, 1 ♂ Certina.

Chloropiae

Chlorops sp.: 1 ♂ Tabaica, 1 ♂ Vinderel, 1 ♀ Bardău Lake, 5 ♂♂ Certina, 1 ♀ Poloninca, 1 ♀ Ulohe; *Meromyza* sp.: 1 ♀ Ulohe, 1 ♀ Pietricea.

Sphaeroceridae

Copromyza equina Fallén, 1820: 1 ♂, Poloninca, 1 ♂ Bardău springs, 1 ♂, Stanchi, limestone spring, 1 ♂, Izvorul Boului, 1 ♂, Comanu - Măcârlău; ●● *C. nitidifrons* Duda: 1 ♂, Stanchi, spring, 1 ♂, Comanu - Măcârlău; ● *C. sordida* Zetterstedt: 1 ♂, Stanchi, limestone spring, 1 ♂, Comanu - Măcârlău; ● *C. vitripennis* Mg. 1830: 1 ♂, Bardău Lake; *Leptocera* (s. str.) *fontinalis* (Fallén, 1826): 1 ♂, Bardău springs; *Sphaerocera curvipes* Latreille: 1 ♂, Bardău Lake, 1 ♂, Comanu - Măcârlău.

Drosophilidae

Leucophenga maculata (Dufour): 1 ♂, Măcârlău - Făina; *Drosophila (Sophophora) obscura* Fallén, 1823: 2 ♂♂ Luhei, 2 ♂♂ Şerban, 2 ♂♂ Certina, 1 ♂, Stanchi, limestone spring; *D. funebris* (F.): 1 ♂, Măcârlău River; *D. melanogaster* Meigen: 1 ♂, Vaser - Catarama; *D. transversa* Fall.: 1 ♂, Măcârlău River; *Scaptomyza graminum* (Fall.): 1 ♂, Măcârlău River.

Ephydridae

Lamproscatella sibilans (Haliday, 1833): 4 ♂♂, Bardău springs; *Hydrellia griseola* (Fallén, 1813): 2 ♂♂, Bardău springs, 10 ♂♂, Măcârlău - Făina, 10 ♂♂, Măcârlău River; *Scatella* (s. str.) *paludum* (Meigen, 1830): 1 ♂, Bardău springs.

Scatophagidae

Scatophaga furcata Say, 1823: 2 ♂♂ Sehleanu, 1 ♂, Stanchi Well; *S. stercoraria* (Linnaeus, 1758): 1 ♂, Certina, 1 ♂, Stanchi Well, 1 ♂, Izvorul Boului; *Neoscatella subguttata* Meigen: 1 ♂, Comanu - Măcârlău; *Psilopa nitidula* (Fall.): 1 ♂, Măcârlău - Făina; *Parydra coarctata* (Fall.): 1 ♂, Măcârlău River.

Muscidae

Hydrotaea irritans (Fallén, 1823): 2 ♂♂, Reviaca; *Musca domestica* Linnaeus, 1758: 4 ♂♂ Poloninca, 3 ♀♀ Şerban, 1 ♂, Comanu; *M. autumnalis* De Geer: 1 ♂, Comanu; *Morellia aenescens* R - D., 1830: 4 ♂♂, Bardău, 2 ♀♀ Tabaica; *Mesembrina meridiana* (L.): 1 ♂, Măcârlău River; *Dexia* sp.*:*1 ♂*,* Stanchi, limestone spring.

Calliphoridae

Cynomya mortuorum (Linnaeus, 1761): 1 Reviaca; *Lucilia caesar* (Linnaeus, 1758): 1 ♂, Tocarnea; L. *silvarum* Meigen: 1 ♂, Vaser - Catarama; *Bellardia pandia* Walker: 1 ♂, Comanu

Sarcophagidae

Sarcophaga carnaria (Linnaeus, 1758): 1 ♂, Luhei; *Heteronichia bulgarica* (Enderlein): 1 ♂, Comanu.

Tachinidae

Ectophasia crassipennis (Fabricius, 1794): 1 ♂, Preluca Glodeanu.

The analysis of the specific diversity of the identified dipterans**.**

204 species were identified, 82 are hydrophilous (*Tipulomorpha*, *Dolichopodidae, Empidoidea,* etc.) and more than 100 species are heliophilous (*Syrphidae, Tabanidae, Tephritidae,* etc.); the figures, enough approached, demonstrate a well balanced equilibrium between the humid and dry ecosistems.

From the specific richness standpoint, from *Syrphidae* family 54 species were recorded and from *Dolichopodidae* 35. At these last species we can add, also like hydrofilous, the *Empidoidea* group (*Empididae* and *Hybotidae*) with 21 species and Tipulomorpha (*Limoniidae, Pediciidae, Tipulidae*) sumating 19 species.

The identification of 35 species not mentioned yet in the historic Maramureş, only in two collecting weeks and remembering that we efectuated six years of recent collectings (1995-1998, 2003-2004), this mean that the entomological potential of the park is big. The species new for Romania's fauna are proceeding from lower areas Vaser, Sâlhoi, where are the biotops convenient for the dipteran fauna, a matter valuable for other studied insects (Coleoptera, Lepidoptera).

The biggest number of species (114) was recorded on the Vaser Valley on the transect: Izvorul Boului - Comanu - Catarama River - Măcârlău and Făina); in higher areas, with grasslands and alpine lands (like Şerban, Pietrosul Bardăului, Vinderel Lake, Tăul Hânchi, Măgura Cataramei, Toroiaga Peak) occurred about 40 species reflecting a normal situation because the number of taxa are decreasing with the altitude.

The numerical structure of the families identified in both areas (corresponding to the two researching campaignes) is presented in the table 1.

Table 1: The numerical structure of the families.

In the western area of the park	In the eastern area of the park
Families number - the site	Families number - the site
4 - Vinderel	2 - Stanchi Stream
8 - Pietriceaua	4 - Sâlhoi
8 - Tabaica	5 - Preluca Măgura Cataramei
8 - Viji	5 - Tăul of Jneapănul Hânchi
10 - Reviaca	6 - Tăul of Prislopul Cataramei
11 - Bardău Lake	10 - Preluca Jneapănul Hânchi
11 - Tocarnea	12 - Toroiaga Peak
12 - Bardău springs	14 - Stanchi Şesuri
12 - Şerbanul	14 - Catarama River
13 - Preluca Glodeanu	16 - Izvorul Boului
13 - Ulohe	16 - Comanu - Măcârlău (transect)
14 - Certina	18 - Stanchi Spring
15 - Luhei	20 - Stanchi Well
16 - Poloninca	20 - Vaser - Catarama confluence
l7 - Sehleanu	20 - Măcârlău River
	23 - Măcârlău - Făina (and back)
	24 - Comanu

Table 2: The numerical structure of the supraspecific diversity in all the park.

2 - Stanchi Stream	13 - Preluca Glodeanu
4 - Vinderel	13 - Ulohe
4 - Sâlhoi	14 - Certina
5 - Preluca Măgura Cataramei	14 - Stanchi Şesuri
5 - Tăul of Jnepenişul Hânchi	14 - Catarama River
6 - Tăul of Prislopul Cataramei	15 - Luhei
8 - Pietricea	16 - Poloninca
8 - Viji	16 - Izvorul Boului
8 - Tabaica	16 - Comanu - Măcârlău (transect)
10 - Reviaca	17 - Sehleanu
10 - Preluca Jnepenişul Hânchi	18 - Stanchi spring
11 - Bardău Lake	20 - Stanchi Well
11 - Tocarnea	20 - Vaser - Catarama confluence
12 - Bardău springs	20 - Măcârlău River
12 - Şerban	23 - Măcârlău - Făina (and back)
12 - Toroiaga	24 - Comanu

In the western area of the park the families number is lower (4-17) and with a little difference between the sites while in the eastern side there exists a bigger difference between the sites (2-24 families). We think that at this result not so much the phenology then the lower altitude and collecting style (longer transects and more time spend in the field) was important.

After the number of families present in each sites we identified three categories of sites: sites with feeble richness (2-12 families), sites with middle richness (13-20 families) and sites with large richness (23, 24 families). At first category belong the montaninous grasslands and alpine lands, at second mezophilous hay fields with springs, streamlets and tributary rivers and at the last, the large valleys of the important rivers, with substantial debit.

CONCLUSIONS

The supraspecific diversity of the Diptera occurring in Maramureş Mountains Nature Park it is now in the optimum circumstances. My assertion is based on the comparison between the 49 families founded in 2007 and the 56 families identified in six years in all Maramureş Depression (Pârvu, 2003). The list of macrotaxa (families) contain the hydrophilous, heliophilous, fitofagous, predacious and parasitical dipteran, thing that denote the presence of a normal faunistic spectrum for the Carpathians, without anomalies. The numerical structure of the families on altitude is decreasing from low clearings and valleys to the higher grasslands and alpine lands, indifferent of the phenological scale or collecting methods.

The large macrotaxonomical richness on the Vaser Valley can be explained also by the paradoxical effect of the anthropisation who mosaicated the biotops; e. g. the forestry railway damed the water flow on the versants, producing a cvasipermanent streamlet on many kilometers; on this area was instaled a vaste biotop with botanical species of *Polygonum* where becam perrenial the larval zoocoenosis of many hydrophilous families like *Dolochopodidae.*

Also, the xerophilous dipteran was not ecologically neglected by this effect but, on the places of former flag stations or forestry platforms growned the truly "jungles"of thistles, dead nettles, umbellifera, favourables to the Syrphidae*,* Rhagionidae*,* Tephritidae and other families.

The specific diversity, in fact, is bigger, the 204 species identified in the very short period for study, were collected in only two weeks.

Is not seems to be aleatory the fact that, the each side of the studied areas (the western and the eastern), supplyed the same number of the species not mentioned yet in all historical Maramureş: 18; by the literary records and author's own contributions, was mentioned more than 1000 species from the Maramureş Depression; this fact demonstrate both the promising entomological potential and the necessity that the researches in this park to be continuate.

The four new for Romania fauna species belong to the normal instalment of faunistical news and proves that the park perimeter is not needier than any other area of Maramureş.

The final conclusion: after the present status of the dipteran fauna, the ecosistems are sufficiently rich but not enough studied, a supplementary reason for a better protection in the new created Maramureş Mountains Nature Park.

RECOMANDATIONS FOR THE PARK MANAGEMENT

● Must be protected the sites with maximum of diversity or which contains valuable species, namely all humid areas like the grasslands with *Polygonum* species along the border of the forestry railway between Izvorul Boului to Făina, the peat bogs and the springs of the alpine land of Pietrosul Bardăului or the well and limestone spring of Poiana Stanchi. ● Must be preserved the ruderal vegetation all around the flag stations or the neglected buildings from Izvorul Boului, Comanu, Măcârlău, Valea Babei and others, downstream of the Vaser Valley.

● Is not indicated the new forestry plantations in montane clearings and must not draw out the dead trees like in the Piciorul Polonincăi clearing for the conservation of the xerophilous or resinophilous species. ● It is necessary to mentain the actual conditions in the exploitation of the haye fields in the lower, mesophilous glades like Preluca Glodeanu or the foot of the hill Tocarnea (or others like Certina, Viji, Reviaca). ● Must be continued the "long term research", also in the forests and in alpine lands and obviously in the large valleys with high taxonomical richness. ● Some paths need to be toileted like in others parks like Retezat or Piatra Craiului. ● All this things being made it is necessary a guide with maps of touristic routes ● It is also possible to arrange a smal museum in the building of the park administration with the most representative specimens of insects or other kind of fauna not disturbing the protection rules.

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VIŞEU RIVER AND SOME TRIBUTARIES ECOLOGICAL ASSESSMENT BASED ON MACROINVERTEBRATE COMMUNITIES (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, Vişeu River, Ţâşla River, Vaser River, Ruscova River, benthic macroinvertebrate communities, human impact.

ABSTRACT

This paper presents the Vişeu River and some tributaries (Ţâşla, Vaser and Ruscova) ecological status, based on the benthic macroinvertebrate communities in correlation with the biotope conditions. In the higher Ruscova Basin the aquatic habitats present an almost natural ecological state, the human impact being insignificant. Here is the benthic macroinvertebrates highest diversity, also the highest specific diversity for the Ephemeroptera, Plecoptera and Trichoptera. In the extreme upper Vişeu River basin, the aquatic habitats present an almost natural ecological state, the Borşa Resort area and the confluence with the impacted Ţâşla River sector induce a significant negative effect on the lotic biodiversity which recover only in the Vişeu Gorge, due to the river selfcleaning processes and clean tributaries inputs. The Ţâşla Basin is the most heavily impacted by the human activities. Lotic sectors slightly affected by the rural and forest exploitation impact are the lower Ruscova, the Vaser River suffering a higher impact of this type.

ZUSAMMENFASSUNG: Ökologische Zustandsbewertung des Vişeu Flusses und einiger seiner Nebenflüsse anhand der benthischen Makroinvertebraten-Gemeinschaften (Maramuresch, Rumänien).

Die Arbeit analysiert den ökologischen Zustand des Vişeu-Flusses und seiner Nebenflüsse Ţâşla, Vaser und Ruscova anhand der Struktur der benthischen Makroinvertebraten Gemeinschaften in Abhängigkeit von den Biotopgegebenheiten. Im oberen Einzugsgebiet des Ruscova-Flusses wurde sowohl die höchste Diversität der Makroinvertebraten-Gemeinschaften als auch die höchste Artendiversität innerhalb der Ordnungen Ephemeroptera, Plecoptera und Trichoptera festgestellt. Im Oberlauf des Flusses haben die aquatischen Lebensräume einen naturnahen Zustand, da der menschliche Einfluss unbedeutend ist. Im unteren Bereich des Ruscova-Flusses ist ein geringer menschlicher Einfluss zu verzeichnen, der sich aus den Abwässern der Haushalte, aus der Viehhaltung und den Ablagerungen von Sägespänen an den Ufern ergibt. Das Einzugsgebiet der Ţâşla ist im Vergleich der untersuchten Fließgewässer am stärksten von menschlichem Einfluss betroffen, so dass sich hier Maßnahmen zur Verbesserung der ökologischen Situation als notwendig erweisen. Während der lothische Abschnitt des Ruscova-Flusses, durch die dörflichen Haushalte und die forstwirtschaftlichen Tätigkeiten schwach beeinflusst ist, ist beim Vaser-Fluss ein stärkerer Einfluss durch die genannten Faktoren feststellbar.

REZUMAT: Evaluarea stării ecologice a râului Vişeu şi a unor afluenţi, pe baza structurii comunităţilor de macronevertebrate bentonice (Maramureş, România).

Lucrarea analizează starea ecologică a râului Vişeu şi a afluenţilor acestuia Ţâşla, Vaser şi Ruscova, pe baza structurii comunităţilor de macronevertebrate bentonice în corelaţie cu condiţiile de biotop. În bazinul superior al Ruscovei comunităţile de macronevertebrate bentonice prezintă diversitate cea mai mare, de asemnea diversitatea specifică a ordinelor Ephemeroptera, Plecoptera şi Trichoptera este mare ceea ce indică faptul că habitatele acvatice prezintă o stare apropiată de cea naturală. Cursul inferior al Ruscovei şi râul Vişeu pe sectorul Borşa - Cheile Vişeului sunt supuse unui impact antropic slab, generat de deversarea în râu a apelor reziduale menajere şi din zootehnie şi de depozitarea pe mal a rumeguşului rezultat din activitatea gaterelor. Râul Vaser cu excepţia sectorului de la confluenţa cu Noviciorul este afectat semnificativ de exploatările forestiere. Bazinul Ţâşlei este cel mai afectat de impactul antropic (poluare generată de exploatările miniere din zonă) dintre râurile analizate în zona de referinţă, aici se impun măsuri de redresare ecologică.

INTRODUCTION

This study's aim is the Vişeu River and some tributaries (Ţâşla, Vaser and Ruscova) ecological assessment, based on the quantitative and qualitative structure of the benthic macroinvertebrate communities and on the biotop characteristics (slope, riverbed width, bank stability, bank vegetation type, canal modification and type of substratum). The information result from this study will be useful for the Vişeu River basin management plan attainment. The Vişeu River is a second order tributary of Danube localized in the north part of the Romanian territory (Fig. 1).

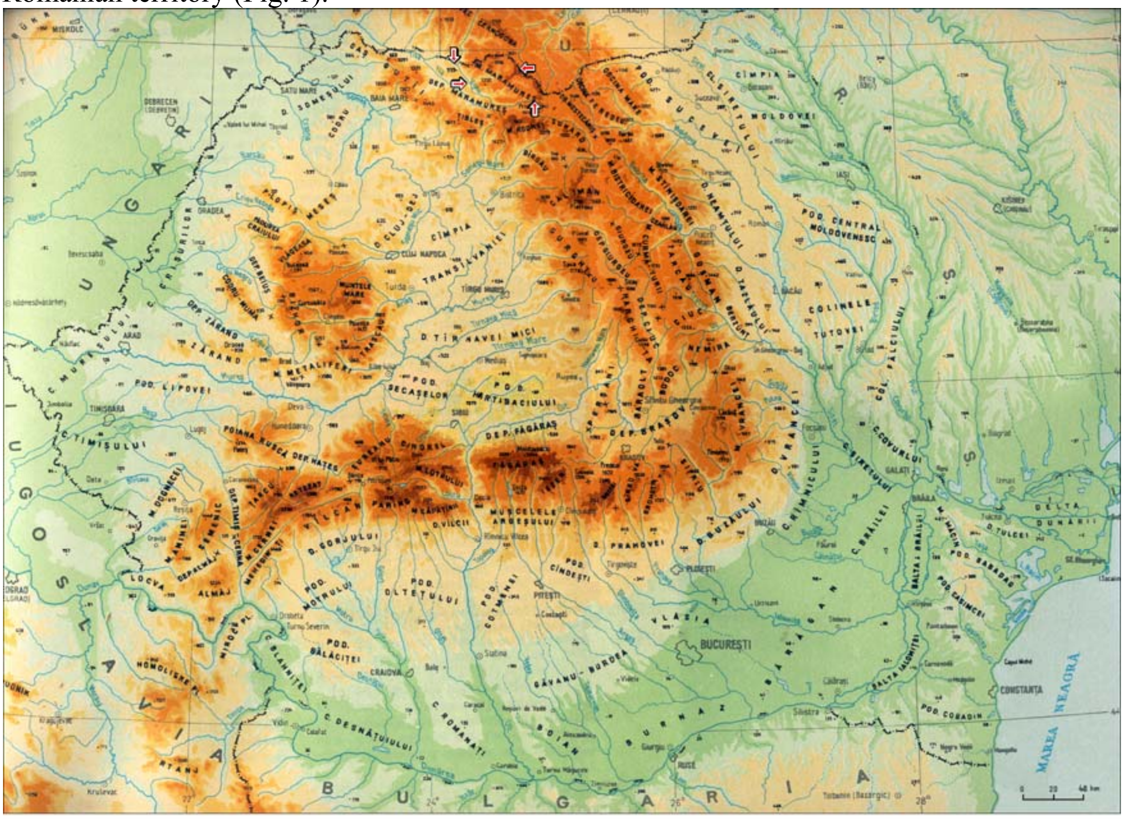

Figure 1: The Vişeu River Basin localization (Badea et al., 1983 - modified).

Vişeu River has its sources in the Rodna Mountains, 80 km length, 1606 km^2 catchment basin and a multiannual average flow at the confluence with Tisa River of 30.7 m^3/s. Some of the most important tributaries of Vişeu River are (from upstream to downstream): Ţâşla River (20 km length, 106 km² drain surface), Vaser River (42 km length, 422 km^2 drain surface, 9 m^3/s multiannual average flow at the confluence with Vişeu River) and Ruscova River (39 km length, 435 km^2 drain surface**,** 11 m^3/s multiannual average flow at the confluence with Vişeu River). (Roşu, 1980; Badea et al., 1983; Posea et al., 1982)

At least due to the biotope characteristics variation and to a variety of human impact types presence, this basin is an interesting one concerning the ecological research. The studied area is part of the Maramureş Mountains Nature Park and of the Maramureş Mountains Natura 2000 site. Actual hidrobiological research in this area are few, in this respect we have to mention the study concerning the benthic macroinvertebrates and fish along Vişeu River, realised by Staicu, Bănăduc and Găldean (1998).

MATERIAL AND METHODS

This paper is based on quantitative and qualitative samples of macroinvertebrates, sampled in 2007 (June - September), in 26 sampling stations (Fig. 2), also biotope factors (slope, riverbed width, bank stability, bank vegetation type, channel modification and type of substratum) were evaluated.

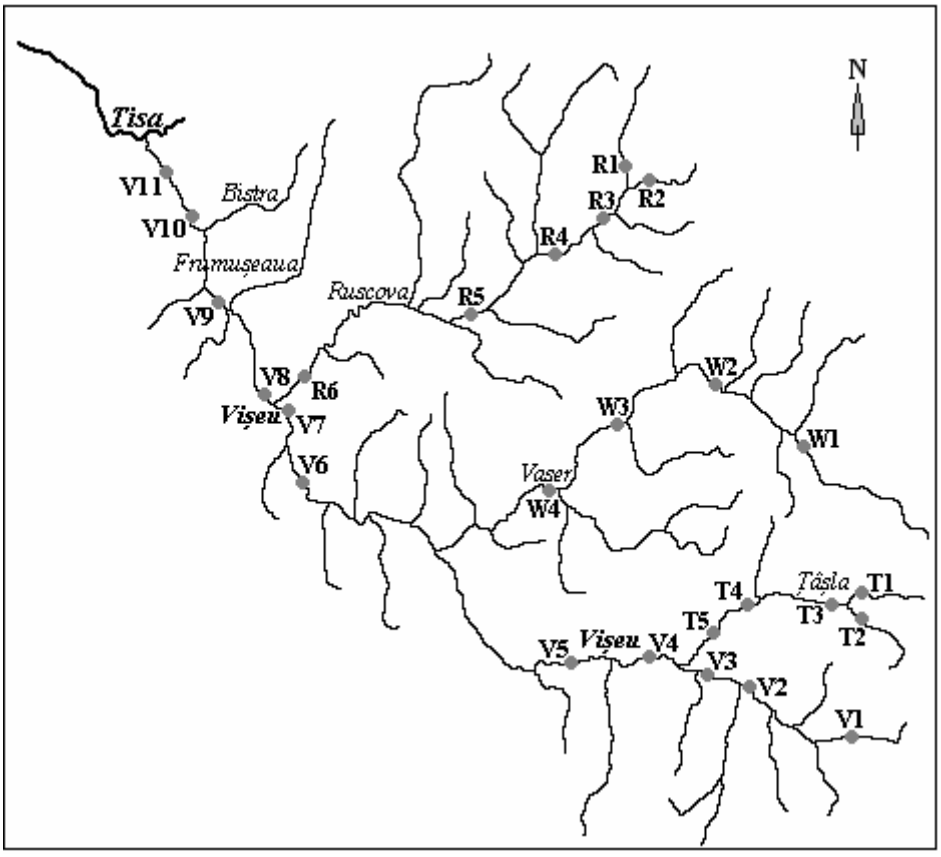

Figure 2: The Vişeu River basin sampling stations (V1-V11, T1-T5, W1-W4, R1-R6) layout.

The sampling stations were chosen according to the valley morphology, the confluence with the main tributaries and the human impact types and degrees on the river sectors - hydro-technical works, pollution sources, and overexploitation of the river bed mineral resource and exploitation of riverine lands.

In each station were sampled quantitative samples from five points, in order to highlight the micro-habitats specific diversity. In the study period 260 quantitative benthic macroinvertebrates samples were sampled and analyzed. The benthic macroinvertebrates quantitative samples were carried out with an 887 cm^2 surface Surber Sampler, with a 250 µ mesh net. The sampled biological material was fixed in 4% formaldehyde solution at which $NaHCO_3$ was added.

The biological material was sorted at a Zeiss, 65x magnifying device, the individuals belonging to each taxonomic group were counted. The identification was done till the species level in the cases of the Ephemeroptera, Plecoptera, Trichoptera and Gastropoda, groups which were considered as indicators for the lotic system ecological state assessment.

After the material was analysed, it was preserved in alcohol 70% and included in the "Lucian Blaga" University of Sibiu, Department of Ecology and Environment Protection, Hydrobiology Laboratory collection.

For the quantitative structure description of the benthic macroinvertebrates communities we have used the relative abundance (A%) and the statistical density (Ds).

The indicator values of the determined species were took from the papers of the following authors: Hellawell (1986); Chapman (1992); Rosenberg and Resh (1993); De Pauw and Hawkes (1992); Seager et al. (1992); Knoben et al. (1995); Resh et al. (1996).

RESULTS AND DISCUSSIONS

Analising the quantitative and qualitative structure of the benthic macroinvertebrates communities from the reference zone can be highlighted six clases (Tab. 1, Fig. 3).

I. Communities in which dominants from the numerical point of view are the efemeropterans. These communities are present in the rivers Vişeuţ (V2), Vişeu 0.5 km upstream the Borşa Resort (V3) and 100 m downstream Borşa Resort (V4), Vaser at the confluence with Bardiu (W3) and at the confluence with Novicior (W4), in Ruscova River basin - Rosoşu Mare (R1) and Rosoşu Mic (R2) 50 m upstream their confluence, Socolău 20 m upstream the confluence with Răchita River (R3) and 50 m downstream the confluence with Rica River (R4);

II. Communities in which numerical codominants are the efemeropterans and the chironomids, present in Vişeu River 1 km downstream Vişeu 50 m upstream confluence with Ruscova River (V7) and 400 m downstream confluence with Bistra River (V10), Ruscova River at 50 m upstream the confluence with Bardiu River (R5) and at 50 m upstream the confluence with Vişeu River (R6);

III. The community of benthic macroinvertebrates present in the Vaser River at Comănu (W1) in which codominants are the plecopterans and the ephemeropterans;

IV. The benthic macroinvertebrates community present in the Vişeuţ River downstream the springs (V1) in which the highest relative abundance (29.8%) was registered for the trichopterans, near which with percentages between 18.54% and 12.58% apear Ephemeroptera, Blepharoceridae, Coleoptera and Plecoptera;

V. The benthic macroinvertebrates community in which numerical dominant are the trichopterans, characteristic for the Ţâşla River (Ţ1, Ţ2, Ţ3, Ţ4);

VI. The benthic macroinvertebrates community in which numerical dominant are the chironomids, present in Vişeu River at 1 km downstream Vişeul de Jos locallity (V6), 250 m downstream confluence with Ruscova River (V8), 400 m downstream confluence with Frumuşeaua River (V9), in Vişeului Gorge (V11) and in Vaser River at Valea Babei (W2).

In the upper Ruscova Basin (R1, R2, R3, R4, R5), the upper course of the Vişeu River (V1, V2, V3) and Vaser River at the confluence with Novicior the benthic macroinvertebrates present a high diversity, also the high specific diversity for the Ephemeroptera, Plecoptera and Trichoptera, are present litoreophilic and oxiphilic species sensitive at the biotope natural conditions (Tab. 1), which show the fact that the aquatic habitats present an almost natural ecological state, the human impact being insignificant.

The lower course of the Ruscova River and Vişeu River on the sector Borşa - downstream the confluence with Bistra (V4 - V10) are under a moderate antropogenic impact, induced by the waste and zootechnical water discharges, and the sawdust illegal deposition on the river banks as a result of the local sawmills activity. The benthic macroinvertebrate communities structure from the Vişeu Gorge (V11; Tab. 1) show the fact that the river ecological state became better in comparison with the upstream sectors.

The Vaser River, excepting the sector from the confluence with the Novicior River is significantly afected by the logging activities (logs run on the minor riverbed, sawdust pollution, the logging installations and plants activities pollution).

The lowest benthic macroinvertebrates density and diversity was found in the Ţîşla River (Tab. 1), this fact reveal the presence of some limiting factors for the organisms development - may be the pollution generated by the local mining exploatations and the mining wastes deposits; the wood is transported directly through the river bed and the mineral resources exploited direct from the river bed.

Table 1: The benthic macroinvertebrate communities structure and the biotop characteristics in the 26 analysed river sectors of the Vişeu River basin (Ds - statistical density, A - relative abundance, qs - taxa present only in qualitative samples).

VIŞEU RIVER			
V1 - Vişeuţ near its springs			
In this area the Vişeuţ River has a torrentiall appearance, an average riverbed width of 50 cm (max. 1.5 m), and an average depth of 20 cm (max. 30 cm). The river bed is formed of rocks, boulders and pebbles; in the river bed are dead tree trunks, on the banks is a coniferous forest.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Ord. Amphipoda Fam. Gammaridae	17.42	5.96	
Ord. Ephemeroptera	54.17	18.54	*Baëtis vernus* Curtis, 1834 *Baëtis rhodani* (Pictet, 1843 - 1845) *Ecdyonurus alpinus* Hefti, Tomka and Zurwerra, 1987 *Ecdyonurus venosus* (Fabricius, 1775) *Rhithrogena picteti* Sowa, 1971
Ord. Plecoptera	36.76	12.58	*Leuctra nigra* (Olivier, 1811) *Leuctra rosinae* Kempny, 1900 *Protonemura praecox* (Morton, 1894) *Protonemura intricata* (Ris, 1902) *Perlodes microcephala* (Pictet, 1833)

Ord. Trichoptera	87.08	29.80	*Rhyacophila fasciata* Hagen, 1859 *Drusus brunneus* Klapalek, 1898 *Drusus discolor* (Rambur, 1842) *Philopotamus montanus* Donovan, 1813
Ord. Coleoptera	42.54	14.56	
Ord. Diptera Fam. Chironomidae Fam. Blepharoceridae	 3.92 50.32	 1.34 17.22	
V2 - Vişeuţ			
The river bed average width is 1.75 m (max. 2 m), the average depth is 20 cm (max. 50 cm), the substratum is formed of boulders and pebbles. On the river banks are willows aproximatively 10% and conferous trees which shadow the river. In this river sector exist microhidrotechnical plants.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Subcls. Oligochaeta	22.55	8.16	
Ord. Amphipoda Fam. Gammaridae	 33.82	 12.25	
Ord. Ephemeroptera	135.29	48.98	*Baëtis vernus* Curtis, 1834 *Baëtis rhodani* (Pictet, 1843 - 1845) *Baëtis alpinus* (Pictet, 1843) *Rhithrogena picteti* Sowa, 1971 *Rhithrogena semicolorata* (Curtis, 1834)
Ord. Plecoptera	28.18	10.20	*Leuctra inermis* Kempny, 1899 *Leuctra fusca* (Linnaeus, 1758) *Protonemura aestiva* Kis, 1965 *Protonemura intricata* (Ris, 1902) *Perlodes microcephala* (Pictet, 1833) *Chloroperla tripunctata* (Scopoli, 1763)
Ord. Trichoptera	33.82	12.25	*Rhyacophila fasciata* Hagen, 1859 *Rhyacophila* sp. *Drusus brunneus* Klapalek, 1898 *Polycentropus flavomaculatus* (Pictet, 1834)
Ord. Diptera Fam. Chironomidae	 22.55	 8.16	
V3 - Vişeu, 0.5 km upstream the Borşa Resort			
The medium width of the minor river bed is 4 m (max. 4.5 m), and the average water depth is 20 cm (max. 50 cm). The substratum is formed mainly of boulders and pebbles, near the banks appear stripes of course sand. On the banks are willows and coniferous trees. Approximate 30 m downstream in the minor river bed are concrete tubes and devices for water deviation for the near fish farm.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Efemeroptera, Plecoptera, Trichoptera
Ord. Tricladida Fam. Planaridae	 qs		
Ord. Amphipoda Fam. Gammaridae	 5.64	 2	
Ord. Ephemeroptera	135.28	48	*Habroleptoides modesta* (Hagen, 1864) *Serratella ignita* (Poda, 1761) *Baëtis vernus* Curtis, 1834 *Baëtis rhodani* (Pictet, 1843 - 1845) *Rhithrogena semicolorata* (Curtis, 1834)

Ord. Plecoptera	16.91	6	*Leuctra inermis* Kempny, 1899 *Protonemura praecox* (Morton, 1894) *Protonemura intricata* (Ris, 1902) *Perlodes microcephala* (Pictet, 1833)
Ord. Trichoptera	101.47	36	*Rhyacophila intermedia* McLachlan, 1968 *Drusus brunneus* Klapalek, 1898 *Silo pallipes* (Fabricius, 1781) *Philopotamus montanus* Donovan, 1813 *Limnephilus* sp.
Ord. Diptera Fam. Chironomidae Fam. Blepharoceridae	 5.64 16.91	 2 6	
V4 - Vişeu, 100 m downstream Borşa Resort			
In this area the medium width of the minor river bed is 6 m (max. 6.5 m), and the average water depth is 50 cm (max. 70 cm). The substratum is formed mainly of pebbles and boulders, near the banks appear stripes of course sand. On the banks are willows and coniferous trees.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Efemeroptera, Plecoptera, Trichoptera
Ord. Tricladida Fam. Planaridae	qs		
Subcls. Oligochaeta	11.27	1.41	
Ord. Amphipoda Fam. Gammaridae	 11.27	 1.41	
Ord. Ephemeroptera	552.42	69.01	*Baëtis vernus* Curtis, 1834 *Baëtis rhodani* (Pictet, 1843 - 1845) *Rhithrogena semicolorata* (Curtis, 1834)
Ord. Plecoptera	11.27	1.41	*Leuctra inermis* Kempny, 1899 *Perlodes microcephala* (Pictet, 1833) *Nemoura cinerea* (Retzius, 1783)
Ord. Trichoptera	180.38	22.53	*Rhyacophila fasciata* Hagen, 1859 *Drusus bruneus* Klapalek, 1898 *Goera pilosa* (Fabricius, 1775) *Philopotamus montanus* Donovan, 1813
Ord. Diptera Fam. Chironomidae	 33.82	 4.23	
Fam. Blepharoceridae	qs		
V5 - Vişeu 50 m upstream the Moisei locality			
Mountainous river, with high liquid discharge and speed; the substratum is formed of rocks, boulders and pebbles. In the lenitic areas are small sandy patches. On the river banks are wiliows and alder trees. The maximum width of the minor river bed is 8 m, and the average one is 6 m; the maximum water depth is 50 cm, and the average one 30 cm.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Subcls. Oligochaeta	5.64	1.35	
Cls. Araneida	5.64	1.35	
Ord. Amphipoda Fam. Gammaridae	 5.64	 1.35	

Ord. Ephemeroptera	388.95	93.24	*Baëtis vernus* Curtis, 1834
Ord. Plecoptera	qs		*Perlodes intricata* (Pictet, 1841)
Ord. Trichoptera	qs		*Hydropsyche pelucidulla* (Curtis, 1834)
Ord. Diptera Fam. Chironomidae	11.27	2.71	
V6 - Vişeu 1 km downstream Vişeu de Jos			
The river course is meandered, the medium width of the minor river bed is 40 m (max. 50 m), the average water depth is 40 cm (max. 1 m). The substratum is formed mainly of pebbles covered with a thin layer of mud, also appear boulders and course sand. On the banks exist willows. The minor riverbed is disturbed due to the substratum exploatation.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Subcls. Oligochaeta	5.64	1.11	
Ord. Ephemeroptera	129.65	25.55	*Baëtis rhodani* (Pictet, 1843 - 1845)
Ord. Plecoptera	5.64	1.11	*Perlodes intricata* (Pictet, 1841)
Ord. Trichoptera	67.64	13.33	*Rhyacophila fasciata* Hagen, 1859 *Hydropsyche instabilis* Curtis, 1834 *Hydropsyche pelucidulla* (Curtis, 1834)
Ord. Diptera Fam. Chironomidae	298.76	58.89	
V7 - Vişeu, 50 m upstream confluence with Ruscova River			
In this area the medium width of the minor river bed is 25 m (max. 30 m), and the average water depth is 40 cm (max. 70 cm). The substratum is formed mainly of pebbles and boulders covered with a thin layer of mud. The river course is meandered, on the banks are willows.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Ord. Tricladida Fam. Planaridae	5.64	0.46	
Ord. Ephemeroptera	625.70	50.92	*Baëtis rhodani* (Pictet, 1843 - 1845) *Siphlonurus aestivalis* Studemann, Tomka, Landolt, 1992 *Caenis robusta* Eaton, 1884 *Ecdyonurus dispar* Kimmins, 1942
Ord. Plecoptera	16.91	1.38	*Rhabdiopteryx* sp. *Brachyptera seticornis* (Klapálek, 1902)
Ord. Trichoptera	197.29	16.05	*Rhyacophila fasciata* Hagen, 1859 *Hydropsyche pellucidula* (Curtis, 1834)
Ord. Coleoptera	5.64	0.46	
Ord. Diptera Fam. Chironomidae	377.68	30.73	
V8 - 250 m downstream confluence with Ruscova River			
Meandered course, the minor river bed average width is 30 m (max. 40 m), the water average depth is 40 cm (max. 70 cm), the river bed is formed of medium boulders, covered with mud, wilow on banks.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Cls. Araneida	5.64	0.65	
Ord. Amphipoda Fam. Gammaridae	33.82	3.92	
Ord. Ephemeroptera	163.47	18.95	*Ecdyonurus dispar* Kimmins, 1942 *Ecdyonurus venosus* Eaton, 1868 *Rhitrogena semicolorata* (Curtis, 1834)

			Caenis macrura Stephens, 1835 *Serratella ignita* (Poda, 1761)
Ord. Plecoptera	73.28	8.50	*Leuctra inermis* Kempny, 1899 *Leuctra fusca* (Linnaeus, 1758) *Perlodes intricata* (Pictet, 1841)
Ord. Trichoptera	157.84	18.3	*Rhyacophila fasciata* Hagen, 1859 *Rhyacophila* sp. *Hydropsyche instabilis* Curtis, 1834 *Limnephilus rhombicus* (Linnaeus, 1758)
Ord. Diptera Fam. Chironomidae	428.41	49.67	
V9 - Vişeu 400 m downstream confluence with Frumuşeaua River			
Meandered course, the minor river bed average width is 12 m (max. 16 m), the water average depth is 60 cm (max. 1.70 m), the river bed substratum is formed of medium sized boulders covered with a thin layer of mud. On both banks are wilows.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Ord. Amphipoda Fam. Gammaridae	qs		
Ord. Ephemeroptera	67.64	24	*Baëtis rhodani* (Pictet, 1843 - 1845) *Serratella ignita* (Poda, 1761)
Ord. Plecoptera	28.18	10	*Leuctra inermis* Kempny, 1899 *Protonemura praecox* (Morton 1894)
Ord. Trichoptera	11.27	4	*Rhyacophila fasciata* Hagen, 1859 *Rhyacphila* sp. *Hydropsyche fulvipes* (Curtis, 1834) *Hydropsiche pelucidulla* (Curtis, 1834) *Sericostoma personatum* (Kirby and Spencer, 1826) *Hydroptilidae* sp.
Ord. Diptera Fam. Chironomidae	174.75	62	
V10 - Vişeu, 400 m dwonstream with confluence with Bistra River			
Meandered course, the minor river bed average width is 30 m (max. 50 m), the water average depth is 40 cm (max. 1.60 m), the river bed substratum is formed of boulders, pebbles, course alternating with fine sand near the banks. On the banks are willows and alders. On the banks and in the minor riverbed are present domestic wastes.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Efemeroptera, Plecoptera, Trichoptera
Subcls. Oligochaeta	5.64	4	
Ord. Ephemeroptera	56.37	40	*Baëtis rhodani* (Pictet, 1843 - 1845) *Rhithrogena semicolorata* (Curtis, 1834)
Ord. Plecoptera	5.64	4	*Amphinemura sulcicollis* (Stephens, 1836)
Ord. Trichoptera	16.91	12	*Rhyacophila fasciata* Hagen, 1859 *Hydropsyche fulvipes* (Curtis, 1834) *Hydropsyche instabilis* Curtis, 1834 *Hydropsyche pelucidulla* (Curtis, 1834) *Limnephilus lunatus* Curtis, 1834 *Sericostoma personatum* (Kirby and Spencer, 1826)

Ord. Diptera Fam. Chironomidae	56.37	40	
V11 - Vişeu in Vişeu Gorge			
The minor river bed average width is 20 m (max. 25 m), the water average depth is 60 cm (max. depth 1.70 m), the river bed substratum is formed of small sized boulders covered with a thin layer of mud.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Gastropoda, Ephemeroptera, Plecoptera, Trichoptera
Cls. Gastropoda Fam. Ancylidae	5.64	0.93	*Ancylus fluviatilis* Müller, 1774
Subcls. Oligochaeta	22.55	3.74	
Ord. Amphipoda Fam. Gammaridae	22.55	3.74	
Ord. Ephemeroptera	135.29	22.43	*Baëtis vernus* Curtis, 1834 *Baëtis fuscatus* (Linnaeus, 1761) *Serratella ignita* (Poda, 1761) *Rhithrogena semicolorata* (Curtis, 1834)
Ord. Plecoptera	33.82	5.61	*Leuctra inermis* Kempny, 1899 *Protonemura praecox* (Morton, 1894) *Perlodes microcephala* (Pictet, 1833)
Ord. Trichoptera	22.55	3.74	*Rhyacophila fasciata* Hagen, 1859 *Rhyacphila* sp. *Hydropsyche angustipennis* (Curtis, 1834) *Hydropsyche instabilis* Curtis, 1834 *Hydropsyche pelucidulla* (Curtis, 1834) *Sericostoma personatum* (Kirby and Spencer, 1826)
Ord. Diptera Fam. Chironomidae	360.77	59.81	
Ţâşla River			
T1 - Ţâşla 2 km upstream the confluence with Bălăsâna			
In this area the Ţâşla River has a torrentiall appearance, the river slope is high, the substratum is formed of rocks and boulders. The average riverbed width of 2 m (maximum width 3 m), and an average depth of 25 cm (maximum depth of 40 cm). On the river banks is a mixed coniferous-deciduous forest).			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Efemeroptera, Plecoptera, Trichoptera
Ord. Ephemeroptera	5.67	12.56	*Baëtis rhodani* (Pictet, 1843 - 1845)
Ord. Plecoptera	qs		*Leuctra* sp. *Protonemura intricata* (Ris, 1902)
Ord. Trichoptera	33.82	74.88	*Philopotamus montanus* (Donovan, 1813) *Drusus discolor* (Rambur, 1842)
Ord. Diptera Fam. Chironomidae	5.67	12.56	
T2 - Ţâşla 100 m downstream the confluence with Bălăsâna River			
In this area the average riverbed width is of 4.5 m (maximum width 6 m), and an average depth of 35 cm (maximum depth of 50 cm), the substratum is formed of boulders, rocks and pebbles. The right bank is covered with concrete and in the same area Ţâşla River receive the liquid flow from a chanal of concrete (possible liquid flows captured from the local mining exploatations pools), in the river bed the mineral resources are directly exploited.			

The benthic macroinvertebrates community structure			
Taxa	Ds (ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Ord. Tricladida Fam. Planaridae	qs		
Subcls. Oligochaeta	11.27	5.56	
Ord. Ephemeroptera	50.73	25.0	*Baëtis vernus* Curtis, 1834 *Baëtis rhodani* (Pictet, 1843 - 1845) *Rhithrogena semicolorata* (Curtis, 1834)
Ord. Plecoptera	5.67	2.78	*Protonemura intricata* (Ris, 1902) *Perlodes intricata* (Pictet, 1841) *Protonemura praecox* (Morton, 1894) *Isoperla grammatica* (Poda, 1761)
Ord. Trichoptera	118.38	58.32	*Drusus discolor* (Rambur, 1842) *Rhyacophila* sp.
Ord. Coleoptera	5.67	2.78	
Ord. Diptera Fam. Chironomidae	11.27	5.56	
T3 - Ţâşla at the confluence with the Vinişorul Streamlet			
The natural structure of the minor river bed was modified - the banks are embankmented (the right bank with boulders and the left bank with wood), reason for which here are missing the water slow moving sectors near the banks. The average riverbed width is of 4 m (maximum width is of 4.5 m), and an average depth of 25 cm (maximum depth is of 30 cm), the substrata is formed of pebbles and boulders. At aproximately 350 m distance on the right bank is localised the not ecologic waste deposit of the Borşa locality.			
The benthic macroinvertebrates community structure			
Taxa	Ds (ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Subcls. Oligochaeta	5.67	3.47	
Ord. Amphipoda Fam. Gammaridae	11.27	6.89	
Ord. Ephemeroptera	22.55	13.79	*Baëtis vernus* Curtis, 1834 *Baëtis rhodani* (Pictet, 1843 - 1845)
Ord. Plecoptera	16.91	10.34	*Protonemura praecox* (Morton, 1894) *Isoperla grammatica* (Poda, 1761) *Perlodes intricata* (Pictet, 1841)
Ord. Trichoptera	84.55	51.72	*Rhyacophila* sp.
Ord. Coleoptera	5.67	3.47	
Ord. Diptera Fam. Chironomidae Fam. Blepharoceridae	11.27 5.67	6.89 3.47	
Vaser River			
W1 - Vaser River at Comănu			
Tipicaly mountainous river, the river bed average width of 4 m (maximum width 6 m), average water depth 40 cm (maximum water depth 50 cm), the substratum is formed of rocks, boulders and pebbles. On the river banks are alder trees. The valley slopes are covered with coniferous species and rare deciduous species.			

The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Ord. Tricladida Fam. Planaridae	qs		
Subcls. Oligochaeta	qs		
Cls. Araneida	11.27	12.5	
Ord. Ephemeroptera	33.82	37.5	*Rhithrogena semicolorata* (Curtis, 1834) *Rhithrogena picteti* Sowa, 1971 *Baëtis alpinus* (Pictet, 1843)
Ord. Plecoptera	45.10	50.0	*Protonemura praecox* (Morton, 1894) *Isoperla grammatica* (Poda, 1761)
Ord. Trichoptera	qs		*Philopotamus variegatus* (Scopoli, 1763) *Sericostoma personatum* (Kirby andSpencer, 1826) *Rhyacophila* sp.
Ord. Diptera Fam. Chironomidae Fam. Blepharoceridae	qs qs		
W2 - Vaser River at Valea Babei			
The minor river bed average width is 7 m (max. 1 m), average water depth 40 cm (max. 60 cm), the substratum is formed of medium boulders and pebbles on a sandy layer. On the right bank the boulders are covered with a thin lay of mud. The minor river bed is affected by the logs transport, fact revealed by the benthic macroinvertebrates communities structure, which present a very low density.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Ord. Ephemeroptera	11.27	7.14	*Rhithrogena semicolorata* (Curtis, 1834) *Baëtis vernus* Curtis, 1834 *Baëtis alpinus* (Pictet, 1843)
Ord. Plecoptera	50.73	32.14	*Protonemura praecox* (Morton, 1894) *Isoperla grammatica* (Poda, 1761)
Ord. Trichoptera	qs		*Sericostoma personatum* (Kirby and Spencer, 1826) *Hydropsyche pelucidulla* (Curtis, 1834) *Hydropsyche* sp.
Ord. Diptera Fam. Chironomidae	95.83	60.72	
W3 - Vaser at the confluence with Bardău River			
In this area the minor river bed average width is 7 m, (max. 11 m), average water depth 40 cm (max. 1 m), the substratum is formed of medium sized boulders and pebbles. On the banks are alder trees.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Ord. Tricladida Fam. Planaridae	qs		
Ord. Amphipoda Fam. Gammaridae	28.18	9.08	*Baëtis vernus* Curtis, 1834 *Baëtis rhodani* (Pictet, 1843 - 1845) *Ecdyonurus venosus* (Fabricius, 1775) *Rhithrogena semicolorata* (Curtis, 1834)
Ord. Ephemeroptera	129.65	41.82	*Leuctra inermis* Kempny, 1899 *Protonemura praecox* (Morton, 1894) *Perla marginata* (Panzer, 1799)
Ord. Plecoptera	62.01	20	*Sericostoma personatum* (Kirby and Spencer, 1826) *Glossosoma conformis* Neboiss, 1963 *Hydropyche pellucidulla* (Curtis, 1834)

Ord. Trichoptera	39.46	12.73	
Ord. Coleoptera	11.27	3.64	
Ord. Diptera Fam. Chironomidae	39.46	12.73	
W4 - Vaser at the confluence with Novicior Brook			
The minor river bed average width is 8 m (max. 9 m), average water depth 40 cm (max. 50 cm), the substratum is formed of boulders and pebbles, near the banks apear sandy stripes. On the banks are alders.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Ord. Ephemeroptera	248.03	57.90	*Leptophlebia marginata* (Linnaeus, 1767) *Baëtis lutheri* (Müller-Liebenau, 1967) *Baëtis rhodani* (Pictet, 1843 - 1845) *Ecdyonurus venosus* (Fabricius, 1775) *Rhithrogena semicolorata* (Curtis, 1834) *Serratella ignita* (Poda, 1761)
Ord. Plecoptera	67.64	15.79	*Leuctra inermis* Kempny, 1899 *Protonemura praecox* (Morton, 1894) *Perla marginata* (Panzer, 1799) *Perla burmeisteriana* Claassen, 1936 *Perlodes microcephala* (Pictet, 1833)
Ord. Trichoptera	33.82	7.89	*Sericostoma personatum* (Kirby and Spencer, 1826) *Glossosoma conformis* Neboiss, 1963 *Hydropyche pellucidulla* (Curtis, 1834) *Brachycentrus montanus* Klapalek, 1892
Ord. Diptera Fam. Chironomidae	78.92	18.42	
Ruscova River Basin			
R1 - Rosoşu Mare Streamlet 50 m upstream the confluence with Rosoşu Mic Streamlet			
Typical river bed for a small mountainous river (867 m) in coniferous forest. The minor river bed average width is 2 m, (max. 2.5 m), average water depth 25 cm (max. 40 cm), the substratum formed of boulders, rocks, pebbles. On the river banks and in the river bed are logs and deposits of sawdust.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Subcls. Oligochaeta	11.27	13.33	
Ord. Amphipoda Fam. Gammaridae	qs		
Ord. Ephemeroptera	45.10	53.34	*Ecdyonurus picteti* (Meyer-Dür, 1864) *Ecdyonurus venosus* (Fabricius, 1875) *Rhithrogena semicolorata* (Curtis, 1834) *Rhithrogena picteti* (Sowa, 1971) *Baëtis rhodani* (Pictet, 1843-1845) *Baëtis vernus* Curtis, 1834
Ord. Plecoptera	11.27	13.33	*Protonemura intricata* (Ris, 1902) *Perla marginata* (Panzer, 1799) *Isoperla rivulorum* (Pictet, 1841)
Ord. Trichoptera	11.27	13.33	*Goera pilosa* (Fabricius, 1775) *Brachycentrus montanus* Klapalek, 1892 *Halesus digitatus* (von Paula Schrank, 1781)

Ord. Coleoptera	qs		
Ord. Diptera Fam. Chironomidae	5.64	6.67	
Fam. Blepharoceridae	qs		
R2 - Rosoşu Mic Streamlet 50 m upstream the confluence with Rosoşu Mare Streamlet			
Rosoşu Mic Streamlet, a right side torrenticoll tributary of Rosoşu Mare. The sector have few branches, the average width of the minor river bed is 2 m (max. 2.5 m), the water average depth is 25 cm (max. 30 cm), the substratum is formed of boulders, roks and pebbles, in the river bed are also logs.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Ephemeroptera, Plecoptera, Trichoptera
Ord. Tricladida Fam. Planaridae	5.64	0.52	
Ord. Amphipoda Fam. Gammaridae	118.38	10.88	
Ord. Ephemeroptera	428.4	39.37	*Ecdyonurus picteti* (Meyer-Dür, 1864) *Rhithrogena semicolorata* (Curtis, 1834) *Rhithrogena picteti* Sowa, 1971 *Baëtis rhodani* (Pictet, 1843 - 1845) *Baëtis vernus* Curtis, 1834
Ord. Plecoptera	163.47	15.03	*Leuctra hippopus* Kempny, 1899 *Protonemura praecox* (Morton, 1894) *Perla burmeisteriana* Claassen, 1936 *Perla marginata* (Panzer, 1799) *Isoperla rivulorum* (Pictet, 1841)
Ord. Trichoptera	253.66	23.32	*Goera pilosa* (Fabricius, 1775) *Sericostoma personatum* (Kirby and Spencer, 1826) *Brachycentrus montanus* Klapalek, 1892 *Halesus digitatus* (von Paula Schrank, 1781)
Ord. Coleoptera	5.64	0.52	
Ord. Diptera Fam. Blepharoceridae	112.74	10.36	
R3 - Socolău 20 m upstream the confluence with Răchita Streamlet			
Situated at 747.72 m, in a mixed coniferous-deciduous forest, the average width of the minor riverbed is 4 m (max. 6 m), the average depth 40 cm (max. 60 cm), branched with boulders, rocks, pebbles river bed.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Efemeroptera, Plecoptera, Trichoptera
Subcls. Oligochaeta	11.27	1.40	
Ord. Amphipoda Fam. Gammaridae	22.55	2.80	
Ord. Ephemeroptera	484.78	60.14	*Rhithrogena semicolorata* (Curtis, 1834) *Baëtis rhodani* (Pictet, 1843-1845) *Baëtis vernus* (Curtis, 1834)
Ord. Plecoptera	67.64	8.39	*Leuctra hippopus* Kempny, 1899 *Protonemura praecox* (Morton, 1894) *Perla burmeisteriana* Claassen, 1936 *Perla marginata* (Panzer, 1799)
Ord. Trichoptera	157.84	19.58	*Goera pilosa* (Fabricius, 1775) *Brachycentrus montanus* Klapalek, 1892 *Halesus digitatus* (von Paula Schrank, 1781)

Ord. Coleoptera	qs		
Ord. Diptera Fam. Chironomidae	62.01	7.69	
Fam. Blepharoceridae	qs		
R4 - Ruscova 50 m downstream the Socolău and Rica confluence			
The average width of the minor river bed is 7 m (max. 8 m), the average water depth is 30 cm (max. 60 cm). The substratum is formed of boulders, rocks and pebbles. In the slow moving water sectors the boulders are covered with a thin layer of mud and some with moss.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Gastropoda, Ephemeroptera, Plecoptera, Trichoptera
Cls. Gastropoda Fam. Ancylidae	33.82	3.57	*Ancylus fluviatilis* Müller, 1774
Cls. Araneida	11.27	1.19	
Ord. Ephemeroptera	473.51	50.0	*Ecdyonurus helveticus* (Eaton, 1877) *Ecdyonurus dispar* (Curtis, 1834) *Rhithrogena semicolorata* (Curtis, 1834) *Baëtis rhodani* (Pictet, 1843-1845) *Baëtis vernus* Curtis, 1834 *Ephemerella notata* (Eaton, 1887)
Ord. Plecoptera	22.55	2.38	*Leuctra hippopus* Kempny, 1899 *Protonemura praecox* (Morton, 1894) *Perla marginata* (Panzer, 1799)
Ord. Trichoptera	259.30	27.38	*Goera pilosa* (Fabricius, 1775) *Brachycentrus montanus* Klapalk, 1892 *Sericostoma personatum* (Kirby and Spencer, 1826) *Halesus digitatus* (von Paula Schrank, 1781)
Ord. Coleoptera	11.27	1.19	
Ord. Diptera Fam. Chironomidae	qs		
Fam. Blepharoceridae	135.29	14.29	
R5 - Ruscova 50 m upstream the confluence with Bardiu River, in Poienile de Sub Munte locality			
The average width of the minor river bed 12 m (max. 14), the averagge water depth 50 cm (max. 80), boulders and pebbles in substratum. Willow and alder trees on the banks. Loggs and wastes in the river.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Gastropoda, Ephemeroptera, Plecoptera, Trichoptera
Cls. Gastropoda Fam. Ancylidae	qs		*Ancylus fluviatilis* Müller, 1774
Ord. Tricladida Fam. Planaridae	qs		
Subcls. Oligochaeta	45.1	6.45	
Ord. Amphipoda Fam. Gammaridae	11.27	1.61	

Ord. Ephemeroptera	236.75	33.87	*Ecdyonurus venosus* (Fabricius, 1875) *Epeorus sylvicola* (Pictet, 1865) *Rhithrogena semicolorata* (Curtis, 1834) *Baëtis rhodani* (Pictet, 1843-1845) *Baëtis alpinus* (Pictet, 1843) *Serratella ignita* (Poda, 1761)
Ord. Plecoptera	180.38	25.81	*Leuctra hippopus* Kempny, 1899 *Protonemura praecox* (Morton, 1894) *Perla marginata* (Panzer, 1799)
Ord. Trichoptera	22.55	3.23	*Goera pilosa* (Fabricius, 1775) *Rhyacophila fasciata* Hagen, 1859 *Hydropsyche pelucidulla* (Curtis, 1834)
Ord. Coleoptera	11.27	1.61	
Ord. Diptera Fam. Chironomidae Fam. Blepharoceridae	 169.11 22.55	 24.19 3.23	
R6 - Ruscova River 50 m upstream the confluence with Vişeu River			
Big mountainous river, the average minor river bed is 15 m (maximum 18 m), the water has a high speed, the average depth is 30-40 cm (maximum 50 cm); the substratum is formed of pebbles, boulders and course sand.			
The benthic macroinvertebrates community structure			
Taxa	Ds(ind./m^2)	A%	Species list - Gastropoda, Ephemeroptera, Plecoptera, Trichoptera
Cls. Gastropoda Fam. Ancylidae	qs		*Ancylus fluviatilis* Müller, 1774
Subcls. Oligochaeta	22.55	2.27	
Cls. Hirudinea	qs		
Ord. Amphipoda Fam. Gammaridae	 73.28	 7.39	
Ord. Ephemeroptera	411.50	41.48	*Ecdyonurus dispar* (Curtis, 1834) *Ecdyonurus venosus* (Fabricius, 1875) *Ecdyonurus torrentis* (Kimmins, 1942) *Rhithrogena semicolorata* (Curtis, 1834) *Baëtis rhodani* (Pictet, 1843-1845) *Baëtis lutheri* (Müller-Liebenau, 1967) *Serratella ignita* (Poda, 1761) *Ephemerella notata* (Eaton, 1887) *Leptophlebia marginata* (Linné, 1767) *Habrophlebia fusca* (Curtis, 1834)
Ord. Plecoptera	62.00	6.25	*Leuctra inermis* Kempny, 1899 *Protonemura intricata* (Ris, 1902) *Perlodes microcephala* (Pictet, 1833)
Ord. Trichoptera	146.56	14.77	*Rhyacophila fasciata* Hagen, 1859 *Rhyacphila* sp. *Hydropsyche fulvipes* (Curtis, 1834) *Hydropsyche pelucidulla* (Curtis, 1834)
Ord. Coleoptera	16.92	1.70	
Ord. Diptera Fam. Chironomidae	 259.44	 26.14	

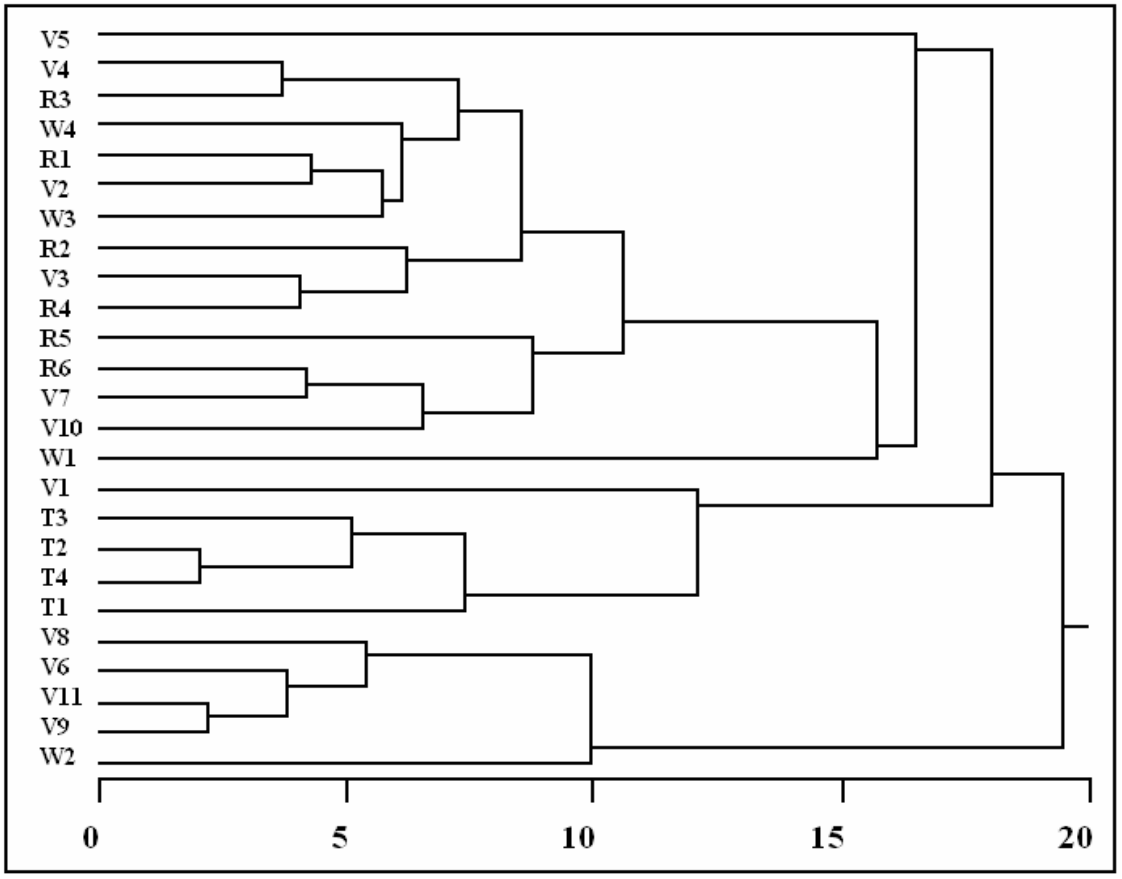

Figure 3: Tree diagram based of the benthic macroinvertebrate groups relative abundence (A%), of the 26 analyzed lotic sectors (euclidian distances, V1 - V11, T1 - T4, W1 - W4, R1 - R6; sampling stations).

CONCLUSIONS

In the higher Ruscova Basin the aquatic habitats present an almost natural ecological state, the human impact being insignificant. Here is the benthic macroinvertebrates highest diversity, also the highest specific diversity for the Ephemeroptera, Plecoptera and Trichoptera.

In the extreme upper Vişeu River basin, the aquatic habitats present an almost natural ecological state, the Borşa resort area and the confluence with the impacted Ţâşla River section induce a significant negative effect on the benthic macroinvertebrates diversity which recover only in the Vişeu Gorge, due to the river selfcleaning processes and clean tributaries.

The Ţâşla River basin is the most heavily impacted by the human activities.

Lotic sectors slightly affected by the rural and forest exploitation impact are the lower Ruscova River and the Vaser River.

The lotic sectors affected by the urban and industrial impact are Vişeu River begining with the section downstream the Borşa locallity and its all middle section.

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THE *HUCHO HUCHO* (LINNAEUS, 1758), (SALMONIFORMES, SALMONIDAE) SPECIES, MONITORING IN THE VIŞEU RIVER (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, lotic system, Danube salmon, monitoring, human impact, management, conservation.

ABSTRACT

The *Hucho hucho* (Linnaeus, 1758) is the largest, exclusively riverine and anadromous salmonid species, which can be found in Europe in Danube, Volga and Pechora basins.

Keeping in mind the extensive initial range of this species, no other fish species has been decimated by man to such an extent.

This study provide data regarding *Hucho hucho* monitoring in the Vişeu River between 1997 and 2008, highlight the possible problems and restrictive factors for *Hucho hucho* presence in this river, propose general and specific management elements for the Danube salmon protection and conservation in this area.

ZUSAMMENFASSUNG: Monitoring des *Hucho hucho* (Linnaeus, 1758), (Salmoniformes, Salmonidae) im Vişeu-Fluss (Maramuresch, Rumänien).

Der *Hucho hucho* (Linnaeus, 1758) ist die größte, ausschließlich lotische und anadrome Art, die in Europa im Einzugsgebiet der Donau, Wolga und Petschora vorkommt.

Betrachtet man die ursprüngliche, weite Verbreitung, ist festzustellen, dass es unter den Fischen keine andere Art gibt, die vom Menschen dermaßen dezimiert wurde.

Die vorliegende Untersuchung umfasst Daten zu einem im Vişeu-Fluss zwischen 1997-2008 durchgeführten Monitoring, das die möglichen Probleme und einschränkenden Faktoren für das Vorkommen des *Hucho hucho* in diesem Fluss aufzeigt. Es werden Vorschläge zum allgemeinen und dem spezifischen Management für Schutz und Erhalt des *Hucho hucho* in diesem Gebiet gemacht.

REZUMAT: Monitorizarea speciei *Hucho hucho* (Linnaeus, 1758), (Salmoniformes, Salmonidae) în râul Vişeu (Maramureş, România).

Hucho hucho (Linnaeus, 1758) este cea mai mare, exclusiv lotică şi anadromă specie de salmonid, care poate fi găsită în Europa în bazinele Dunării, Volgăi şi Pechora.

Păstrând în minte răspândirea inițială extensivă a acestei specii, nici o altă specie de peşte nu a fost astfel decimată de om.

Acest studiu oferă date referitoare la monitoringul speciei *Hucho hucho* în râul Vişeu între 1997 şi 2008, scoate în evidență posibilele probleme şi factori restrictivi pentru prezența speciei *Hucho hucho* în acest râu, propune elemente de management general şi specific pentru protecția şi conservarea lostriței în această arie.

INTRODUCTION

The *Hucho hucho* (Linnaeus, 1758), is the largest, exclusively riverine and anadromous species, which can be found in Europe in Danube, Volga and Pechora basins (Nelson, 1976; Holčik, 1995). The *Hucho hucho* is known in the Romanian Carpathians area as lostriță, lostoză, lostosă, lostocă, lostiță, lostruță, lostucă or puică (Vasiliu, 1959), it is the biggest salmon in the Romanian waters, it can reach around 20 kg and over 1 m length, was the most popular salmon species in its distribution area in the last centuries and attracted the Romanian ichtiologists attention beginning with the XVIII Century (Antipa, 1909).

In natural conditions, the Romanian Carpathians hydrographical nets are highly favourable for salmonids, mainly in their upper parts. This area sheltered in the last part of the XIX Century and the beginning of the XX Century also this valuable salmon species in many river basins: Mureş, Cerna in Banat region, Danube (probably from its tributaries), Jiu, Olt, Lotru, Argeş, Râul Târgului and may be in Crişul Negru, Crişul Alb, Crişul Repede, Strei, Timiş, Râul Doamnei, Buzău, Moldova, Suceava and Siret (Bănărescu, 1964).

In the middle of the XX Century this species was still only in Vişeu, Vaser, Novăț, Ruscova, Bistrița Moldovenească, Dorna, Suceava and Moldova rivers (Bănărescu, 1964).

Unfortunately in the last decades the regress was continued and in the present only about few such lotic systems exist data regarding this species. This obvious accentuated regress was happened in the general context of the increasing of the human impact also in the upper salmonids sectors of the Romanian Carpathian rivers with negative effects also on the aquatic communities (Ardelean and Wilhelm, 2007; Bănăduc, 1999, 2005, 2006; Bănărescu, 2004, 2005; Bănărescu and Oromulu, 2004; Curtean-Bănăduc, 2005; Curtean-Bănăduc et al., 2007; Davideanu et al., 2006; Meşter et al., 2003; Sandu et al., 2008, Vornicu et al., 2006).

The *Hucho hucho* is protected by Low 13 of 1993 (through which Romania became a part of the Bern Convention), the European Directive 92/43/EEC, O.U.G. 57/2007 of the Romanian Government regarding the regime of natural protected areas, natural habitats conservation, of the wild flora and fauna.

In spite of the efforts of protection of this species the constant human pressures make it to regress continuously, especially due to: over fishing, man-made lakes of the upper reach of rivers and pollution. As a result of these threats, this species is now common in only around 33% of its former range, rare in 28% and has disappeared completely from 39% (Holcik, 1990).

It is extinct in many parts of its native habitat across its original range; patchily distributed now, especially in the European part of its range, where it survives thanks to heavy stocking. Keeping in mind the extensive original range of this species, no other fish species has been decimated by man to such an extent (Holčik, 1995).

In Europe, originally found only in the Danube Basin, and more abundant in the right-hand tributaries; present also in the Prut Basin, though very seldom in the lower reaches of the streams, during the last decades attempts were made to spread its distribution westward but they usually failed as the Thames and Rhine cases. Neither were attempts very fruitful to extent its distribution into Elbe, as up to the present there is no proof of natural reproduction. The same thing has happened in the Poprad and the Dunajec (Vistula's tributary) and even in the stream sections in its distribution area where it did not occur naturally. (Lelek, 1980)

Fortunately some reintroduction attempts in its former Romanian Carpathians spreading area (Cengher, 2007) were successfully and encouraging for this species potential conservation.

Our aim was to provide data regarding *Hucho hucho* monitoring in the Vişeu River. The first fish survey was started in 1997 (Staicu et al., 1998) and the last one was in 2008, along this eleven years the presence/absence of this fish species was monitorised.

METHODS

Different observation and fishing techniques were used between 1997 and 2008 to monitor the *Hucho hucho* species individuals: checking the fishermen captures (including the illegal ones - with electricity, natural and/or synthesis substances, dung forks, etc.), angling, hand nets fishing and electro fishing (IG 1300 - 470 V DC, 2.6 kW device). Presence (one to maximum three individuals) or absence of this species individuals was registered.

RESULTS

The Danube salmon presence or absence along the study period (Fig. 1) was observed in: station 1 - 1 km downstream Bistra Village Submountainous area with heterogeneous substratum formed of rocks, pebbles and gravel, water velocity over 2 m/s; station 2-5 km downstream Bistra Village Submountainous area with heterogeneous substratum formed of rocks, pebbles, gravel and mud, water velocity over 2.5 m/s; station 3 - confluence with Tisa River, submountainous area with pebbles and gravel in a sandy matrix, water speed over 3.5 m/s.

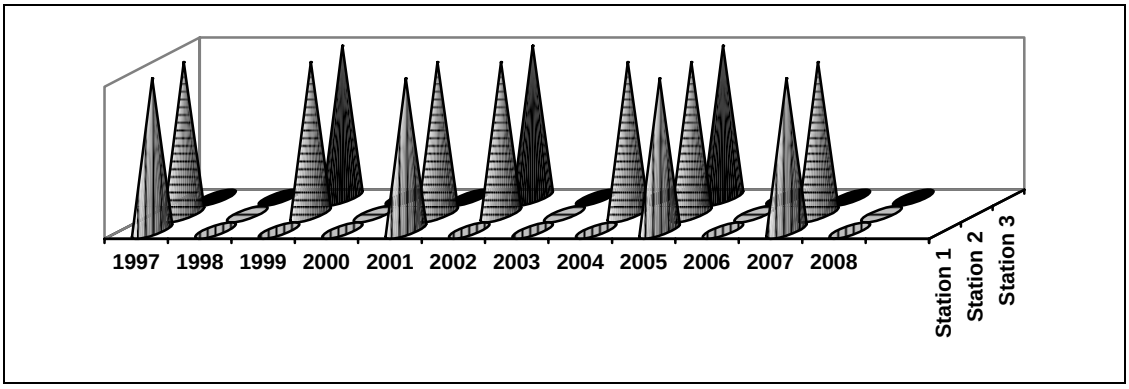

Figure 1: The Danube salmon presence/absence in the monitorised sectors between 1997 and 2008.

Possible problems and restrictive factors for *Hucho hucho* presence in Vişeu River.

This species relative big dimension can be one of the reasons for which it is still found only in the lower Vişeu River sectors, in the conditions in which appeared many periods with decreased general natural water flow in the last decade.

Another reason can be the presence of the aggressive human impact effects (Staicu et al., 1998) due to the heavy metals mining industry in the upper part of the Vişeu River basin and due to the canalisation problems of the localities in the same area, the water quality problems raising bad influence on this species especially in the upper and middle watershed.

Another negative and continuous activity is the illegal over fishing in the area, observed all these eleven years.

The high degree of variability of the presence of this species in the studied area, underline the maximum importance of a free and undisturbed connection with the Tisa River, which act here the role of a high value of interest section for the aquatic biodiversity. The even not permanently human impact pressure on the confluence area can have as a result the limitation of a free circulation from one river to another, including for the spawning period.

The well known trophic needs (quantitatively and qualitatively) of the Danube salmon, make its presence impossible if its trophic fish base is under the human impact pressure and can not have a very good/good status.

The spawning places are not completely known in the present and a proper protection can not be assured for them.

This species occur not only in the mountain and/or high altitude river stretches, but in lower reaches as well, though these are warmer and warmer during the summer months, in the warming climate and aggressive deforestation context.

Eutrophication, linked with higher seasonal and diurnal oxygen variations, probably also contributed to its gradual reducing even before the massive water pollution which began after the Second World War.

It is obvious that the existing protective measures do not ensure that this species is out of danger in the area.

General management proposals for the Danube salmon protection

Trying to answering questions on the threat of *Hucho hucho*, as well as providing proposals and solutions, intended to help protect and to conserve this highly endangered species at the European level.

Relatively high and constant water flow should be assured by the basin management plan. The forest water retention capacity should be encouraged by the appropriate forestry management in all the Vişeu River basin. No hydro technical works should be allow to be built on the Vişeu River basin in the future. No water captures should be allow for hydro technical works in the neighbouring watersheds.

The water quality in the streams should be much improved everywhere in the basin where it is a necessity, through (quantitatively and qualitatively) cleaning activities, canalisation of the localities, sawdust management and river bed alteration avoidance.

Stopping the illegal fishing and forbidding the legal fishing for the Danube salmon.

The lower gorge sector of the Vişeu River, including the confluence area, should have a highly restricted protection regime not only for Danube salmon but for all the local fish species. The same situation should be for their trophic resources the benthic macroinvertebrates. (UNDP Project 042/2007)

The needed high efforts of sustaining the aquaculture based on predator fish species are well known but a small fish farm for this species in the Vişeu River basin, better in the lower gorge area, is of vital importance for the conservation of this species in this area.

Specific management proposals for the Danube salmon protection

Total ban of fishing for huchen till the population became a viable one and the monitoring and management plans became active in the area.

Obligatory is the annual minimum stocking (simplest and cheapest) with the local breed alevines; this help to maintain the species in the river but cannot replace the natural spawning of indigenous individuals. Artificial diet only mixed with natural ones (crustaceans, insects larvae, tubificids, etc.) should be used (Jungwirth, 1978).

Unintensive and intensive culture of this species for stocking can be used, the techniques being available.

Restocking attempts within the former distribution area of this species should be encouraged and supported financially.

Keeping the natural habitats status (minor, medium and major riverbed, banks, and riparian zones) is very important especially for this species territorial specificity.

Quantitative and qualitative water conservation in its natural regime.

The forbiden of the forestry activities in spring and summer at a minimum of 1 km near the river banks.

The identification of the spawning areas and their highly protection all over the year.

The forbiden of the modifiyng of the lotic sector in lenitic or semi-lenitic sectors.

The forbiden of the timber transport through the riverbed.

The forbiden of the sawdust illegal deposition in the river and its proximity, this activity reducing the macroinvertebrates used as food and the asphyxia of the small fish.

Keeping the natural vegetation (arboreal, shrubs and herbs) near the both riverbanks with a length of a minimum of 500 m, without forestry activities for conservation, regeneration or pasturing, to keep the solid debris and slurry, and the water temperature at minimum and the shadow and oxigenation degree at maximum. On the contrary can be induced the spawn asphyxiation and the saplings death.

Leting the natural fall wood (trees, branches) in the water and on its banks.

The construction of bridges should be made at the level of the multianual maxim water flow, made by local stones or concrete paved with them - from terrestrial neighbouring areas.

The forbiden of exploatation of the riverbed rocks and sand.

The forbiden of dams construction and canalization, and straightening of the rivers.

The forest exploatation in the basin shoul be not made in periods with precipitations, in this way being avoided the benthic macroinvertebrates (direct and indirect trophic resources) microhabitats collmatation.

Biannual or annual integrated monitoring activities.

The Biotic Integrity Index based on ichtiofauna - for Carpathian rivers of first and second order value should be keept at a minimum of 43 (Bănăduc, 2002).

CONCLUSIONS

The many cases of failure of spreading of this seriously endangered species in Europe outside its natural range, and the decreasing of its spreading range in the last decades showed the necessity of a proper management plans activities there where this species still exist.

The presence also in the spring months of individuals over 60 cm and 2 kg let us to believe that the reproductions of the Danube salmon in the Vişeu Basin it can still be possible.

The variation of this species presence/absence along the studied eleven years can be a result of the fishing techniques limitations or a result of an existing variable environment which induce years when the species can be present and years when this species presence is not possible.

Active and real management activities in this basin area are highly needed for the protection and conservation of this species in this specific basin, one of the last where this species still exist on the Romanian territory!

Unfortunately, none of the measures have had long-term success till now, due to the complex sensitivity of this species under the continuous complex human impact influence. It has therefore been advocate that total protection should be given to this species and its habitat. Exploratory ichtiological studies are still needed on the Vişeu River tributaries, to identify rivers where the Danube salmon can still be present, and these sectors/rivers should also have a special management and monitoring plan.

All the stakeholders of this basin should collaborate with the Maramureş Mountains Nature Park Administration for a real and complex management of this species habitat!

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THE CURRENT DISTRIBUTION OF HERPETOFAUNA IN THE MARAMUREŞ COUNTY AND THE MARAMUREŞ MOUNTAINS NATURE PARK, (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, inventory, mapping, amphibian, reptilian, area of occupancy.

ABSTRACT

We documented and then updated the geographic range of herpetofauna from the Maramureş County based on historical and present data and on our own inventory data. A total of 25 species (14 amphibians and 11 reptiles) were recorded in the area. We further examined the species conservation status by applying three cartographic measures and a relative area of occupancy index. The species were roughly ranked in a similar way according to all indices. We found that the most rare and potentially threatened species were *Rana arvalis*, *Coronella austriaca* and *Natrix tessellata*. We suspect that the lack of suitable habitats and ecological specialization are the causes of their increased vulnerability. The indices tested by us proved adequate for detecting vulnerable amphibian and reptile species, and could serve as a simple but effective tool in species conservation.

RÉSUMÉ: La distribution de l'herpetofaune du département de Maramureş et du Parc Naturel Montagnes de Maramureş (Maramureş, Roumanie).

Les données sur la distribution de l'herpetofaune du département de Maramureş et du Parc Naturel Montagnes de Maramureş proviennent de la littérature et notre inventaire. En total 25 espèces sont présentes dans la région, dont 14 amphibiens et 11 reptiles. Nous avons estime le statut de conservation en appliquant trois mesures cartographiques et un indice relatif de l'aire occupe. Les espèces ont été hiérarchise similairement par rapport a tout les indices utilises. Les plus rares et possiblement menaces espèces sont *Rana arvalis*, *Coronella austriaca* et *Natrix tessellata*, probablement a cause due manqué des habitats propice. Les indices utilises sont utiles pour identifier les espèces vulnérables et peuvent servir comme instruments simples et efficaces pour décider les priorités en conservation.

REZUMAT: Distribuţia actuală a herpetofaunei în judeţul Maramureş şi Parcul Natural Munţii Maramureşului (Maramureş, România).

Datele referitoare la distribuţia herpetofaunei din judeţul Maramureş şi din Parcul Natural Munţii Maramureşului au fost preluate din literatura de specialitate şi completate cu date personale. În total au fost inventariate 25 de specii în zonă (14 de amfibieni şi 11 de reptile). În continuare, am estimat statutul speciilor, aplicând trei indici cartografici şi un indice al habitatului ocupat. Speciile au fost ierarhizate într-un mod similar în raport cu toţi indicii testaţi. Cele mai rare şi potenţial periclitate specii au fost *Rana arvalis*, *Coronella austriaca* şi *Natrix tessellata*, probabil datorită ponderii scăzute a habitatelor prielnice. Indicii testaţi s-au dovedit utili în detectarea speciilor vulnerabile de amfibieni şi reptile şi pot servi ca instrumente simple şi eficiente în stabilirea priorităţilor în conservare.

INTRODUCTION

Understanding and managing species diversity requires knowledge about their geographical distribution and patterns. A key component to understanding shifts in species diversity is the availability of detailed maps of species distribution based on historical and present data. Amphibians and reptiles are excellent indicator taxa of global changes since they are undergoing a worldwide decline according to recent global studies (Whitfield et al., 2000; Beebee and Griffiths, 2005). Reliable and updated distribution data are essential for understanding the impact of human-induced disturbances and propose mitigating activities of their effects.

The Maramureş Mountains Nature Park was established in 2004 (H. G. 2151/2004). Few historical records on herpetofauna were available here (Frivaldszky, 1871), partly due of its isolation and past access restrictions due to the vicinity of the border with Ukraine (ex Soviet Union). In 2007 we inventoried the herpetofauna of the area in order to update and check the presence of protected species within the park (Cogălniceanu et al., 2007).

In this paper we aim to (1) update the species list and document the geographic range of herpetofauna from the Maramureş County and compare it with the Maramureş Mountains Nature Park, and (2) evaluate the species conservation status in the area based on changes over time of the distribution records and the area of occupancy.

MATERIAL AND METHODS

The Maramureş County is located in the northeast part of Romania and covers a surface of 621.500 ha (latitude N 47°35'5" - 47°58'20"; longitude E 24°8'12" - 25°2'38"). The Maramureş Mountains Nature Park is located between the Vişeu Valley and the Romanian - Ukrainian border and covers approximately 150.000 ha out of which 9.050 ha are nature reserves (IV IUCN category) and 139.800 ha are protected landscapes (V IUCN category). The altitude varies between 300 and 1970 m a. s. l. and the area receives an average 900 mm of rainfall annually and has an average annual temperature of 6 ^{o}C.

We compiled the available amphibian and reptile distribution data from Maramureş County based on bibliography and museum collections. In 2007 we carried out a herpetofauna inventory in the Maramureş Mountains Nature Park (Cogălniceanu et al., 2007) and we added our field data. Garmin handheld GPS units with 3-5 m horizontal accuracy, set to WGS84 geographic coordinate system, were used to record point locations for each station in the field. The collected GPS data was imported into a GIS environment using ArcGIS Desktop 9.3. There, the data was converted to the national Stereographic 70 coordinate system in order to match the basemap layers' coordinate system, and each point location was associated with its corresponding field data attributes in order to build a geodatabase comprising the whole field inventory.

Early records of the Maramureş County herpetofauna, go back to 1871 (Frivaldszky, 1871). Since then, over 17 publications provided distribution data for amphibians and reptiles in the Maramureş County, of which six were published before 1990 (Fuhn, 1960; Fuhn and Vancea, 1961; Stugren and Popovici, 1961; Micluţă, 1969, 1970; Borcea, 1983) while eleven were published during 1996-2002 (Andrei, 1997; Ardelean and Bereş, 2000; Bereş, 1996, 1997; Dehelean and Ardelean, 2000; Ghira et al., 2002; Török, 1997 a, 1997 b, 1998, 1999, 2000).

The distribution data from bibliography and collections were analyzed as historical data (records before 1990), recent data (records only after 1990), and 2007 field data. We used the UTM grid system with cells of 100 km^2 (10 × 10 km), each cell being identified with a biogeographical code (Lehrer and Lehrer, 1990), as mapping units since most literature records are based on localities and offer no information on the area covered within a location. When more localities were located in the same U. T. M. grid cell they were counted as a single record. While this method has certain limits, it allows for a quantification of the area covered, providing an equal value for each record and thus an estimate of the area of occupancy.

In order to identify changes in the area of occupancy we computed three distribution indices: (i) the relative change in species distribution, $Rc = V / (C + N)$, (ii) the continuity index, $Ci = C \times 100 / (V + C)$, and (iii) the relative degree of knowledge $K = (C + N) \times 100 / T$, where V = number of records before 1990, C = number of constant records (before and after 1990 records), N = number of records after 1990 and T = total number of records. Values of the relative change in species distribution ratio higher than one indicate a reduction of the distribution range of one species. The continuity index is a measure of the constant record of the species at a particular site. Higher values of this index correspond to an increasing continuity. The relative degree of knowledge index has high values when most records are recent (i. e. after 1990), and lower values when more records are old (i. e. before 1990).

The area of occupancy is an indicator of the extent of unsuitable or unoccupied habitats. Since we did not have distribution records from all 104 grid cells we computed a relative area of occupancy for each species (number of UTM grid cells where a species is present / total number of quadrates from which at least one species was recorded - i. e. 53 from our data). This index allowed us to estimate the range of favourable and unsuitable habitats in the studied region.

In the recent years a number of taxonomical changes were proposed but never considered in the national legislation (especially in the national annexes of the Habitats Directive OUG 57/2007). Our present paper uses the old, still widely used scientific names to avoid confusion (Tab. 1).

Table 1: Taxonomic changes involving amphibian and reptile species present in the Maramureş County.

Old species name	New species name
Amphibians	
Triturus alpestris	*Mesotriton alpestris*
Triturus montandoni	*Lissotriton montandoni*
Triturus vulgaris	*Lissotriton vulgaris*
Rana esculenta	*Pelophylax esculentus*
Rana ridibunda	*Pelophylax ridibundus*
Bufo viridis	*Pseudepidalea viridis*
Reptiles	
Lacerta vivipara	*Zootoca vivipara*
Elaphe longissima	*Zamenis longissimus*

RESULTS

Distribution data for amphibians and reptiles is available for only 50.96% of the area of the Maramureş County and 42.10% of the area of the Maramureş Mountains Nature Park. 14 amphibian and 11 reptile species were recorded in the Maramureş County. The most widely distributed amphibian species are *Bombina variegata* and *Rana temporaria* whereas for reptile species are *Lacerta agilis* and *Natrix natrix* (Fig. 1). From a total numbers of 1133 records (841 from bibliographic sources, 4 from collections and 288 field records), 90.64% are records after 1990 and only 9.36% records before 1990. From the Maramureş Mountains Nature Park there are only 47 herpetofauna records before our 2007 inventory (24 records are after 1990).

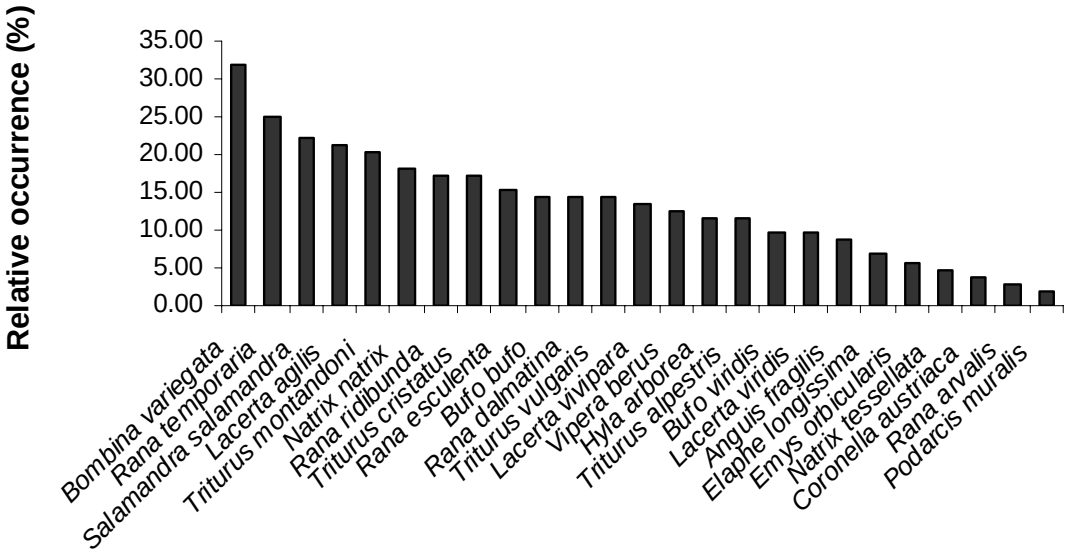

Figure 1: The relative occurrence of amphibian and reptile species calculated as total number of records (T) for a species on the total number of grid cells from the Maramureş County.

The known distribution records for herpetofauna available at county level are presented in figure 2. The figures 3-8 shows the distribution data for the most common species. The maps include both published and collection data assigned to the UTM grid cell centroid and our own GPS - based inventory represented as high resolution point data. The available data type and the values of calculated indices for each species are presented in the table 2.

The analysis of the new distribution data (records after 1990) indicated that one amphibian species (*Rana temporaria*) and three reptile species (*Emys orbicularis*, *Natrix tessellata* and *Podarcis muralis*) were not previously reported from the Maramureş County. A considerable increase in the number of records was found for *Triturus montandoni*, *Rana dalmatina*, *Rana esculenta* and *Lacerta agilis*. *Rana arvalis* suffered the highest reduction area as suggested by the values of the Rc and Ci indices. Five amphibian species (*Bombina variegata*, *Hyla arborea*, *Triturus montandoni*, *Rana dalmatina* and *Rana esculenta*) and two reptile species (*Lacerta agilis* and *Coronella austriaca*) show the highest values for the Ci and also the K index. *Rana temporaria*, *Natrix tessellata*, *Emys orbicularis* and *Vipera berus* also present a high value of the K index since they either have a restricted distribution or all records are recent.

Table 2: The distribution of records according to the species investigated and to the date of observation. Four indices are proposed as ratios between the different record types (see text for details).

Species	Records before 1990 (V)	Continuous records (C)	Records after 1990 (N)	Total number of records (T)	Relative area of occupancy	Relative change in species distribution (Rc) V / (C + N)	Continuity index (Ci) C × 100 / (V + C)	Relative degree of knowledge (K) (C + N) × 100 / T
Amphibia								
Triturus alpestris	2	3	7	12	0.23	0.20	60.00	83.33
Triturus cristatus	5	0	13	18	0.34	0.38	0.00	72.22
Triturus montandoni	0	5	16	21	0.40	0.00	100.00	100.00
Triturus vulgaris	3	1	11	15	0.28	0.25	25.00	80.00
Salamandra salamandra	7	12	4	23	0.43	0.44	63.16	69.57
Bombina variegata	0	4	29	33	0.62	0.00	100.00	100.00
Bufo bufo	1	2	12	15	0.28	0.07	66.67	93.33
Bufo viridis	1	2	7	10	0.19	0.11	66.67	90.00
Hyla arborea	0	3	9	12	0.23	0.00	100.00	100.00
Rana arvalis	2	1	0	3	0.06	2.00	33.33	33.33
Rana dalmatina	0	2	13	15	0.28	0.00	100.00	100.00
Rana esculenta	0	1	15	16	0.30	0.00	100.00	100.00
Rana ridibunda	1	1	16	18	0.34	0.06	50.00	94.44
Rana temporaria	0	0	26	26	0.49	0.00		100.00
Reptilia								
Emys orbicularis	0	0	6	6	0.11	0.00	100.00	
Anguis fragilis	1	2	6	9	0.17	0.13	66.67	88.89
Podarcis muralis	0	0	2	2	0.04	0.00		100.00
Lacerta agilis	0	2	20	22	0.42	0.00	100.00	100.00
Lacerta viridis	1	3	6	10	0.19	0.11	75.00	90.00
Lacerta vivipara	2	1	11	14	0.26	0.17	33.33	85.71
Coronella austriaca	0	2	2	4	0.08	0.00	100.00	100.00
Elaphe longissima	1	1	5	7	0.13	0.17	50.00	85.71
Natrix natrix	3	1	15	19	0.36	0.19	25.00	84.21
Natrix tessellata	0	0	5	5	0.09	0.00		100.00
Vipera berus	2	4	7	13	0.25	0.18	66.67	84.62

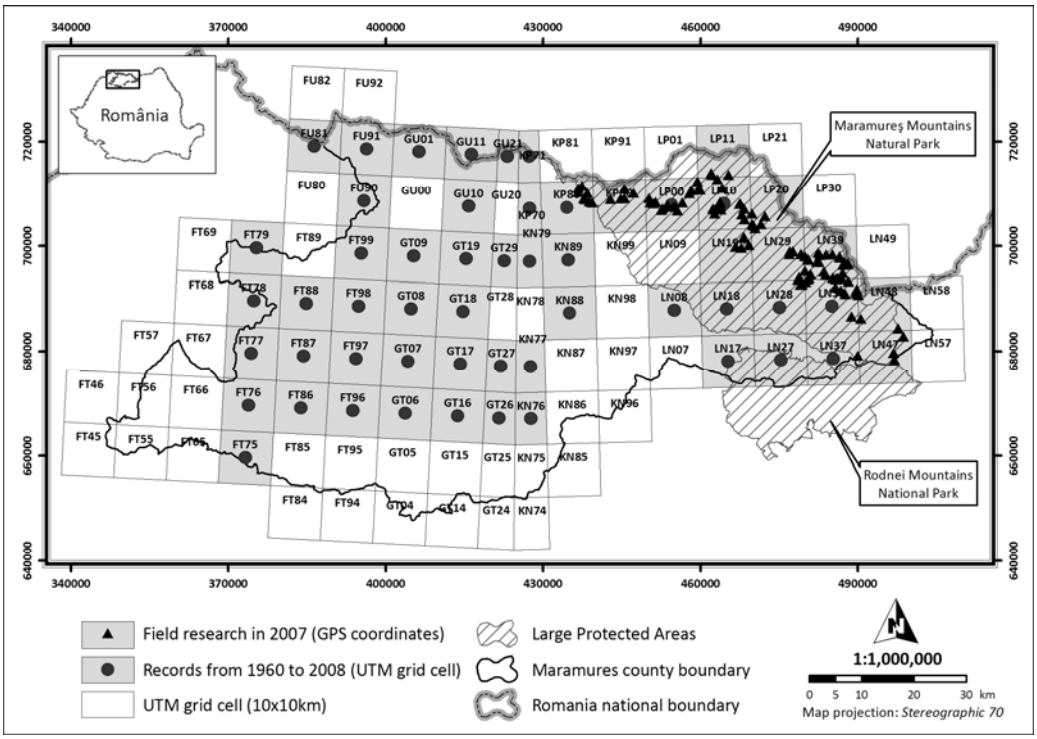

Figure 2: Cover of geographic records of amphibians and reptiles from the Maramureş County

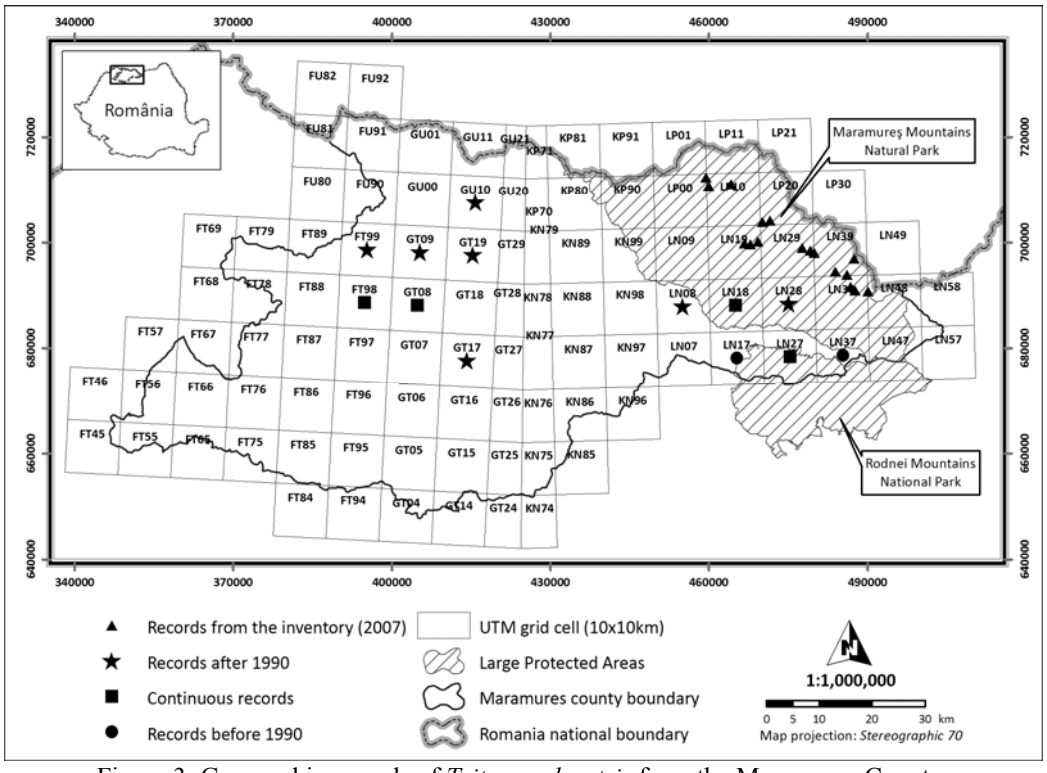

Figure 3: Geographic records of *Triturus alpestris* from the Maramureş County.

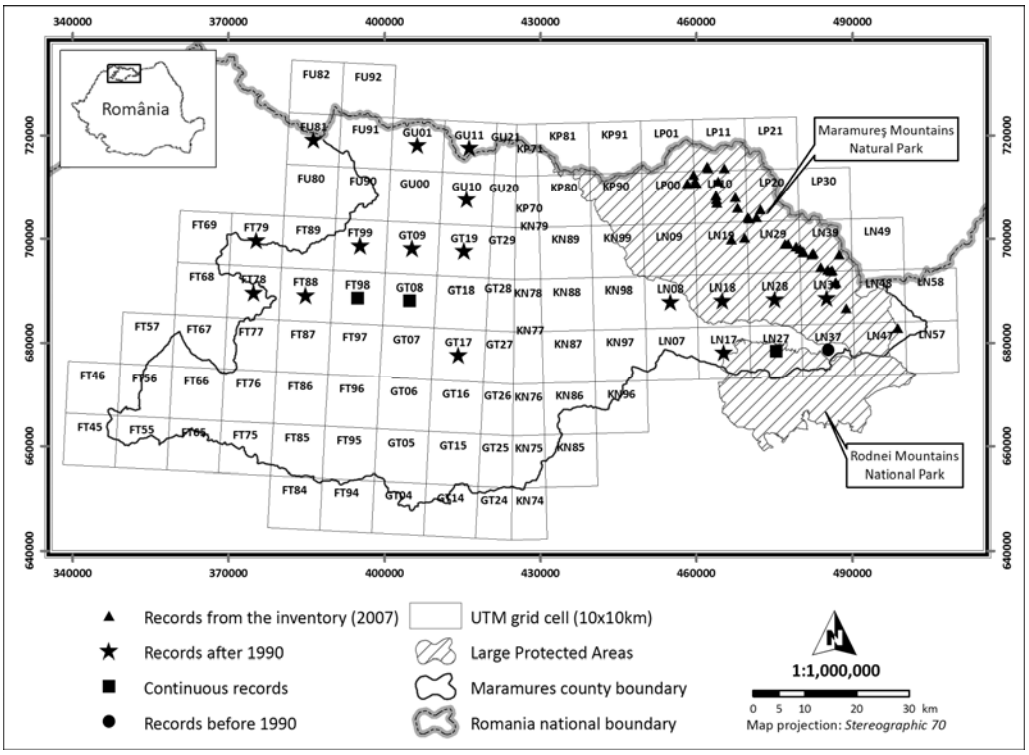

Figure 4: Geographic records of *Triturus montandoni* from the Maramureş County.

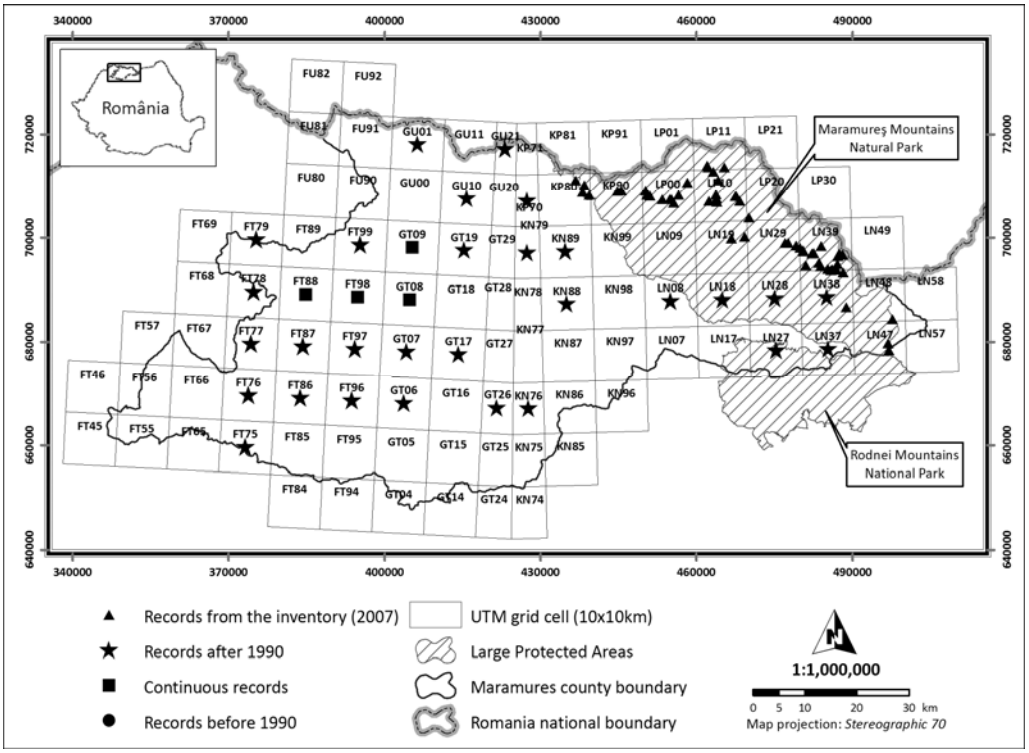

Figure 5: Geographic records of *Bombina variegata* from the Maramureş County.

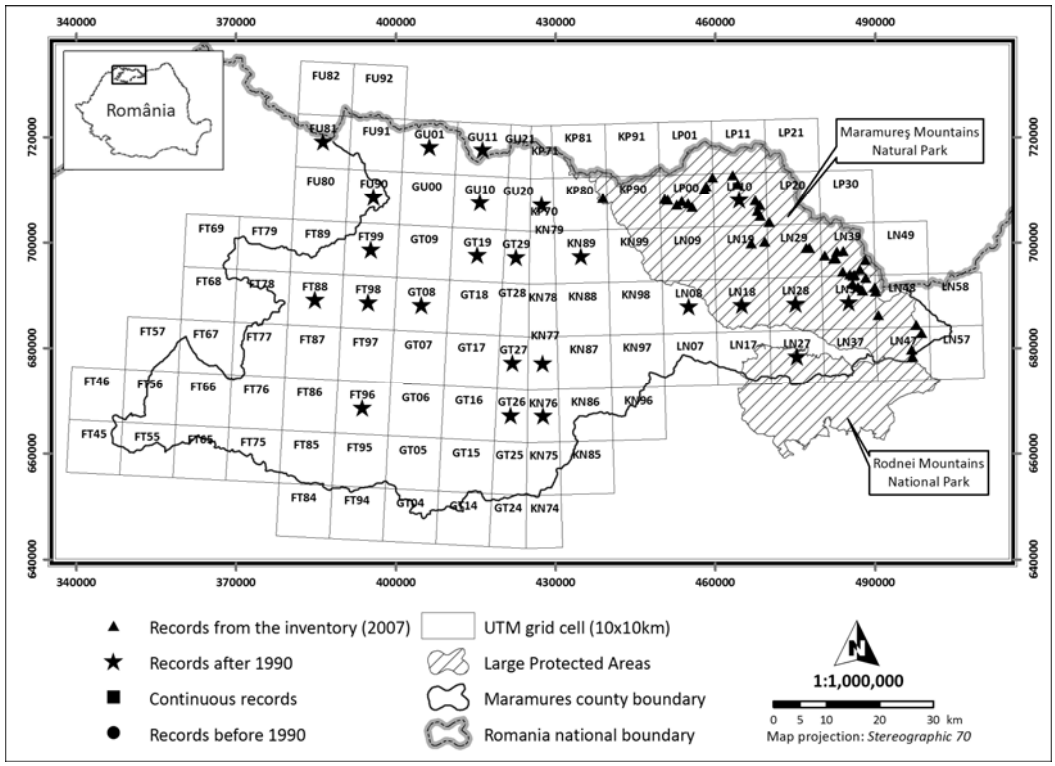

Figure 6: Geographic records of *Rana temporaria* from the Maramureş County.

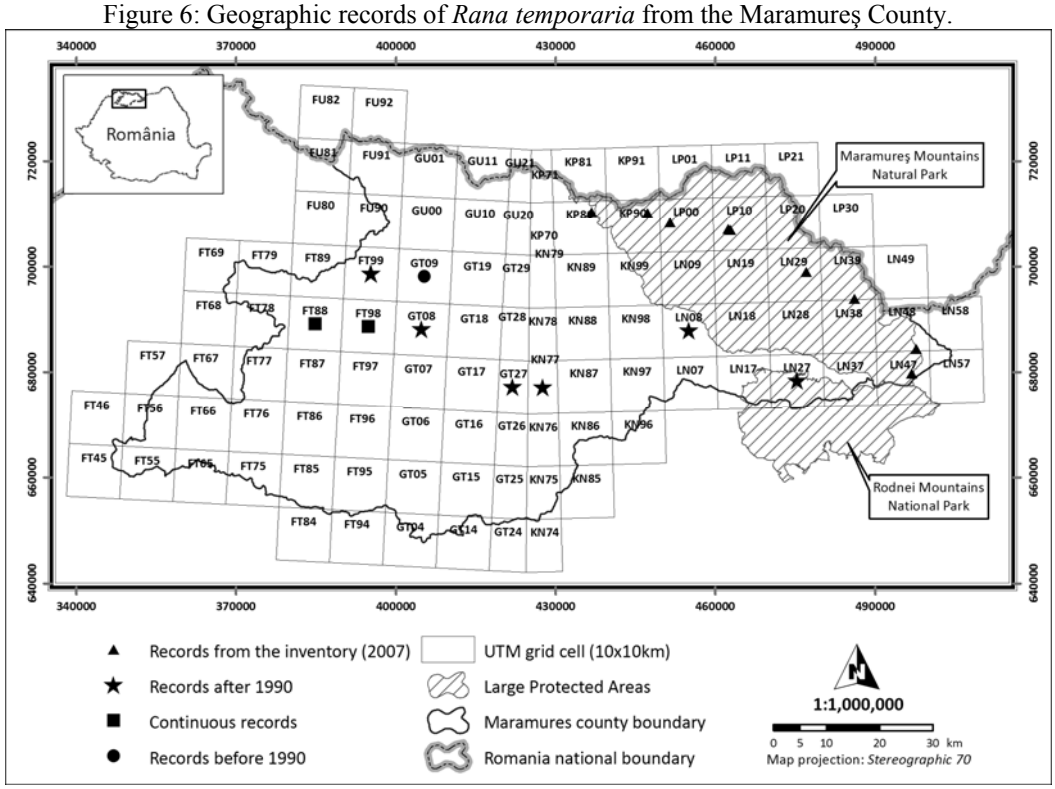

Figure 7: Geographic records of *Anguis fragilis* from the Maramureş County.

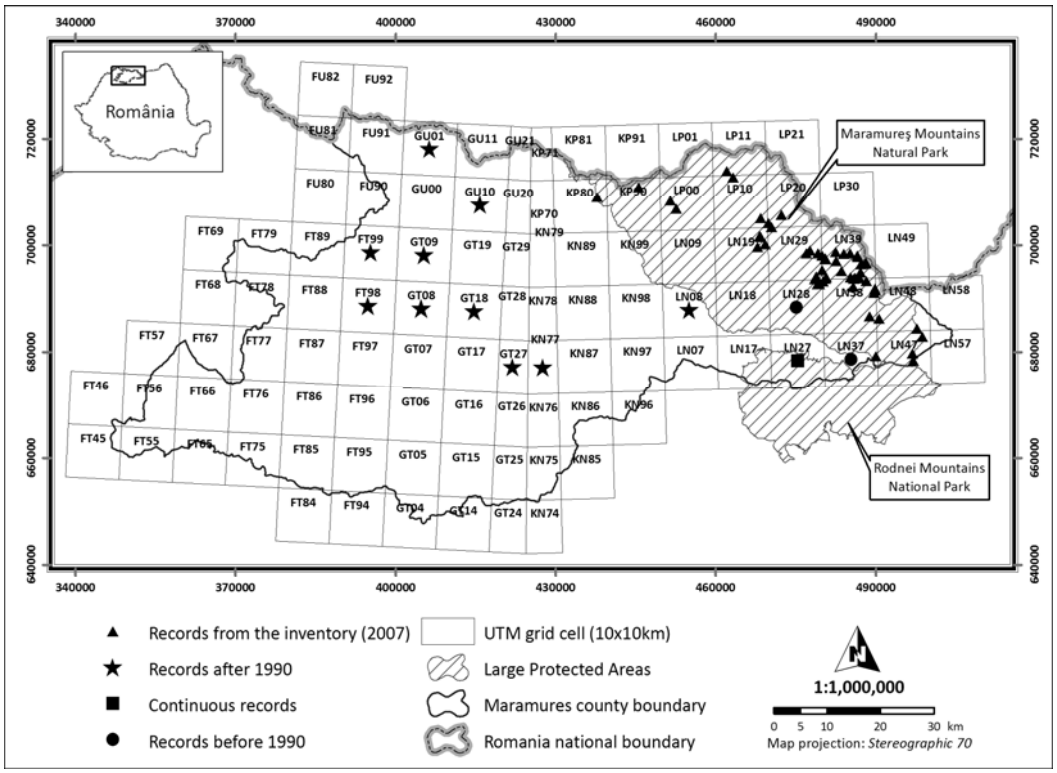

Figure 8: Geographic records of *Lacerta vivipara* from the Maramureş County.

DISCUSSION

Developing a proper conservation strategy for amphibian and reptile species is often a daunting task due to the absence of reliable estimates of biophysical, genetic, social, behavioural, demographic, and habitat parameters (Dodd, 1993). One of the most useful criteria to determine vulnerability in reptiles is the geographic range (criterion B of the 2001 IUCN Red List Categories and Criteria version 3.1, IUCN, 2005), as researchers normally start their study by recording species distribution (Pleguezuelos et al., 2002). Santos et al. (2007) used with good results the percentage of grid cells with both old and new citations to determine the conservation status of Iberian snakes. We used this index and two indices from the cartographic method together with a relative area of occupancy index to identify the amphibian and reptile species undergoing decline. Species were roughly ranked in the same way by the cartographic method and relative area of occupancy index. Species with the highest value for relative change in distribution range were in most cases the same with the lowest value of relative area of occupancy.

Some amphibian and reptile species can be easily overlooked due to elusive behaviour and secretive habitats resulting in low detectability. This might explain the lack of any increase of distributional records for *Rana arvalis*, *Coronella austriaca*, and up to a certain extent for *Podarcis muralis.* For other species as *Rana temporaria*, *Triturus montandoni*, *Rana dalmatina*, *Rana esculenta* and *Lacerta agilis* there was a considerable improvement in their distributional records. *Rana arvalis* had the highest score by relative distribution area index and the lowest scores by relative area of occupancy index. No new reports of *Rana arvalis* were made during the last eighteen years. Lack of suitable habitats due to habitat reduction and deterioration are probable the main causes for the increased vulnerability of this species.

Coronella austriaca is another species with a low relative area of occupancy score. Studies carried out in different populations of this species in Europe show that it is generally present in relatively low abundance; it has small home range and a sedentary life, large juvenile mortality, the late maturation of females (Spellerberg and Phelps, 1977; Goddard, 1984; Gent and Spellerberg, 1993). The detection probability of this species is generally moderate to low (Kéry, 2002) and the number of visits to confirm with 95% confidence that the species is absent may vary between six and up to 35, depending on the habitat type, season and local population densities (Kéry, 2002; Hartel et al., unpublished results). Low relative area of occupancy scores were found also for *Natrix tessellata*. Aquatic and semi-aquatic species and feeding specialists are expected to suffer more severe population declines as suitable habitats disappear, and *Natrix tessellata* is an aquatic colubrid snake that is known for having a basically fish-based diet (Luiselli and Capizzi, 2007).

There were several limitations of our study that should be considered in evaluating our results. First we cannot control for false absences. False absences may complicate distribution studies in cryptic species especially if the detection probability is not incorporated in the study design and data analysis (Kéry, 2002). Second, the size of the UTM grid cells used by us is large (10 × 10 km), but using smaller cells is not supported by the available data, although this would increase efficiency (Pressey and Logan, 1998). Third, our analysis does not control for the habitat variables. Quantifying the ecological conditions using various habitat and landscape parameters can be used to construct predictive models regarding the importance of habitat features for amphibians and reptiles. Also this type of analysis will benefit from adding human threats such as land use or land cover change, as well as land ownership and planned infrastructures.

The indices based on cartographic data proposed by us proved adequate for detecting vulnerable amphibian and reptile species and are relatively easy to compute. They represent a simple tool for detecting trends in area of occupancy that can be used by protected areas managers.

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PRELIMINARY ORNITHOLOGICAL SURVEY IN THE MARAMUREŞ MOUNTAINS NATURE PARK (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, Maramureş Mountains Nature Park, avifauna, conservation dependent species.

ABSTRACT

A preliminary ornithological survey was conducted in the Maramureş Mountains Nature Park in 2007. Observations were made from ten routes and six observation points of different regions in the park. A total of 102 species were identified. The most important breeding species of the park is the Black Grouse (*Tetrao tetrix*), as this is one of the few sure breeding sites in Romania. Other representative species identified were: Golden Eagle (*Aquila chrysaetos*), Capercaillie (*Tetrao urogallus*), Pygmy Owl (*Glaucidium passerinum*), Tengmalm's Owl (*Aegolius funereus*), Ural Owl (*Strix uralensis*), Three-toed Woodpecker (*Picoides tridactylus*) and White-backed Woodpecker (*Dendrocopos leucotos*). The most significant threataning factor detected was the excessive lodging activity dominating most of the park's area, which could lead to the decline or dissapearance of a large number of species.

ZUSSAMMENFASSUNG: Vorstudie zur Vogelfauna des Naturparks Maramuresch Gebirge (Maramuresch, Rumänien).

Während des Jahres 2007 wurde im Naturpark Maramurescher Gebirge eine vorläufige Vogelzählung durchgeführt. Die Beobachtungen wurden auf zehn Trassen und sechs Beobachtungspunkten unterschiedlicher Gebiete des Naturparks vorgenommen. Dabei wurden insgesamt 102 Vogelarten festgestellt. Die aus Sicht des Naturschutzes bedeutendster Brutvogelart ist das Birkhuhn (*Tetrao tetrix*), wobei es sich um eines der wenigen sicheren Brutgebiete in den Karpaten Rumäniens handelt. Andere beobachtete, repräsentative Arten sind Steinadler (*Aquila chrysaetos*), Auerhahn (*Tetrao urogallus*), Sperlingskauz (*Glaucidium passerinum*), Raufußkauz (*Aegolius funereus*), Habichtskauz (*Strix uralensis*), Dreizehenspecht (*Picoides tridactylus*) und Weissrückenspecht (*Dendrocopus leucotos*). Der wichtiugste festgestellte Gefährdungsfaktor ist die excessive Waldrodung, die in den meisten Bereichen des Parks stattfindet. Werden die Abholzungen nicht bald kontrolliert, könnten sie durch den Verlust an Lebensraum zur Reduzierung oder dem Verschwinden der Brutbestände vieler Vogelarten führen.

REZUMAT: Studiu preliminar asupra avifaunei Parcului Natural Munţii Maramureşului (Maramureş, România).

În 2007, în Parcul Natural Munţii Maramureşului a avut loc un recensământ preliminar a avifaunei. Observaţiile au fost efectuate de pe zece trasee şi şase puncte de observaţie din diferite regiuni ale parcului. Au fost identificate, în total, 102 specii de păsări. Specia cuibăritoare cea mai importantă din punctul de vedere al conservării este Cocoşul de Mesteacăn (*Tetrao tetrix*), acesta fiind unul dintre puţinele locuri sigure de cuibărit în România. Alte specii reprezentative, identificate au fost: Acvila de Munte (*Aquila chrysaetos*), Cocoşul de Munte (*Tetrao urogallus*), Ciuvica (*Glaucidium passerinum*), Minunița (*Aegolius funereus*), Huhurezul Mare (*Strix uralensis*), Ciocănitoarea de Munte (*Picoides tridactylus*) şi Ciocănitoarea cu Spate Alb (*Dendrocopos leucotos*). Cel mai semnificativ factor periclitant, identificat a fost defrişarea excesivă, ceea ce are loc în cea mai mare parte a parcului. Defrişările, dacă nu vor fi controlate, în curând, ar putea duce la reducerea sau dispariţia efectivelor cuibăritoare a multor specii de păsări.

INTRODUCTION

Recent ornithological data are missing from large areas of Romania, national and natural parks being no exception. In the last few years, however, after the forming of national and natural parks administrations and with the first preparations of the management plans, there were some projects initiated in many parks aiming the gathering of recent information on biodiversity. In 2007 the "Milvus Group" Bird and Nature Protection Association conducted a preliminary survey of the Maramureş Mountains Nature Park's avifauna. The main objectives of the study were to create a list of breeding species, to gather information about the distribution of some rare or / and conservation dependent species inside the park and to identify major threatening factors of these species. Some important species were identified during a previous visit in 2006. These data are also presented.

STUDY AREA AND METHODS

The study area consisted of the Romanian part of the Maramureş Mountains, which was recently designated as a natural park. It is a relatively high range, elevations ranging from about 350 m to 1956 m, covering a wide range of habitats. The main vegetation types are (from lower elevations towards the highest): beech, mixed beech - coniferous and spruce forests, *Pinus mugo* shrubs and alpine meadows. Mainly in the major valleys, around the human settlements, but for a lesser extent also on higher altitudes large areas are covered by secondary meadows, which are presently used as hay meadows or pastures. In these regions, the landscape is characteristic, grasslands alternating with patches of forests.

Observations were made from ten routes selected to cover the main habitats and subdivisions of the park. The selected routes were the following (with the main habitat types): 1. Bistra - Tocarnea Peak - Luhei Valley: alternation of hay meadows, pastures and beech forest; 2. Bistra Valley - Poloninca Peak - Şerban Peak - Culmea Şerban - Bistra Valley: beech, mixed and spruce forests, *Pinus mugo* shrubs, alpine pastures and natural alpine meadows; 3. Paltinul Chalet - Culmea Şerban - Şerban Peak - Pop Ivan Peak - Culmea Râpei - Paltinul Chalet: beech, mixed and spruce forests, *Pinus mugo* shrubs, alpine pastures and natural alpine meadows; 4. Repedea Valley - Petriceaua - Vinderel Lake - Mihailecu - Repedea

Valley: beech, mixed and spruce forests, *Pinus mugo* shrubs, alpine pastures; 5. Poienile de sub Munte - Obcina Priporului - Poienile de sub Munte: alternation of hay meadows, beech forest and scattered houses; 6. Bardi Valley - Culmea Coşnea - Pecealu Peak - Pietrosu Bardăului - Bardi Valley: mixed and spruce forests, *Pinus mugo* shrubs, alpine pastures, mountain river; 7. Prislop Pass - Piciorul Cearcănului: spruce forests, *Pinus mugo* shrubs, alpine pastures; 8. Piciorul Cearcănului - Fântâna Stanchii - Jupania: spruce forests, *Pinus mugo* shrubs, alpine pastures; 9. Ţâşla Valley - Piciorul Caprei- Lucăceasa - Toroiaga: spruce forests, *Pinus mugo* shrubs, alpine pastures and natural alpine meadows; 10. Vaser Valley until Făina: mountain river, human settlement, beech, mixed and spruce forests, hay meadows.

Additional observations have been made from six points in the Vişeu Valley, as many species characteristic to hills may be present in the park only in this major valley. The main habitat types around these observation points were: extensive agricultural fields, hay meadows, orchards, the Vişeu River, a small lake near Petrova, human settlements and the garbage dump near Vişeu de Sus. Observations were carried out during 10-23 July 2007. The selected routes were completed between 6^{00}-22^{00}. At least 30 minutes were spent at each of the observation points in the Vişeu Valley. All bird species observed and the number of individuals was noted. In 2006 observations were made between 05-12 May.

In the case of some species, such as owls, grouse and woodpeckers, we used some special methods to identify them. We have searched for footprints, feathers, excrements and pellets. The Pygmy Owl (*Glaucidium passerinum*) is a mostly diurnal species, consequently we used its calls to detect it in spruce forest. We have tried to play the sounds of nocturnal owls only once in the Repedea Valley. This time we have used the sounds of Tawny Owl (*Strix aluco*), Ural Owl (*Strix uralensis*) and Tengmalm's Owl (*Aegolius funereus*). In the case of the woodpeckers, we drummed on dead trees to call them. We have also verified more then 50 Black (*Dryocopus martius*) and Three-toed Woodpecker.

RESULTS

During the two weeks spent in the park we have observed 98 species of birds. Other three species were identified indirectly (Ural Owl - a feather found, Black Grouse (*Tetrao tetrix*) - excrements found, Three-toed Woodpecker - a lot of holes found). Tengmalm's owl was heard only in 2006. Additionally there was also a male Black Grouse seen and three Pygmy Owls heard in 2006, too.

The list of bird species identified in the Maramureş Mountains Nature Park in 2006 and 2007 is the following: *Tachybaptus ruficollis* (Pallas, 1764), *Ciconia ciconia* (Linnaeus, 1758), *Ciconia nigra* (Linnaeus, 1758), *Anas platyrhynchos* (Linnaeus, 1758), *Aquila chrysaetos* (Linnaeus, 1758), *Buteo buteo* (Linnaeus, 1758), *Pernis apivorus* (Linnaeus, 1758), *Accipiter gentilis* (Linnaeus, 1758), *Accipiter nisus* (Linnaeus, 1758), *Falco tinnunculus* (Linnaeus, 1758), *Falco subbuteo* (Linnaeus, 1758), *Falco peregrinus* (Tunstall, 1771), *Tetrao urogallus* (Linnaeus, 1758), *Tetrao tetrix* (Linnaeus, 1758), *Bonasa bonasia* (Linnaeus, 1758), *Coturnix coturnix* (Linnaeus, 1758), *Gallinula chlorophus* (Linnaeus, 1758), *Charadrius dubius* (Scopoli, 1786), *Tringa ochropus* (Linnaeus, 1758), *Actitis hypoleucos* (Linnaeus, 1758), *Columba livia domestica* (Gmelin, 1789), *Columba palumbus* (Linnaeus, 1758), *Columba oenas* (Linnaeus, 1758), *Streptopelia decaocto* (Frivaldszky, 1838), *Streptopelia turtur* (Linnaeus, 1758), *Cuculus canorus* (Linnaeus, 1758), *Otus scops* (Linnaeus, 1758), *Glaucidium passerinum* (Linnaeus, 1758), *Aegolius funereus* (Linnaeus, 1758), *Strix aluco* (Linnaeus, 1758), *Strix uralensis* (Pallas, 1771), *Apus apus* (Linnaeus, 1758), *Alcedo atthis*

(Linnaeus, 1758), *Upupa epops* (Linnaeus, 1758), *Dryocopus martius* (Linnaeus, 1758), *Picus canus* (Linnaeus, 1758), *Picus viridis* (Linnaeus, 1758), *Dendrocopos major* (Linnaeus, 1758), *Dendrocopos leucotos* (Bechstein, 1802), *Picoides tridactylus* (Linnaeus, 1758), *Jynx torquilla* (Linnaeus, 1758), *Alauda arvensis* (Linnaeus, 1758), *Hirundo rustica* (Linnaeus, 1758), *Delichon urbicum* (Linnaeus, 1758), *Delichon urbicum* (Linnaeus, 1758), *Riparia riparia* (Linnaeus, 1758), *Anthus trivialis* (Linnaeus, 1758), *Anthus spinoletta* (Linnaeus, 1758), *Motacilla alba* (Linnaeus, 1758), *Motacilla cinerea* (Tunstall, 1771), *Cinclus cinclus* (Linnaeus, 1758), *Troglodytes troglodytes* (Linnaeus, 1758), *Prunella modularis* (Linnaeus, 1758), *Erithacus rubecula* (Linnaeus, 1758), *Luscinia luscinia* (Linnaeus, 1758), *Phoenicurus ochruros* (Gmelin, 1788), *Phoenicurus phoenicurus* (Linnaeus, 1758), *Saxicola torquata* (Linnaeus, 1758), *Oenanthe oenanthe* (Linnaeus, 1758), *Turdus torquatus* (Linnaeus, 1758), *Turdus merula* (Linnaeus, 1758), *Turdus philomelos* (Brehm, 1831), *Turdus viscivorus* (Linnaeus, 1758), *Turdus pilaris* (Linnaeus, 1758), *Sylvia atricapilla* (Linnaeus, 1758), *Sylvia borin* (Boddaert, 1783), *Sylvia curruca* (Linnaeus, 1758), *Phylloscopus collybita* (Vieillot, 1817), *Regulus regulus* (Linnaeus, 1758), *Regulus ignicapillus* (Temminck, 1820), *Ficedula albicollis* (Temminck, 1815), *Aegithalos caudatus* (Linnaeus, 1758), *Parus palustris* (Linnaeus, 1758), *Parus montanus* (Baldenstein, 1827), *Parus cristatus* (Linnaeus, 1758), *Parus ater* (Linnaeus, 1758), *Parus major* (Linnaeus, 1758), *Parus caeruleus* (Linnaeus, 1758), *Remiz pendulinus* (Linnaeus, 1758), *Sitta europaea* (Linnaeus, 1758), *Certhia familiaris* (Linnaeus, 1758), *Lanius collurio* (Linnaeus, 1758), *Lanius excubitor* (Linnaeus, 1758), *Pica pica* (Linnaeus, 1758), *Garrulus glandarius* (Linnaeus, 1758), *Nucifraga caryocatactes* (Linnaeus, 1758), *Corvus monedula* (Linnaeus, 1758), *Corvus cornix* (Linnaeus, 1758), *Corvus corax* (Linnaeus, 1758), *Sturnus vulgaris* (Linnaeus, 1758), *Oriolus oriolus* (Linnaeus, 1758), *Passer domesticus* (Linnaeus, 1758), *Passer montanus* (Linnaeus, 1758), *Fringilla coelebs* (Linnaeus, 1758), *Carduelis cannabina* (Linnaeus, 1758), *Carduelis carduelis* (Linnaeus, 1758), *Carduelis chloris* (Linnaeus, 1758), *Carduelis spinus* (Linnaeus, 1758), *Serinus serinus* (Linnaeus, 1766), *Coccothraustes coccothraustes* (Linnaeus, 1758), *Loxia curvirostra* (Linnaeus, 1758) and *Emberiza citrinella* (Linnaeus, 1758).

We would also like to present the distributional data of some rare or / and conservation dependent species. The location of observations on other species, like Golden Eagle (*Aquila chrysaetos*) and Peregrine Falcon (*Falco peregrinus*), however, will not be presented as a safety measure. The only Black Stork (*Ciconia nigra*) was observed in the Vaser Valley. The Capercaillie (*Tetrao urogallus*) was widespread all across the higher regions of the park and was mostly identified after its excrements. The only sure Black Grouse excrement from 2007 came from Fântâna Stanchii. Other excrements were found and a lekking male was seen in 2006 at the Cearcănul and Piciorul Cearcănului. Two Quails (*Coturnix coturnix*) were heard at high altitudes (1570 and 1660 m) at Cearcănul and at Fântâna Stanchii. A pair of Green Sandpipers (*Tringa ochropus*) was seen in the Vaser Valley. The only Pygmy Owl answering the calls played by us in 2007 was in the vicinity of the Petriceaua Peak. In 2006, however, there were three heard, all of them around the Prislop Pass and Cearcănul. The only Tengmalm's Owl was heard in 2006 near the Prislop Pass. No nests of these two owl species were found in 2007. The Three-toad Woodpecker, based on the holes excavated in dead trees, was seemingly widespread in all spruce forests, but, in spite of the efforts made to detect it, no birds were seen.

Another objective was to detect the most important threatening factors. There was excessive lodging activity all across the park, which can be considered far the most important and dangerous factor, threatening a high number of bird species.

DISCUSSIONS

The field observations were carried out in the month of July, which has led from one hand to the absence of some species from our list, which probably breed in the park area. On the other hand the number of observed bird individuals was also lower than in the optimal survey period (in the months April and May). In the dominant habitat types we consider that most of the bird species have been identified. The abundance (the number of specimens observed from each species) however is close to real only on higher altitudes (from the spruce forest level). The bird species breeding on lower altitudes and some early breeding spruce forest bird species (owls, grouse and woodpeckers) were recorded in numbers much lower than in their main breeding period of time. Important species missing from our bird list, species which were not detected probably only because of their secretive behaviour after the mating period, are the Corncrake (*Crex crex*) and the Red-breasted Flycatcher (*Ficedula parva*). A higher number of bird species could have gone undetected in the Vişeu Valley, where relatively little time was spent for the actual survey.

The most important breeding bird species of the park is the Black Grouse, as this is one of the very few sure breeding areas of the species in Romania (it also breeds in the Rodnei Mountains (Daróczi, 2006) and it may also breed in nearby ranges as far south as the Călimani Mountains (Munteanu, 2002). All our observations came from the special conservation area Cornu Nedeii - Ciungii Bălăsânii, designated for this species protection. It is not excluded that it occurs outside of this area. Consequently further information is required to determine its exact distribution and its habitat - mainly *Pinus mugo* and *Juniperus* shrubs - have to be protected.

Between the other conservation dependent species, we can consider important the breeding of relatively high numbers of Capercaillies, which prefer spruce forests with variable structure; the Pygmy Owl, the Tengmalm's Owl and the Three-toed Woodpecker, which all prefer old spruce or mixed forests with dead trees for breeding; the Black Stork, which breeds in old forests and feeds in undisturbed valleys; the Black Woodpecker and the Ural Owl, which may breed in any kind of old forest; and the White-backed Woodpecker, Collared and Red-breasted Flycatcher, which prefer the old beech forests with dead trees. The Golden Eagles usually breed on cliffs, but tree nesting is not excluded. Peregrines may also breed in the park, however, only a juvenile bird was observed.

We consider important to mention the breeding of the Quail at altitudes over 1600 m. According to Cramp (1998) it usually breeds below 1000 m, at higher altitudes being rare. The pair of Green Sandpipers observed in the Vaser Valley in mid July is also worth mentioning, as there is no evidence so far of its breeding in Romania (Munteanu, 2002).

Lodging was far the most important threatening factor. Large areas were clear-felled especially in the western part of the park, where very few old stands remained. Lodging activity, however, has also started to take large proportions in the eastern regions, which, being less accessible, are still in better condition. We have to underline the fact, that some of the species, like owls or woodpeckers have relatively large territories and forests inside "special conservation areas" will not be large enough to support viable populations. These species will also need large areas of old forests with standing dead trees outside of these areas, where forestry activities will not be cancelled, but limited, and where a special management system will be created and applied taking in consideration nature conservation problems. If lodging will not be controlled, the populations of many species will heavily decrease or disappear.

Another important threat is the decline of the number of domestic grazing animals, which will lead to the abandonment of the hay meadows and pastures. This will affect species like birds of prey and the corncrake. Human disturbance does not seem a very important threatening factor at the moment, but in case the number of the tourists visiting the park increases, measures have to be taken for controlling their activity.

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RESULTS OF RESEARCH ON THE BAT (CHIROPTERA) FAUNA OF THE MARAMUREŞ MOUNTAINS NATURE PARK (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, Maramureş Mountains Nature Park, bats, *Chiroptera*, species, distribution, conservation.

ABSTRACT

The paper presents data on the bat fauna of the Maramureş Mountains Nature Park. The survey took place between June and August 2007 and in January 2008, inventorying potential refuges in buildings and caves, capturing the bats with mist nets or identifying them with ultrasound bat-detectors in their foraging habitats. Ten bat species where identified during the study, seven of them being unknown until now from the area; in this way the number of bat species known from the park increased from six to 13. Important colonies of *Myotis myotis / oxygnathus*, *Eptesicus serotinus* and *Rhinolophus hipposideros* where found in buildings. The paper presents data on the size of colonies, type of roosts and habitats used by the species present. Also, recommendations are made for proper conservation.

ZUSAMMENFASSUNG: Ergebnise des Untersuchung das Fledermaus (Chiroptera) Fauna das Maramurseh Gebirge Naturpark (Maramuresch, Rumänien).

Die Arbeit handelt über die Fledermausarten im Naturpark des Maramuresh Gebirges. Die Untersuchung wurde in 2007 in den Monaten Juni - August bzw. Januar 2008 durchgeführt. Die Inventur der Arten in den vorhandenen Lebensräumen wie Gebäuden und Höhlen, erfolgte anhand von Ultraschalldetektoren sowie Fänge mit Hilfe von Fledermausnetzen. Es wurden insgesamt 10 Fledermausarten nachgewiesen, darunter sieben neue Arten für das Gebiet. Somit erhöht sich die Zahl der Fledermausarten auf 13. In einigen Gebäuden wurden bedeutende Kolonien gefunden, gebildet aus *Myotis myotis / oxygnathus*, *Eptesicus serotinus* und *Rhinolophus hipposideros*. Die Arbeit presentiert Daten über die Größe der vorgefundenen Kolonien, die Art der Zufluchtsorte und Habitate und schließlich naturschutzfachliche Empfehlungen zum Schutz der Fledermäuse.

REZUMAT: Rezultate ale cercetării asupra faunei de lilieci (Chiroptera) a Parcului Natural Munții Maramureşului (Maramureş, România).

Lucrarea prezintă date despre fauna de lilieci a Parcului Natural Munții Maramureşului. Studiul a fost realizat între iunie - august 2007 şi ianuarie 2008, prin inventarierea potențialelor adăposturi în clădiri şi peşteri, prinderea liliecilor cu plase chiropterologice sau identificarea lor cu detectoare de ultrasunete în habitatele de hrănire. Au fost identificate zece specii de lilieci, dintre care şapte încă nesemnalate în parc, numărul speciilor de lilieci cunoscute din zonă ridicându-se la 13. Au fost găsite importante colonii în clădiri de *Myotis myotis / oxygnathus*, *Eptesicus serotinus* şi *Rhinolophus hipposideros*. Lucrarea prezintă date despre mărimea coloniilor, tipurile adăposturilor şi habitatelor în care au fost identificate speciile, precum şi recomandări pentru conservarea acestora.

INTRODUCTION

Comparing with other European countries, in Romania bats including that ones with a conservation status (Tab. 1) are the least studied mammals. Little is known about their ecology, habitat use, and their distribution. Most of the older publications do not give detailed information, mentioning only the presence / absence of species, without data on specimen numbers, colony size and circumstances of data collection. For this reason it is difficult to establish population trends in case of the majority of bat species occurring in Romania.

Until now literature sources have mentioned the presence of six bat species from the area of the Maramureş Mountains Nature Park. The first data on the bat fauna of the study area mentioned the lesser mouse-eared bat (*Myotis blythii,* actually *Myotis oxygnathus*), collected in 1941 from Borşa and published in 1954 (Topál, 1954; Barti, 2005). This data is cited in other papers regarding the distribution of bats in Romania (Dumitrescu et al., 1962-1963; Valenciuc et al., 2007; Gheorghiu et al., 2001; Murariu, 2005). Ardelean (1993) mentioned the brown long-eared bat (*Plecotus auritus*) from Faina, in the Vaser Valley. Murariu and Răduleț (1998) found Brandt's bat (*Myotis brandtii*) at Repedea. One *Myotis blythii* colony with 150-200 individuals was found in the church of Repedea Village (Răduleț, 1999). Greater mouse-eared bat (*Myotis myotis*) and lesser mouse-eared bat (*Myotis oxygnathus*) are mentioned from the Vişeu Valley, at Bistra-Repedea (Ardelean and Ştefănescu, 2000; Ardelean and Béres, 2000). Chiş and Manole (2001) found the lesser horseshoe bat (*Rhinolophus hipposideros*) in cave no. 1 (Coreniuc) from Senderschi quarry, near village Bistra. This is the first data of the species from the nature park and from the Maramureş Depression. The same authors identified the greater horseshoe bat (*Rhinolophus ferrumequinum*) and the lesser horseshoe bat (*Rhinolophus hipposideros*) in cave no. 2 (1002/2) from Tocarnea Hill, near Bistra. They also mention the presence of *Myotis myotis* in cave no. 1 (Coreniuc) from Senderschi quarry and in cave no. 2 (1002/2) from Tocarnea Hill.

MATERIALS AND METHODS

Maramureş Mountains Nature Park is situated in the northern part of Romania and includes the Maramureş Massif up to the Romanian - Ukrainian border. The Maramureş Mountains belong to the Eastern Romanian Carpathians and cover a large area on the right side of the Vişeu River to the country border, from the Tisa Defile (downstream the locality Valea Vişeului) to Cârlibaba and Bistriţa Aurie Valleys. The main crest has a NW - SE orientation; the altitudinal range of the study area is between 330 m and 1951 m above the sea level.

The study was performed between June and August 2007. Also, in January 2008, cave no. 1 (Coreniuc) from Senderschi quarry, near village Bistra was visited, in order to collect data about hibernating bats. The bat roosts were identified both in buildings and in natural habitats (Tab. 2). Identification of species, counting or estimation of individual numbers took place in roosts or at roost entrances. In order to catch bats in woodlands, water surfaces or in the vicinity of roosts, we used chiropterological mist-nets. Bats were set free after the measurements (forearm, weight, etc.). For the bats identification in feeding habitats we used the ultrasound detectors Pettersson D 200 (Pettersson Electronic) heterodyne detector and Tranquility Transect (Courtpan Ltd.) time expansion detector. With the latter one, bat calls were recorded, transferred on the computer and analyzed using specific software (BatSound, Pettersson). A GPS / PDA system was used to gather data on geographical position of roosts and to identify exact places where bat calls were recorded. For the morphological identification of the specimens or those observed in the roosts we used the identification key of Dietz and Helversen (2004). Bat calls were identified based on Russ (1999), Russo and Jones (2002).

RESULTS AND DISCUSSION

We identified ten bat species, seven of them being unknown till now from the area.

Lesser horseshoe bat (*Rhinolophus hipposideros*)

Summer roosts of the lesser horseshoe bat are located in buildings, caves or abandoned mines. The species hibernates in underground sites (caves, mines and cellars). Lesser horseshoe bats feed primarily in deciduous woodlands and areas of wet woodland. They generally forage within 2-3 km from their roosting site.

We identified lesser horseshoe bats in their summer roosts (buildings and caves) and also in their specific feeding habitats. The individuals' number in roosts was under ten. Results show that abandoned buildings outside the settlements, in pastures and meadows, used only in the past as summer shelters by locals, offer suitable roosts for lesser horseshoe bats, especially if these buildings are surrounded by deciduous woodland. In January 2008, we found in cave no. 1 (Coreniuc) from Senderschi quarry, near Bistra, ten hibernating individuals. We measured an inside temperature of 5.4 ºC and a relative air humidity of 89%.

Distribution in the Maramureş Mountains Nature Park: Bistra - church (N 47°52'1.38", E 24°11'57.66") - one specimen (12.06.2007); Bistra - school (N 47°51'50.98", E 24°11'16.73") - two specimens (13.06.2007); Valea Zatisnena, near Bistra - abandoned old building (N 47°52'43.18", E 24°13'53.04") - eight specimens (12.06.2007); Valea Bistrei - abandoned building (N 47°52'24.6", E 24°13'6.82") - one specimen (12.06.2007); cave no. 1002 / 1 - Tocarnea (N 47°52'51.6", E 24°10'9.37") - one specimen (13.06.2007); Coreniuc Cave, Senderschi Valley (N 47°52'32.56", E 24°12'25.49") - min. two specimens - identified with ultrasound detector at the cave entrance (19.06.2007); ten specimens (29.01.2008).

Proposed conservation measures: protection of roosts; maintenance of mature deciduous woodlands, as the most important feeding habitat of this species; maintenance of linear landscape elements, tree lines, hedges, which offer connectivity between roosts and feeding areas.

Greater mouse-eared bat (*Myotis myotis*) and lesser mouse-eared bat (*Myotis oxygnathus*)

These two species are discussed together, because are morphologically very similar and often form mixed colonies. *Myotis oxygnathus* has a smaller body, and also a white spot between the ears, but even so, the two species are hard to separate, even in case of hand held individuals (Arlettaz et al., 1991). Summer roosts of these species are located in buildings and/or caves, with hibernation colonies located in underground sites. Their feeding habitat consists of mature deciduous or mixed woodlands, parks and pastures. *Myotis myotis* captures an important part of its prey directly from the ground. They can fly considerable distances (more than ten km) from roosts to the foraging area.

In the Maramureş Mountains Nature Park, important house-dwelling species (Fig. 1) colonies were identified in church attics and towers with up to 250 adult individuals. All of these roosts are covered with metal sheet (tin), which warm up easier during summer days and for this reason they present good conditions for thermoregulation and energy budget of bats. In January 2008, two hibernating individuals were found in cave no. 1 from Senderschi quarry.

Distribution in the Maramureş Mountains Nature Park: Crasna Vişeului - church (N 47°49'53.54", E 24°13'38.03") - one specimen (16.06.2007); Repedea - church (N 47°50'1.93", E 24°23'59.21") - approx. 200 specimens (18.06.2007); Ruscova - church (N 47°47'33.29", E 24°17'2.4") - one specimen (18.06.2007); Leordina - church (N 47°47'13.45", E 24°14'53.84") - approx. 120 specimens (18.06.2007); Petrova - church (N 47°49'24.24", E 24°13'34.64") - approx. 250 specimens (18.06.2007); Coreniuc Cave, Senderschi Valley - two specimens (29.01.2008).

Proposed conservation measures: protection of known roosts (renovation works must take place in the period when bat colonies are absent); conservation of mature deciduous and mixed woodlands; maintenance of linear landscape elements, tree lines, hedges, which offer connectivity between roosts and feeding areas.

The Grey long-eared bat (*Plecotus austriacus*)

It is one of the species which have successfully adapted to urban areas. In some parts of Europe they are frequent in lowlands and hilly areas. During summer, the species can be found up to an altitude of 1500 m. Summer roosts are located mainly in buildings, whereas hibernating sites are located in buildings, cellars and other underground sites. The grey long-eared bats forage in woodlands, woodland edges, parks, orchards and gardens, mainly within two km of the roost. In Romania little is known about the species distribution, due to the reason that past studies are mainly concentrated on cave-dwelling bats. In areas where studies were made on house-dwelling bats, its presence was generally proved (Jére and Dóczy, 2001; Jére et al., 2005). In the study area three specimens were identified in a church attic.

Distribution in the Maramureş Mountains Nature Park: Poienile de Sub Munte - church (N 47°49'16.14", E 24°26'8.41") - three specimens (16.06.2007)

Proposed conservation measures: protection of known roosts (renovation works when bat colonies are absent); reduction of pesticide use; conservation of mature deciduous woodlands.

Serotine (*Eptesicus serotinus*)

It is a common and widespread species in Romania and all over Europe. It has successfully adapted to urban areas (Catto et al., 1996; Gaisler et al., 1998) and is present even in large cities. Summer roosts are located almost exclusively in buildings, but also in attics or in wall crevices. It hibernates generally in buildings, rarely in caves. The Serotine forages at woodland edges, unimproved pastures, parks, gardens and around white light streetlamps.

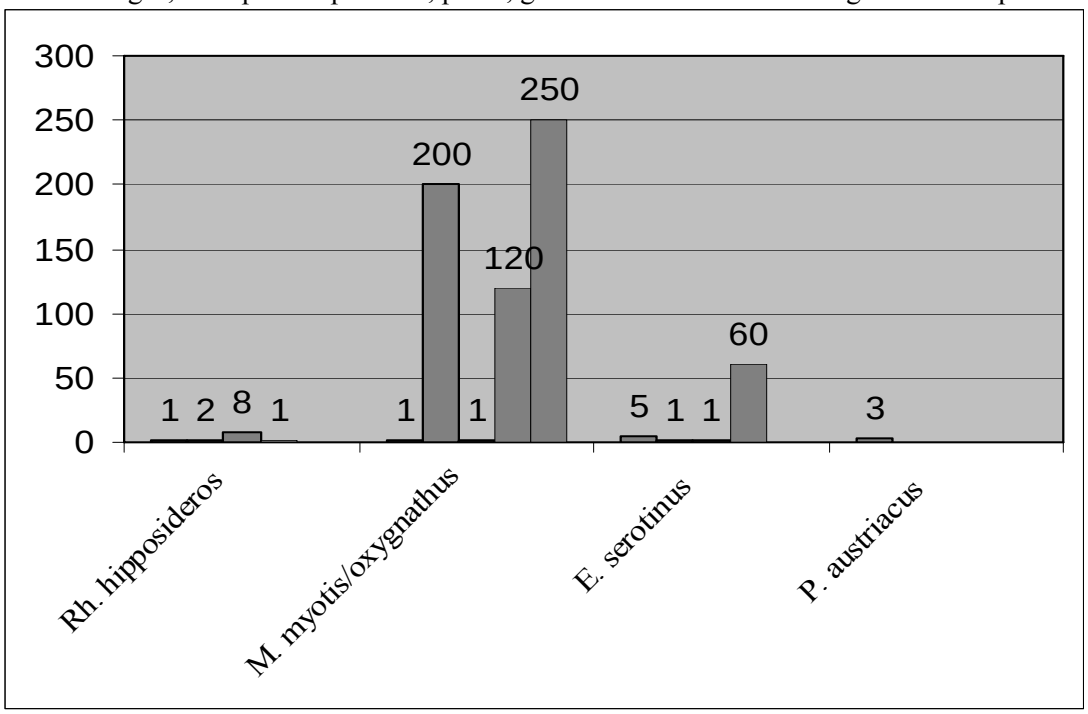

Figure 1: Individual numbers of house dwelling bat species identified in the study area.

In the Maramureş Mountains Nature Park, the species was identified in buildings, but also in their foraging habitats. The biggest colony was formed by approx. 60 individuals. It is a frequent species in settlements and its surroundings.

Distribution in the Maramureş Mountains Nature Park: Bistra - school (N 47°51'50.98", E 24°11'16.73") - five specimens (13.06.2007); Repedea - church (N 47°50'1.93", E 24°23'59.21") - one (18.06.2007); Poienile de Sub Munte - church (N 47°49'16.14", E 24°26'8.1") - one (16.06.2007); Leordina - church (N 47°47'13.45", E 24°14'53.84") - approx. 60 (18.06.2007); Coreniuc Cave, Senderschi Valley: one (an adult male) was mist netted at the cave entrance (19.06.2007); Bistra - identified with ultrasound detector (11.06.2007); Repedea - ultrasound detector (14.06.2007); Coşnea (near Poienile de Sub Munte) - ultrasound detector (17.06.2007); Rica Valley (near Poienile de Sub Munte) - ultrasound detector (15.06.2007); Borşa - ultrasound detector (28.08.2007); Frumuşaua Valley (near Crasna Vişeului) - ultrasound detector (16.06.2007); Vişeu de Sus - ultrasound detector (28.08.2007).

Proposed conservation measures: protection of known roosts (renovation works when bat colonies are absent); maintenance of traditionally used pastures; reduction of pesticide use.

Northern bat (*Eptesicus nilssonii*)

Summer roosts are generally located in buildings and rock crevices, hibernacula are located in underground sites or buildings. Solitary individuals can also be found in tree holes. The northern bat forages in open and semi-open habitats. It is considered a rare species in Romania, with few distributional data, however in the last years its presence was proved in different parts of the country (Barti, 2001; Done, 2007; Valenciuc et al., 2007). It is probably not so rare in the mountains from the central and northern part of the country, as thought before.

Maramureş Mountains Nature Park distribution: near Repedea Village - identified with ultrasound detector (16.06.2007)

Proposed conservation measures: protection of roosts; reduction of pesticide use.

Noctule *(Nyctalus noctula)*

It is a common and widespread species, well adapted to urban environment (Gaisler et al., 1998) and is present even in large cities, where roosts are located in wall crevices of large buildings. Summer roosts are located in tree holes, and crevices of walls or bridges. Hibernation roosts are located in tree holes, rock or wall crevices, and only very rarely in caves. The Noctule forages 10 to 40 m above the water, wetlands, pastures, parks and woodland edges. Often it can be found foraging around white streetlamps. In our study the Noctule was identified with ultrasound detectors foraging in open habitats. It is a frequent species in settlements and their surroundings, where probably uses crevices of different buildings and tree holes for roosting.

Maramureş Mountains Nature Park distribution: Bistra - identified with ultrasound detector (11.06.2007); Repedea - ultrasound detector (14.06.2007); Borşa - ultrasound detector (28.08.2007); Frumuşaua Valley (near Crasna Vişeului) - ultrasound detector (16.06.2007); Petrova - ultrasound detector (16.06.2007); Vişeu de Sus (20.06.2007).

Proposed conservation measures: protection of known roosts and old trees; conservation of freshwater habitats, maintenance of the water quality; reduction of pesticide use.

Leisler's bat (*Nyctalus leisleri*)

Summer roosts of Leisler's bat are located in tree holes and buildings whereas hibernacula are found in buildings or tree holes. The species forages over water surfaces, pastures, woodland edges or woodland clearings. It is considered a rare species, with only a few data available from Romania. Studies in the past years suggested that it's probably not as rare as considered before, mainly in habitats with mature woodland.

Maramureş Mountains Nature Park distribution: Near Repedea Village - ultrasound detector identification (16.06.2007).

Proposed conservation measures: protection of roosts and old trees; conservation of freshwater habitats, maintenance of water quality; maintenance of traditionally used pastures.

Table 1: Conservation status of bat species occurring in the Maramureş Mountains Nature Park (Bern Convention, Bonn Convention, EUROBATS Agreement annexes, Habitats Directive and IUCN Red List).

Species	Bern Conv.	Bonn Conv.	Euro Bats Agr.	HD	RL IUCN
Greater horseshoe bat (*Rhinolophus ferrumequinum*)	II	II	+	II, IV	LR: nt
Lesser horseshoe bat (*Rhinolophus hipposideros*)	II	II	+	II, IV	LR: nt
Greater mouse-eared bat (*Myotis myotis*)	II	II	+	II, IV	LR: lc
Lesser mouse-eared bat (*Myotis oxygnathus*)	II	II	+	II, IV	LR: nt
Brandt's bat (*Myotis brandtii*)	II	II	+	IV	LR: lc
Serotine (*Eptesicus serotinus*)	II	II	+	IV	LR: lc
Northern bat (*Eptesicus nilssonii*)	II	II	+	IV	LR: lc
Noctule *(Nyctalus noctula)*	II	II	+	IV	LR: lc
Leisler's bat (*Nyctalus leisleri*)	II	II	+	IV	LR: lc
Common pipistrelle (*Pipistrellus pipistrellus*)	III	II	+	IV	LR: lc
Grey long-eared bat (*Plecotus austriacus*)	II	II	+	IV	LR: lc
Brown long-eared bat (*Plecotus auritus*)	II	II	+	IV	LR: lc
Barbastelle (*Barbastella barbastellus*)	II	II	+	II, IV	VU

Table 2: Roost and habitat types where certain bat species were identified and collection methods.

Species	Roosts and habitats	Method of identification
Lesser horseshoe bat (*Rhinolophus hipposideros*)	Attic, cellar, cave - summer Cave - hibernation Deciduous woodland	Visual observation Ultrasound detector
Greater mouse-eared bat (*Myotis myotis*) and lesser mouse-eared bat (*Myotis oxygnathus*)	Attic, church tower - summer Cave - hibernation	Visual observation
Grey long-eared bat (*Plecotus austriacus*)	Attic - summer	Visual observation
Serotine (*Eptesicus serotinus*)	Attic - summer Deciduous woodland Settlements	Visual observation Mistnetting, ultrasound detector Ultrasound detector
Northern bat (*Eptesicus nilssonii*)	Deciduous woodland, pasture	Ultrasound detector
Noctule *(Nyctalus noctula)*	Open habitats, river valleys, settlements	Ultrasound detector
Leisler's bat (*Nyctalus leisleri*)	Open habitat	Ultrasound detector
Common pipistrelle (*Pipistrellus pipistrellus*)	River valley	Ultrasound detector
Barbastelle (*Barbastella barbastellus*)	River valley with deciduous woodland	Ultrasound detector

Common pipistrelle (*Pipistrellus pipistrellus*)

Common and widespread in Romania and Europe, presents a good adaptation to urban areas. Summer colonies are found in tree holes, buildings, attics, wall crevices. It hibernates in attics, cellars, and wall crevices, natural and artificial underground sites. Pipistrelles forage over water surfaces, woodlands, woodland edges, parks, tree lines and around white streetlamps. We identified the species here with ultrasound detector only in Rica Valley, near Poienile de Sub Munte Village, which is surprising in comparison with its general abundance.

Distribution in the Maramureş Mountains Nature Park: Rica Valley (near Poienile de Sub Munte) - identified with ultrasound detector (15.06.2007).

Conservation measures: maintenance of freshwater habitats and vegetation on river banks, which favor high densities of aquatic insects; maintenance of linear landscape elements, tree lines, hedges, which offer connectivity between roosts and feeding areas.

Barbastelle (*Barbastella barbastellus*)

Barbastelle is typical for woodland areas. Summer roosts are in tree holes, spaces under old tree barks and buildings. It hibernates in underground sites such as caves, mines, cellars, tree holes, and feeds in deciduous woodlands, river bank woodland and even over open water. We identified it with ultrasound detector only in Rica Valley, near Poienile de Sub Munte Village, but probably it is one of the typical species from habitats with mature deciduous woodland.

Distribution in Maramureş Mountains Nature Park: Rica Valley (near Poienile de Sub Munte) - identified with ultrasound detector (15.06.2007)

Proposed conservation measures: conservation of mature deciduous woodland; water quality protection; decreasing pesticide use, mostly near river bank vegetation and woods edges.

Additionally, three other bat species are mentioned by literature sources from the study area, but we did not find these during our survey:

Greater horseshoe bat (*Rhinolophus ferrumequinum*) - cave no. 2 (1002 / 2), Tocarnea Hill, Bistra (Chiş and Manole, 2001-2002)

Brandt's bat (*Myotis brandtii*) - Repedea (Murariu and Răduleț, 1998)

Brown long-eared bat (*Plecotus auritus*) - Făina, Vaser Valley (Ardelean, 1993).

CONCLUSIONS

In the Maramureş Mountains Nature Park, karsts areas represent only a small percentage of the surface. Caves are not frequent in the study area and beside this a part of them are cold caves. In this way, they do not offer proper conditions for bat colonies during summer, but could be suitable for the hibernating period. In these circumstances, buildings, churches and old buildings in pastures and meadows, situated outside of the settlements can serve as the most important roosts for bats during summer, and can shelter important colonies, with hundreds of individuals. Several colonies of *Myotis myotis / oxygnathus*, *Eptesicus serotinus* and *Rhinolophus hipposideros* were found in buildings of this type. Protection of these roosts is essential for the conservation of populations in the study area. Caves are important in the hibernation period and can offer roost for an important number of bats; maintaining their populations undisturbed during this period is essential.

During our study we found that diversity and abundance of bat communities is higher in areas situated at lower altitudes and with mature deciduous woodland and watercourses, than in those from higher altitudes and covered with coniferous forests. Proper habitat conservation and management has the same importance in bat conservation, likewise the protection of roosts. Thus, the conservation of landscape elements used by bats (woodlands, water surfaces, linear vegetation elements) is extremely important.

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SMALL MAMMALS (RODENTIA AND INSECTIVORA) FROM THE MARAMUREŞ MOUNTAINS NATURE PARK (MARAMUREŞ, ROMANIA)

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KEYWORDS: Romanian Carpathians, Maramureş, insectivores, rodents, chorology, community structure, distribution.

ABSTRACT

The fauna of small mammals from the Maramureş Mountains Nature Park was poorly researched in the past. During three field campaigns in July and August 2007 and May 2008 a series of investigations using live trapping was carried out in 9 stations within the park's borders. The researches aimed to draw up a chorological list for the small mammal species and to characterize the community's altitudinal distribution. Up to the present 16 species are known from this area, among them 5 insectivores and 11 rodents.

RÉSUMÉ: Petits mammifères (Rodentia et Insectivora) du Parc Naturel Maramureş Monts (Maramureş, Roumanie).

La faune de des petits mammifères du Parc Naturel Maramureş Monts n'est pas ete bien recerche dans le passe. Durant trois campagnes de terrain, en Juliet et Aout 2007 et Mai 2008 nous avons entrepris une série des investigations visant l'élaboration une liste chorologique pour les espèces de petits mammifères et leur distribution altitudinale. Jusqu'au présent 16 espèces sont connues d'ici, 5 insectivores et 11 rongeurs.

REZUMAT: Mamifere mici (Rodentia şi Insectivora) din Parcul Natural Munții Maramureşului (Maramureş, România).

Parcul Natural Munții Maramureşului a fost foarte puțin studiat în trecut sub aspectul faunei de mamifere mici. Pe parcursul a trei campanii de teren, în iulie şi august 2007 şi luna mai 2008, am întreprins o serie de investigații pe baza capturării animalelor vii, urmărind obținerea unei liste privind răspândirea acestora şi distribuția lor altitudinală. Până în prezent, sunt cunoscute 16 specii din această arie, şi anume 5 insectivore şi 11 rozătoare.

INTRODUCTION

Like in any mountain regions from Romania, only few studies were carried out in Maramureş Mountains on the small mammal communities. The first data on the fauna of Maramureş region belong to Hanák (1848), who describes the observation of *Marmota marmota* in Maramureş Mountains, as well as its whistling in Pietrosul Rodnei. The first faunistic list for Maramureş, including also mammals, was elaborated by Frivaldsky (1875). This list was then taken over and completed by Kardos in "Monography of Maramureş" (Szilágyi, 1876). In this paper 31 species of wild fauna are enumerated, along 10 domestic

species, for some being given the location of their capture or observation. Recently some papers were published including data on the small mammal species from different areas of Maramureş region: Szabó (1960) - Valea Vinului (Rodna Mountains), Wagner (1974) - Rodna Mountains, Ardelean (1993) - Vaser Valley, Murariu and Răduleț (1998) - Maramureş Depression. In 2000 Ardelean and Béres published a synthesis on the vertebrates fauna from Maramureş. However, the data from Maramureş Mountains and especially from the nature park area are scarce.

The present study aimed to draw up a chorological list for the small mammal species and to characterize the communities altitudinal dynamics.

METHODS AND RESEARCH AREA

Investigations were carried out by live-trapping of small mammals using Polish wooden box-traps and Fitch traps. The traps were set either in a rectangular net (in forests) or in transect (along river banks), at 10 m distance one from another. They were baited using oil soaked bread, seeds and meat. Traps were checked twice a day, in the night and at dawn. Captured animals were determined according to Pucek (1981), Murariu (2000) and Popescu and Murariu (2001) based on external morphological features. Their age and sex (in case of rodents) was noted. Individuals were measured, weighed and marked by cutting their fur in different parts of the body, and then released.

The quantitative data are expressed by the capture index values (Benedek, 2006).

Studies were accomplished during three field campaigns carried out in July and August 2007 and May 2008. As the researches were done as part of a contract with the Maramureş Mountains Nature Park Administration, in the frame of the program for volunteers, all the stations were chosen within the park's border.

Paltinul Chalet - situated in the beech forest vegetation level. 15 traps were set along the Frumuşeaua Rivulet, 14 in the beech forest on the left side of the stream, with rich herbaceous and shrub layer, dead trunks, situated on medium slope, and 15 traps were set in the beech forest on the right side of the rivulet, with dense canopy, no shrub layer and few herbaceous plants, thick litter, on a steep slope.

Repedea Forest Range - three habitats investigated. 14 traps were set in line along the edge of the beech forest on the left bank of the Repedea Rivulet, downstream the forest range. The forest is mature, with well developed canopy, shrub layer made of *Corylus avellana, Spiraea ulmifolia* and *Rosa canina*, rich, high herbaceous layer dominated by *Telekia speciosa, Urtica dioica* and *Petasites* sp*.,* grasses and ferns. 14 traps were set in a swampy open area, on the right side of the rivulet, next to the road, at the base of the slope. Ten traps were set upstream the forest range, in the secondary meadow with high vegetation and scattered *Fagus*.

Vinderel Lake - situated at 1670 m altitude, in the subalpine area. 20 traps were set in the pasture around the lake, 10 traps were placed among the *Juniperus* shrubs in the steep part of Farcău Massif, on 45° slope, with superficial soil and poor herbaceous vegetation, and ten traps were placed on the steep rocks. No small mammal was captured in this station.

Coşnea - Poienile de sub Munte - situated in the beech forest vegetation level. This station was researched during two field campaigns, in July and August 2007. A line of traps was set on Coşnea River bank, among rocks and ferns, and a net was set in the beech forest behind the range. The forest has a rich canopy, with *Rubus* shrubs and ferns.

Bardău Forest Range - situated at 650 m, in the mixed forest vegetation level. Two field investigations were carried out in this station, in July 2007 and May 2008. Four habitats were researched. A traps net was set in the mixed forest in front of the range. An exploited

forest, with few spruce trees and more spruce seedlings, rich shrub layer of *Rubus hirtus* and *Vaccinium myrtillus*, herbaceous layer and moss, on steep slope. Another net was placed on Vaser Valley, downstream the confluence with Bardău River, behind the forest range, ten traps were set in the meadow next to Bardău nursery, and the last net was placed in the spruce forest, with rich canopy, many dead trunks, on steep slope.

Făina - 750 m altitude. Two field campaigns were carried out, in August 2007 and May 2008 in three habitats. The spruce forest from the left side of Vaser River, behind the camping, with dense canopy, poor herbaceous layer made of *Vaccinium* and moss, on steep slope. In this forest a large number of rodents holes was observed. The second investigated habitat was the right bank of Vaser River, the traps being placed among the rocks and the vegetation, and the third habitat, researched only in May 2008, is a meadow near the wooden church from Făina.

Bistra Valley - situated in the beech forest vegetation level. Here two field campaigns took place, in August 2007 and May 2008. 25 traps were set at random, along a transect of three km, from the Vişeu River bank to the most distant house no. 74 on Bistra Valley. Along the transect several habitats were investigated, the traps being placed in the places suggested by the forester from Bistra, Mr. Ircuț Valentin, an expert in mammals and their habitats.

Valea Neagră - tributary to the Vişeu River, on the oposite side of Bistra Village. 25 traps were set at the confluence with Vişeu, on the banks of both rivers, in a hygrophillous meadow and two lines, one at the forest edge and the other up the slope, along a road.

Vişeu de Sus - in the mixed forest vegetation level. This station was researched during one night in May 2008. Two habitats were investigated: the riverbank of a tributary of Vaser and the nearby mixed forest, made of *Fagus sylvatica* and 20% *Picea abies, Acer pseudoplatanus, Tilia cordata*, with dense canopy, poor herbaceous vegetation, on steep slope.

RESULTS

Up to the present 16 species of small mammals are known from the Maramureş Mountains Nature Park, namely five of insectivores and eleven rodents. Among them twelfe species were captured or observed during our research, two of them, namely *Arvicola terrestris* and *Microtus agrestis* being recorded for the first time in the area. The faunistical and chorological catalogue is given below.

Ordo **Insectivora** Bowdich, 1821

Fam. Erinaceidae Bonaparte, 1838

1. *Erinaceus concolor* Martin, 1838

It was cited in the Maramureş Mountains (Kardos ap. Szilágyi, 1876; Călinescu, 1931), but without mentioning the localities. During our study one individual was observed in the Coşnea - Poienile de Sub Munte area.

Fam. Talpidae Gray, 1825

2. *Talpa europaea* Linnaeus, 1758

Is a very frequent species in Maramureş region, it was collected from Repedea (Murariu and Răduleț, 1998). In Maramureş Mountains Nature Park its presence was noted during the study based on the mole hills found in several areas.

Fam. Soricidae Gray, 1821

3. *Sorex araneus* Linnaeus, 1758

In the research area *Sorex araneus* was collected from Repedea (Murariu and Răduleț, 1998). During the study two specimens were captured in August 2007 in Coşnea - Poienile de Sub Munte area.

4. *Neomys fodiens* (Pennant, 1771)

In Maramureş is a wide spread species, but with low densities. It was captured at Repedea in 1997 (Murariu and Răduleț, 1998).

5. *Crocidura suaveolens* (Pallas, 1811)

Cited at Borşa and other localities that are not mentioned (Ardelean and Béres, 2000).

Ordo **Rodentia** Gray, 1821

Fam. Sciuridae Gray, 1821

6. *Sciurus vulgaris* Linnaeus, 1758

In the literature *Sciurus vulgaris* is recorded from Făina Forest, Botizu - Valea Vaserului (Ardelean, 1993), being considered common and abundant in Maramureş, including in the settlements to the upper limit of the forest (Ardelean and Béres, 2000). During our field campaigns one individual was observed on the Vaser Valley, upstream Bardău Forest Range.

Fam. Gliridae Thomas, 1897

7. *Myoxus glis* (Linnaeus, 1766)

In Maramureş Mountains Nature Park the species was mentioned from the Vaser Valley (Ardelean, 1993) and Repedea (Murariu and Răduleț, 1998). Direct evidences of their presence in the area (broken tails) were found at Bistra. In this locality some inhabitants of the village say that they have to protect their food supplies by capturing them using snap-traps.

8. *Muscardinus avellanarius* (Linnaeus, 1758)

Is recorded in the literature from the same localities, namely Vaser Valley (Ardelean, 1993) and Repedea (Murariu and Răduleț, 1998).

Fam. Arvicolidae Gray, 1821

9. *Arvicola terrestris* (Linnaeus, 1758)

Was not cited before from the research area. One specimen was observed during the study in Coşnea - Poienile de Sub Munte area.

10. *Clethrionomys glareolus* (Schreber, 1780)

Was mentioned from Maramureş in 1998, by Murariu and Răduleț. Several specimens were captured during our field campaigns on Vaser Valley at Bardău and Făina and one specimen was found on Bistra Valley and Valea Neagră.

11. *Microtus agrestis* (Linnaeus, 1761)

Not cited before from this area. During our campaigns two individuals were captured in August 2007 on Vaserului Valley, at Făina and another one was found in May 2008.

12. *Ondatra zibethicus* (Linnaeus, 1758)

In Maramureş the species was cited for the first time in 1963, when a specimen was captured on the Tisa River bank and another in a fountain in Sighetul Marmației. After an important range expansion in 1960-1970, when *Ondatra zibethicus* reached Moisei (on Vişeu River) and even the brooks from Poienile de Sub Munte (inside the present Maramureş Mountains Nature Park), its populations recorded a significant numerical decline, due to some very dry summers in the 1980's. In the present just a small populations still lives in the area, especially in the lakes and fishponds from Tisa Valley (Ardelean and Béres, 2000).

Fam. Muridae Gray, 1821

13. *Apodemus sylvaticus* (Linnaeus, 1758)

In the research area *Apodemus sylvaticus* was collected from Vaser Valley (Ardelean, 1993) and by Béres from several localities (Ardelean and Béres, 2000). In May 2008 we captured one specimen in a beech forest near Vişeu de Sus town, where it was the only small mammal captured.

14. *Apodemus flavicollis* (Melchior, 1834)

In the Maramureş Mountains Nature Park *Apodemus flavicollis* was collected from Vaser Valley (Ardelean, 1993) and by Béres from several localities (Ardelean and Béres, 2000). During our study it was the dominant species, being encountered in almost every research station, in all the campagnes. 22 specimens were captured in all, at Coşnea, on Bistra Valley, on Valea Neagră, at Bardău and Repedea.

15. *Apodemus agrarius* (Pallas, 1771)

It was captured by Béres in 1967 in several areas from Maramureş, up to 800-1100 m altitude, but the localities are not mentioned (Ardelean and Béres, 2000). During our research twelfe specimens were captured, being the dominant species in the stations situated at low altitudes, along the water (Paltinul, Valea Neagră).

16. *Rattus norvegicus* Berkenhout, 1769

One specimen was found dead in the vicinity of Coşnea - Poienile de Sub Munte.

DISCUSSION

The specimens captured during the three investigation campaigns carried out in the Maramureş Mountains Nature Park, are synthetised in the table 1.

Table 1: Synthesis of the captures from the investigated localities, in terms of individual numbers and percents, during the field researches from 2007 and 2008.

	Bistra	Valea Neagră	Paltinul	Repedea	Coşnea	Vişeu de Sus	Bardău	Făina	Vinderel	Total	%
A. flavicollis	22	2	0	2	10	0	5	1	0	42	59.1
A. agrarius	5	6	2	0	0	0	0	0	0	13	18.3
A. sylvaticus	0	0	0	0	0	1	0	0	0	1	1.4
C. glareolus	1	1	0	0	0	0	4	3	0	9	12.7
M. agrestis	0	0	0	0	0	0	0	3	0	3	4.2
S. araneus	0	0	0	0	2	0	0	0	0	2	2.8
Total ind.	28	9	2	2	12	1	9	7	0	71	100
%	40.8	12.7	2.8	2.8	16.9	1.4	12.7	9.8	0	100	

The small mammals community from the Maramureş Mountains Nature Park (Fig. 1) is clearly dominated by *A. flavicollis* (60%), followed by *A. agrarius* (18.3%), due the low altitude of most investigated stations, in the vicinity of water courses. *C. glareolus* presents a reduced abundance (12.6%) due on one hand to the same cause, as the stations at low altitudes are situated outside the optimum area of the species, and on the other to the low abundance of small mammals at higher altitudes. *M. agrestis, A. sylvaticus* and *S. araneus* present low relative abundances, being captured only in one localities.

The abundance of small mammals communities generally decreases on altitude. A similar situation was recorded also by other authors (Simionescu, 1968; Benedek, 2006), although these mention also the decrease in species diversity (and number), which was not the case during our study (Fig. 2), when the highest number of species per station (3) was encountered both in the lowest (Valea Neagră, Valea Bistrei) and in the highest localities (Făina - except Vinderel Lake where were no captures), possibly due to habitats' heterogenity.

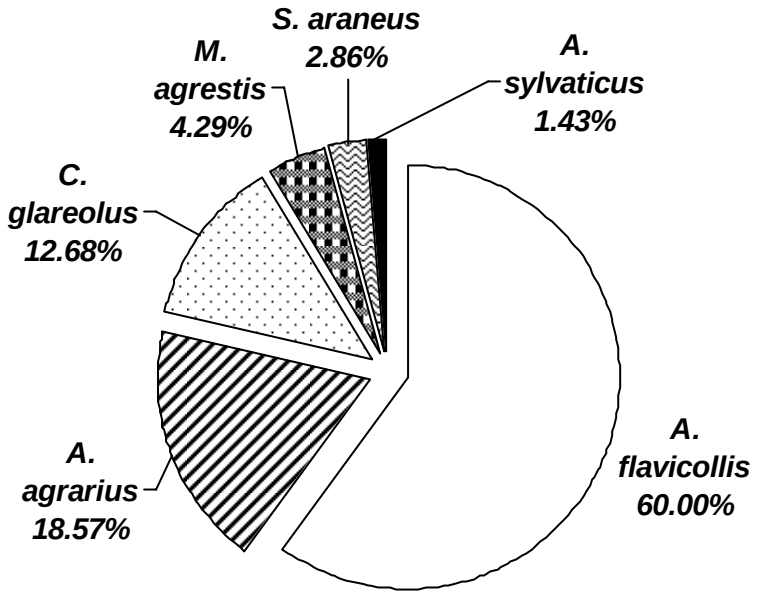

Figure 1: Specific structure of small mammals communities from the Maramureş Mountains Nature Park, expressed in terms of general relative abundance (%).

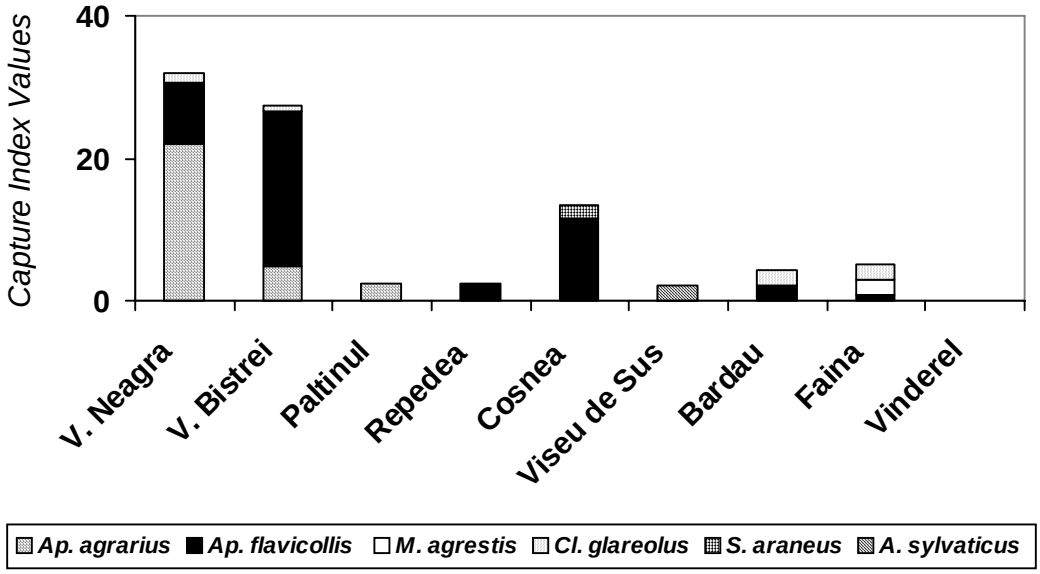

Figure 2: Altitudinal dynamics of small mammals communities based on capture index values in the investigated stations from Maramureş Mountains Nature Park.

Considering the structure and abundance of small mammals communities in the investigated stations, significant altitudinal differences are observed in both respects. Thus, in most of the stations (Bistrei Valley, Coşnea, Repedea) *A. flavicollis* is prevailing (in the last two was the only captured species), while on Valea Neagră and Paltinul (situated at lower altitudes) *A. agrarius* was more abundant. Although present also in the lower stations, *C. glareolus* presents much higher abundances in higher stations (Făina and Bardău). On the other hand, *M. agrestis* was found only at Făina.

The small mammal communities abundance decreases significantly on altitude; the highest densities were recorded in the lowest investigation station (Bistra Valley), while in the highest station (Vinderel Lake) no specimen was found. An exception is represented by the Coşnea area.

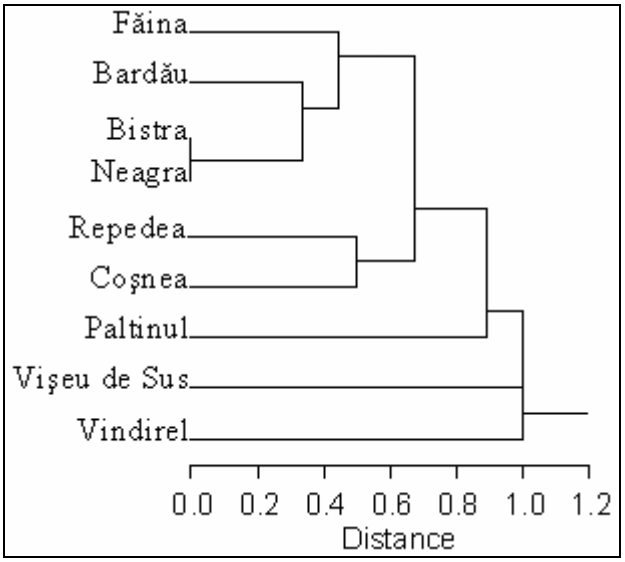

Figure 3: Cluster analysis of the investigated stations,
based on Jaccard index,
average distance linkage method.

Considering the small mammals communities sheltered, the investigated stations form three distinct groups (Fig. 3).

A first group is composed of Făina, Bardău, Bistra and Valea Neagră, the last two being identical from faunistical point of view. This group is characterised by the presence of *A. flavicollis, A. agrarius* and *C. glareolus*.

A second group is formed of Repedea and Coşnea, based on the high abundance of *A. flavicollis*.

The rest of the sampling stations are joined separately, indicating a faunistical segregation.

CONCLUSIONS

Up to the present 16 species of small mammals (five insectivores and eleven rodents) are known from the Maramureş Mountains Nature Park. Among them, six species were captured during our research and other six were noted based on direct or indirect observations. Two of the captured rodent species (*Arvicola terrestris* and *Microtus agrestis*) are newly recorded in the area.

The small mammals communities from the investigated area is dominated by the rodent *Apodemus flavicollis*, a typical forest species, which represented more than a half of the captured individuals. The structure and abundance of the small mammals communities present an altitudinal dynamics; the density decreases at higher altitudes. Faunistically the most resembling stations are Bistra Valley and Neagră Valley.

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