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C U P R I N S

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THE "DINOSAUR ISLAND" – NEW INTERPRETATION OF THE HAŢEG BASIN VERTEBRATE FAUNA AFTER 110 YEARS

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Rezumat

"Insula Dinozaurilor" - Noi interpretări asupra faunei de vertebrate din Bazinul Hațegului după 110 ani

Fauna de vertebrate maastrichtiane din Bazinul Hațegului, România, a fost descrisă de către F. Nopcsa drept una insulară, datorită numeroaselor caracteristici paleobiologice ieşite din comun, cum ar fi: endemicitatea ridicată şi diversitatea scăzuta a faunei, precum şi caracterul primitiv şi dimensiunile reduse (considerate a fi rezultatul unui fenomen de nanism insular) ale taxonilor componenți. Totuşi, această ipoteză nu a fost serios re-investigată în lumina cantității apreciabile de noi date şi descoperiri care s-au acumulat între timp. Prezenta contribuție sintetizează corpul de noi evidențe acumulate, pro sau contra ipotezei de faună insulară, şi ajunge la concluzia că fauna de vertebrate din Bazinul Hațegului reprezintă o faună insulară; însă originea şi istoria evolutivă a acestei faune a fost complexă, implicând mai multe valuri de migrații ce au avut istorii evolutive diferențiate. "Insula Haţeg" a fost nu numai o fundătură evolutivă, după cum a sugerat Nopcsa, dar şi un leagăn ce a dat naştere unor noutăți evolutive.

INTRODUCTION

Beginning with the early years of the 20th century, when the first Late Cretaceous continental vertebrate remains were discovered by NOPCSA (1900, 1902, 1905) in the Haţeg Basin (and surrounding areas of Transylvania), several peculiar features of this assemblage were noted. One of the most outstanding aspects of this mostly reptilian fauna was represented by its presumed insular habit. Nopcsa, a promoter and early supporter of the

theory of plate tectonics (WEISHAMPEL & REIF 1984), suggested that this fauna (made up, in his best knowledge, mainly of dinosaurs, besides turtles, crocodilians and pterosaurs) lived on an island within the realm of the Tethys Ocean (NOPCSA 1923 a). And this restrictive, insular habitat markedly influenced the composition and evolution of the assemblage, leading to the development of peculiar features, seen rarely in the case of fossil assemblages, especially from the Mesozoic (see below). Until recently, this paradigmatic conclusion of Nopcsa was largely accepted, but was never analysed in detail and supported by independent data.

The present contribution seeks to discuss the hypothesis of the insular nature of the Late Cretaceous fauna from the Haţeg Basin in the light of the newest discoveries and developments, made both locally and worldwide, to establish whether the data accumulated during the 110 years that went on from its first discovery supports or contradicts the insular hypothesis.

GEOLOGICAL BACKGROUND

The Haţeg Basin, situated in the northwestern part of the Southern Carpathians, and surrounded by the Retezat, Şureanu and Poiana Ruscă Mountains, represents a post-tectonic depression formed subsequently to the Latest Cretaceous Laramian tectogenetic phase that built up the major structural framework of the Southern Carpathians (SĂNDULESCU 1984). The formation of the basin took part concomitantly with the uplift of the nappe structure of the Carpathians, as a consequence of local post-orogenic collapse of the new orogen, along major faults (WILLINGSHOFER 2000). The temporal overlap between the raise of the surrounding areas and marked subsidence within the basin led to the accumulation of a thick pile of siliciclastic continental deposits, preserved especially in the central and northwestern areas of the basin.

The molasse-type detritic sequences, varying from conglomerates and breccias to sandstones, silts and mudstones, were grouped in two major lithostratigraphic units, considered as being largely synchronous: the Sânpetru and Densuş-Ciula formations, the first one outcropping in the central part of the basin, around Pui and in the Sânpetru-Toteşti-Nălaţ-Vad area, the second one in the western part, in the Densuş-Vălioara-Tuştea-Fărcădin area (GRIGORESCU 1992). The lithology of the two units is slightly different, mainly due to the presence of the pyroclastic sediments and volcanoclasts in the lower part of the Densuş-Ciula Formation; however, the known faunal and palynological assemblages from the two units are comparable and supports their synchronicity. The age of these deposits were first considered as Danian (in the sense of Latest Cretaceous, NOPCSA 1905), then as Late Maastrichtian

(DINCĂ & all. 1972; ANTONESCU & all. 1983). Recently, the age of the deposits was established to be Maastrichtian, based on palaeomagnetism (PANAIOTU & PANAIOTU 2002) and palynology (VAN ITTERBECK & all. 2005); biostratigraphic studies in the underlying marine deposits, based on foraminifera (e. g. NEAGU 2006) and calcareous nannoplankton (e. g. GRIGORESCU & MELINTE 2002; MELINTE & BOJAR 2006) also support this age assignment.

Lithological, sedimentological and geochemical features of the Maastrichtian deposits (BOJAR & all. 2005; THERRIEN 2005, 2006; VAN ITTERBECK & all. 2004) allowed the reconstruction of the environmental conditions in which the Haţeg vertebrate assemblage lived. The sediments accumulated within a setting dominated by fluvial processes, placed at the foothills of the surrounding uplifted metamorphic massifs; the rapid, anastomosed river channels, the well or poorly drained floodplains, small lakes and swamps created a mosaic of microhabitats populated by a diverse invertebrate and vertebrate fauna. Vegetation was similarly diverse, varying from savannah-like plains with a groundcover of ferns and early angiosperms and disperse trees, swamps with a dense vegetation of ferns and angiosperms or gallery forests developed along the rivers, to mangrove forests (PETRESCU & DUŞA 1982).

The presence of a subtropical, seasonally variable, but dominantly semiarid climate is independently supported by paleobotany and palynology (PETRESCU & DUŞA 1982, VAN ITTERBEECK & all. 2005), sedimentology and geochemistry (BOJAR & all. 2005; THERRIEN, 2005), clay mineralogy (S. RĂDAN, unpublished data), taphonomie (CSIKI 2006) and palaeomagnetism (PANAIOTU & PANAIOTU 2002). According to the paleomagnetic studies, the present area of the Haţeg Basin was situated at a more southerly position, of about 28-30^{O}N, which is in agreement with the independent geological data.

NOPCSA AND THE DINOSAURS OF THE "HAŢEG ISLAND"

The discoverer and first student with important contribution to the understanding of the Late Cretaceous vertebrate faunas of the Haţeg Basin and surrounding areas was F. Nopcsa. Nopcsa, a local nobleman, had dedicated a large part of his prodigious scientific activity to the study of these fossil vertebrates, first reported by him in 1897 (2007 marking thus the 110th anniversary of the Haţeg Basin dinosaurs). Nopcsa published several monographical descriptions of the different reptilian taxa (mainly dinosaurs, but also turtles and crocodilians) from Haţeg (e. g. NOPCSA 1900, 1902, 1923 b, 1928), as well as a few synthetic overviews of the assemblage, discussing its relationships to faunas from Europe or other continents, and trying to decipher its origin and evolution (NOPCSA 1915, 1923 a).

In these contributions, Nopcsa drew attention to several peculiar features of the Haţeg reptilian fauna, features that in his opinion made this assemblage a particular one. These features included in the first place

(1) the **primitive character** of the assemblage in overall, as well as that of most of the included taxa. Nopcsa demonstrated that many of the Haţeg Basin dinosaurs were anachronistic relative to their late chronostratigraphic position, at the end of the Cretaceous. Thus, the hadrosaur "*Orthomerus*" (*Telmatosaurus*) *transsylvanicus* was considered as closely related to the primitive "trachodontids", while "*Rhabdodon*", another ornithopod taxon, was representing the even more ancestral group of "kallodontids", known mainly from the Late Jurassic. Nopcsa identified the same primitiveness also in the case of the sauropod "*Titanosaurus*" and in that of the ankylosaurian *Struthiosaurus*, as well as in the cases of the turtles (*Kallokibotion*) or pterosaurs ("*Ornithodesmus*"). Moreover, the assemblage itself had an archaic composition, being dominated by taxa considered by Nopcsa typical for the Late Jurassic – Early Cretaceous (sauropods, "kallodontids"), but lacking or occurring rarely in the contemporaneous faunas of North America.

Besides the archaism of the fauna, Nopcsa noted several other outstanding features, such as:

(2) the **markedly endemic nature** of the assemblage. In different stages of his work on the Haţeg fauna Nopcsa changed his views about the taxonomy and systematic position of the different taxa, proposing 3 different names for the hadrosaur *Telmatosaurus* (WEISHAMPEL & all. 1993): *Limnosaurus*, *Telmatosaurus* and *Orthomerus*, and as much as 4 for the basal euornithopod *Zalmoxes* (WEISHAMPEL & all. 2003): *Camptosaurus*, *Onychosaurus*, *Mochlodon* and *Rhabdodon*. However, regardless of these different understandings of the taxa, it was obvious to him that most of them represented endemics, either with a distribution strictly restricted to the Transylvanian area, or having a somewhat wider, European range. The names Nopcsa gave to the newly described species (*transsylvanicus*, *dacus*, *bajazidi* – after the name of his Albanian secretary, D. E. Bajazid) also illustrates this opinion, ad even many of the genera he described were considered at least in different stages of his studies as being unknown from other areas (*Telmatosaurus*, *Kallokibotion* or the crocodilian *Allodapouschus*).

(3) the **small size** of many of the dinosaurian taxa was considered by Nopcsa as being one of the most important arguments supporting his idea of the Haţeg fauna as an insular one, by comparison to those from the Neogene Mediterranean islands (NOPCSA 1923 a). By comparing the different dinosaur taxa from the Haţeg Basin with their close relatives from other areas, Nopcsa noticed that those from Haţeg were significantly smaller than their

western European, North American, African or South American counterparts. The size of the Haţeg individuals of "*Rhabdodon*" was only half that of the individuals of the same genus discovered in southern France, that of the *Telmatosaurus* individuals only one-third or less than those of other hadrosaurs (especially from North America, the only ones known to Nopcsa outside Europe), while the size of the titanosaurs from Haţeg, illustrating the most important case of dwarfing, not exceeded one-fourth of the size of the large Late Jurassic neosauropods from North America or Africa. Nopcsa explained these observations as examples of "island dwarfism" (size reduction due to the insular habit of taxa that are represented in continental areas by large-sized individuals: elephants, hyppopotames etc.; Roth, 1990, 1992). The scientific community received the interpretation put forward by Nopcsa positively and since then it is cited as a classic example (and, for long time, the only one known from the Mesozoic) of insular dwarfism (e. g. DALLA VECCHIA 2003; WEISHAMPEL & all. 1991).

(4) the **low diversity** of the Haţeg fauna was also noticed early by Nopcsa (NOPCSA 1915), who underlined that it (and the Late Cretaceous European faunas in general, considered by Nopcsa as having a similar, almost identical composition with that from Haţeg) included a small number of taxa – not more than 6 dinosaurs (including the purported bird *Elopteryx nopcsai* – ANDREWS 1913), as well as one turtle (or at most two congeneric species, cf. Nopcsa, 1923b), one crocodilian and one pterosaur. This composition was in neat contrast with that of the Late Cretaceous faunas of North America that included, in Nopcsa's times, at least 25 dinosaur taxa.

To explain all these peculiarities of the Haţeg vertebrate fauna, Nopcsa made appeal to a simple and attractive hypothesis, namely that this fauna lived in an insular environment (NOPCSA 1923 a). Nopcsa, a promoter of the ideas grouped subsequently under the name of "plate tectonics" (WEISHAMPEL & REIF 1984), had no difficulties in imaging the habitat of the Cretaceous Haţeg vertebrates as an island placed in the middle of the Tethys Ocean, even in the lack of much supporting geological, tectonical and palaeogeographical evidence. And, once the idea of the insular habitat was accepted, the particular palaeobiological features observed by Nopcsa were easy to explain, these reproducing those observed in several instances of Neogene or Recent island faunas. This working hypothesis, similarly to that of the existence of the insular dwarfism in the case of the Haţeg dinosaurs, achieved widescale acceptance, and the dinosaur fauna of the Haţeg Basin was frequently cited as a classical example of Mesozoic insular faunas, one of the few ones known, without critically reviewing the arguments put forward by Nopcsa in the light of the subsequent new discoveries, both locally or worldwide.

However, there are several recent attempts to question either the validity of Nopcsa's most important argument for an insular habitat – that of the existence of insular dwarfs in the Haţeg Basin (LE LOEUFF 2005), as well as the insular character of the fauna in overall (JIANU CORALIA MARIA & BOEKSCHOTEN 1999).

This contribution is an essay to critically review the original Nopcsa hypothesis, that of the Cretaceous vertebrate fauna from the Haţeg Basin seen as an island fauna, in the light of the new geological and paleontological data acquired from the Haţeg Basin, on one hand, as well as taking into account the most recent developments in the fields of Mesozoic vertebrate Paleontology and phylogeny, paleobiogeography and paleogeography - tectonics, on the other.

NEW DISCOVERIES AND NEW INTERPRETATIONS

1. New discoveries in the Maastrichtian of the Haţeg Bazin

Following the tragical death of Nopcsa, the studies concerning the reptilian fauna from the Haţeg Basin were interrupted for over a half century, a period marked only by isolated paleontological discoveries made during geological mapping or exploration activities, or by small-scale studies on different components of the local fauna and flora (CSIKI 2005, for a review). It was only beginning with 1977, that the geological and paleontological research activities were renewed, first by the Paleontology Laboratory of the University of Bucharest (under the supervision of dr. Dan Grigorescu) in collaboration with the Hunedoara County Museum (to become later the Muzeul Civilizaţiei Dacice şi Romane) from Deva (Ion Groza, Coralia-Maria Jianu). Since then, the researches continued without major interruptions, with contributions from other researchers from Romania (the Babeş-Bolyai University, Cluj-Napoca, under the supervision of dr. Vlad Codrea, in collaboration with researchers of the Royal Belgian Institute of Natural Sciences, Bruxelles, Belgium) or from abroad (SUA, United Kingdome, France, Germany, the Netherlands, Spain) (CSIKI 2005). These ongoing researches led to the accumulation of a wealth of new data concerning the vertebrate fauna (as well as the invertebrates and floras) from the Maastrichtian of Haţeg Basin and surrounding areas, as well as the paleogeographic – paleotectonic context in which it lived. The most important new developments are:

- discovery of several new taxa of vertebrates, widening the faunal list from 10 taxa (known to Nopcsa) to over 60 taxa (GRIGORESCU 2005), including members of all major vertebrate groups: fishes, amphibians (anurans, albanerpetontids), sauropsid (turtles, lizards,

snakes, crocodilians, pterosaurs, ornitischian and saurischian dinosaurs including birds) and synapsid (multituberculate and possibly therian mammals) amniotes;

- revision of the anteriorly discovered taxa, either by Nopcsa or others, leading to the clarification of their taxonomy and systematic-phylogenetic position; these revisions showed that almost all taxa are new: the name *Magyarosaurus* was erected instead of *Titanosaurus* (HUENE 1932) or that of *Zalmoxes*, instead of *Rhabdodon*, with two different species (WEISHAMPEL & all. 2003), while *Telmatosaurus* was resurrected to replace *Orthomerus* (WEISHAMPEL & all. 1993). Besides these, several new, yet undescribed taxa of sauropods and theropods were also reported (CSIKI & GRIGORESCU 2004, 2005);

- discovery of important assemblages of invertebrates (PANĂ & all. 2002; CSIKI 2006) and plants, represented by macrofloral remains (e. g. MĂRGĂRIT & MĂRGĂRIT 1967) or palynomorphs (ANTONESCU et al. 1983; VAN ITTERBECK et al. 2005), allowing a better understanding of the Maastrichtian paleocommunity of the Haţeg Basin, reconstruction of the local vegetation and a more complete picture of the trophic relationships within the ecosystem;

- methodological diversification and in-depth analysis in the domains of sedimentology and geochemistry (e. g. VAN ITTERBECK & all. 2004; THERRIEN 2005, 2006; BOJAR et al. 2005) as well as regional geology and tectono-sedimentary evolution (e. g. SANDERS 1998; STILLA 1985; WILLINGSHOFFER 2000), allowing a more detailed understanding of the existing sedimentary environments and that of the geographical, climatic and sedimentological parameters controlling the accumulation of the Maastrichtian deposits, and, implicitly, the characteristics of the physico-geographical context of the environment of the Haţeg Basin paleocommunity.

2. New discoveries and interpretations in the vertebrate palaeontology, palaeogeography and paleobiogeography

After the completion of the scientific work of Nopcsa, a large number of new discoveries and conceptual advancements were made, allowing a reassessment of the explanatory framework he put forward to explain the peculiarities of the Haţeg paleocommunity.

One of the most important subsequent developments concerns the theoretical and methodological advancements made in the field of "insular biogeography" especially by MCARTHUR & WILSON (1967). The Insular Biogeography represents a field of the biogeography that defines and explains the factors controlling the specific diversity found in

an insular habitat (under this term being included all types of isolated communities, living on islands but also in oases, mountain tops or lakes).

According to the theory of island biogeography, the number of species existing on an island is controlled by several factors that influence directly the two parameters controlling local diversity: immigration rate (the rate at which new taxa are introduced) and extinction rate (the rate at which already present taxa are eliminated). The interconnected fluctuations of these two parameters lead to the establishment of a dynamic equilibrium state (the *equilibrium state* of the insular ecosystem), represented by the total number of taxa that can inhabit the island (the *equilibrium number*). The most important factors influencing these parameters, and respectively the equilibrium state, are: the dimension of the island (through the species-area effect, a larger area being capable of hosting a larger diversity), distance from the closest mainland (controlling the degree of isolation of the island, in the one and, and the taxonomic composition of the immigration, a function of the types of isolating barriers and of the dispersive potential of the different taxa, on the other hand) and the age of the island (controlling the degree to which the state of dynamic equilibrium was achieved).

Moreover, the island biogeography also identifies several of the biological blueprints that characterize an insular fauna such as the taxonomic bias in the composition of the island faunas (due to a severe filtering of the possible immigrants), presence of wide-scale intraclade adaptative radiations and that of evolutionary-adaptative phenomena such as insular gigantism or dwarfism, linked to the absence of the threatening predators or due to the shortage in the available resources or the relict and endemic character of the island faunas.

Besides the theory of insular biogeography, another important contribution is represented by the theory of vicariance biogeography, resulted from the synthesis of two paradigmatic theories (a geological one, represented by global tectonics, and a biological one, represented by the phylogenetic systematics; this theory is especially important in the evaluation of the different competing models of historical-biogeographical evolution of different paleofaunas (e. g. WEISHAMPEL & JIANU CORALIA MARIA 1997).

A second important advancement was made in the knowledge about the taxonomic composition of the different Late Cretaceous (and Mesozoic, in general) continental vertebrate faunas, from Europe and worldwide (see a synthesis of these in Csiki, 2002, unpublished, with more recent data from KIELAN-JAWOROWSKA et al. 2004; WEISHAMPEL & all. 2004 a). During the last century, Cretaceous continental vertebrate assemblages were discovered in all continents, sometimes covering the complete chronostratigraphic scale for this period; the dating of the different fossil assemblages became more precise, including absolute ages; using new procedures of investigation and fossil recovery led to the discovery

of previously ignored components of the paleocommunities, especially the small-sized ones; the accumulation of a large quantity of fossil material permitted the detailed taxonomical-systematic study of the different taxa, thus leading to a better understanding of the composition, abundance and taxonomic diversity of the different faunas; and, finally, the development of new analytical techniques for mapping the phyletic and evolutionary relationships between the different taxa (especially the methods of phylogenetic analysis, based on the concepts of the phylogenetic systematics) allowed a clearer and more detailed understanding of these relationships, the only ones that can reliably be used in the evolutionary and paleobiogeographic analysis of a certain area.

Finally, a third important theoretical contribution to the reassessment of the insularity of the Haţeg fauna is represented by the new studies and syntheses of paleogeography, paleotectonic and palinspastic reconstructions of the Tethys and surrounding areas. According to these syntheses (e. g. DERCOURT & all. 1993, 2000; ZIEGLER 1987), during the Cretaceous, the Tethys Ocean covered the southern part of present-day Europe and epicontinental seas connected it, while the emergent areas were restricted to islands of different sizes. The extension, limits of and relationships between these different continental areas fluctuated during the Cretaceous, depending on the sea-level changes, tectonical and orogenetic events taking place, and by mapping these fluctuations one can reconstruct the individuality and spatio-temporal continuity of any selected landmass along this period.

In the palinspastic reconstructions cited, the area of the present-day Haţeg Basin and surrounding areas was an emergent area during the Latest Cretaceous, having a considerable spatial extension: this emergent area can be conventionally designated as the "Haţeg island" (or the "Transylvanian Island"). Moreover, this emergent area shows a remarkable temporal continuity (although with considerable modifications in size and position, both in absolute terms and relative to other emergent landmasses) along the Cretaceous. The presence of an emergent area in this position suggests that the Maastrichtian vertebrate fauna of Haţeg can be considered as an island fauna.

3. Synthesis of the new data and the new model of the "Haţeg Island"

The new discoveries and theoretical advancements outlined above allow a critical reassessment of the paleobiological features considered by Nopcsa while outlining the hypothesis of the "Haţeg island fauna", from two viewpoints: (1) whether these features are still valid, and (2) whether they support the insular model of the Haţeg fauna. The 4 paleobiological features listed above will be rediscussed here, according the new arguments pro and contra.

(1) the **primitive character** of the assemblage itself, as well as that of the included taxa

For Nopcsa, the identification of the primitive status of the different taxa relied on the inherently restricted comparisons with the taxa known at his time, without a well-established systematic-phylogenetic background. Subsequently, through the discovery of supplementary skeletal material in the Haţeg Basin, or referred to closely related taxa from other areas, as well as development of phylogenetic analyses concerning these taxa, allowed the compared phylogenetic study of the Haţeg taxa within a much broader and sounder framework. The phylogenetic analysis of the better-known taxa: *Kallokibotion* (GAFFNEY & MEYLAN 1992), *Allodaposuchus* (BUSCALIONI & all. 2001), *Telmatosaurus* (WEISHAMPEL & all. 1993), *Zalmoxes* (WEISHAMPEL & all. 2003) and *Struthiosaurus* (PEREDA-SUBERBIOLA & GALTON 2001) revealed that these are basal, primitive members within their respective clades. This basal phylogenetic position contrasts with their late chronostratigraphic position, suggesting the presence of extended *ghost-lineages* (evolutionary lines suggested by phylogenetic analyses, but not yet supported by paleontological evidenc; NOVACEK & NORELL 1992; WEISHAMPEL 1996), some of them descending into the later part of the Early Cretaceous. In overall, the identified ghost-lineages suggest the presence of long evolutionary lines evolving in geographical areas that lack fossil record during long time spans, thus "hidden" from a paleontological viewpoint – and the insular areas represent such regions, due to their fluctuating areal extension and their low potential of continental sediment accumulation and preservation. Mesozoic insular faunas with late chronostratigraphic appearance in the fossil record, relative to their moment of individualisation (faunas which we can call *resurgent faunas*), were cited from other parts of the world as well (e. g. MOLNAR & WIFE 1994; STILWELL & all. 2005).

Not only the individual taxa, but also the composition of the fauna (both overall taxonomic composition and relative abundance of the taxa) shows a pronounced arhaic character, especially in the dominance of the rhabdodontid-type basal euornithopods and that of the titanosaur sauropods, this composition being more reminiscent of those of the Early Cretaceous faunas of Europe and North America, than of those from the Late Cretaceous of North America or Asia (e. g. HOLTZ et al. 2004). This similarity suggests the survival of a certain type of community structure characterising the Early Cretaceous, in isolation up into the Maastrichtian.

As a conclusion, both the basal position of many of the vertebrate taxa, and the community structure of the assemblage suggests a relict fauna, a conclusion that supports (although not exclusively) the hypothesis of insular fauna.

(2) the **endemic character** of the assemblage.

The monographic review of many of the taxa described by Nopcsa (WEISHAMPEL & all. 1993, 2003; BUSCALIONI & all. 2001), besides the discovery of a large number of new taxa redraw the conclusions reached by Nopcsa regarding the endemicity of the fauna, but, *surprisingly*, in the sense of better supporting its endemic nature.

A partial faunal analysis, considering only the dinosaurian component of the assemblage, compared to the overall reptilian diversity (in order to keep it comparable with a similar analysis, for Nopcsa's period) allows the following observations. From the taxa described by Nopcsa, between 10% (pessimistic view, minimizing the degree of endemism) and 80% (optimistic view, with maximized endemism) of the described species (from a total of 11) represented endemic taxa, with the mention that Nopcsa himself, in his later syntheses, favorised a more pessimistic viewpoint. Presently, from the about 50 reptilian taxa known, between 30% (pessimistic; 40% representing, however, uncertain taxa with regard to their endemic nature, due to lack of low-level taxonomic resolution) and 60% (optimistic; 38% uncertain) represent probably endemic elements. Further detailed studies of the less well known groups would lead to a degree of endemism varying from 35% to over 90% (!!), in this last, hyper-optimistic evaluation virtually the complete reptile assemblage would prove itself endemic at a specific or even at a generic level. From this viewpoint it is probably noteworthy that from the better-known and described reptile taxa only one (*Allodaposuchus precedens*) is reported to occur also in western Europe (France, Spain; BUSCALIONI & all. 2001).

The degree of endemism at the level of the whole fauna is probably comparable or even greater, taking into account that the anurans (VENCZEL & CSIKI 2002), lizards (FOLIE & CODREA 2005) and mammals (de ex. KIELAN-JAWOROWSKA & all. 2004) are represented almost exclusively by taxa known only from the Haţeg Basin.

As a conclusion, the endemic nature of the fauna, as noted by Nopcsa, remains significant even after considering the latest discoveries. Moreover, if Nopcsa considered that the endemic nature of the Haţeg fauna is representative at the level the Late Cretaceous of Europe, the new discoveries suggest that it is highly endemic even compared to other Late Cretaceous European faunas.

The marked endemism of the Haţeg assemblage also supports (although not exclusively) the hypothesis of insular fauna.

(3) the **small size** of the included taxa.

Recent phylogenetic analyses concerning dinosaur taxa (WEISHAMPEL & all. 1993, 2003) or other studies (JIANU & WEISHAMPEL 1999) demonstrated what Nopcsa had only suggested (based on coarse size comparisons between not closely related taxa), namely that at

least some of the taxa populating the Haţeg area (*Telmatosaurus transsylvanicus*, *Magyarosaurus dacus*, *Zalmoxes robustus*) represent possibly cases of autapomorphic dwarfing (a size reduction that affects only the respective taxa, not being characteristic of a whole phyletic line). In all these cases, the autapomorphic size reduction was explained by insular dwarfisms and considered to be linked to the insular habitat of the respective taxa, as suggested already by Nopcsa. However, recent studies also showed that autapomorphic size reduction is not the general rule even in the case of dinosaurs (it was not yet documented in any other vertebrate group). Thus, in the case of *Zalmoxes*, the description of a second species, *Z. shqiperorum* (WEISHAMPEL & all. 2003) as being larger than *Z. robustus* and attaining sizes comparable to those of the closest relatives of the genus (individuals of the genus *Rhabdodon*, known from France and Spain), shows that size reduction apparently affected these two congeneric and sympatric species differently (e. g. JIANU & WEISHAMPEL 2001; WEISHAMPEL & all. 2003). Possible explanations to this pattern can be sought probably in ecological differentiation between the two species (each of them exploiting different food resources, at least partially, to avoid direct competition), differentiation that probably promoted reproductive isolation within the ancestral *Zalmoxes* stock, followed by subsequent taxonomic diversification.

On the other hand, the case for insular dwarfism in the Haţeg sauropods was contested by LE LOEUFF (2005) based on the identification of several large-sized specimens, considered conspecific with the smaller individuals. The review of the sauropod material from the Haţeg Basin revealed, however, the existence of a larger taxonomic diversity in the case of the sauropods than considered before, the large-sized specimens being referred to another titanosaur taxon, different from *Magyarosaurus dacus* (e. g. CSIKI & GRIGORESCU 2006 a, CSIKI et al. 2007). The identification of the presence of a large-sized sauropod (reaching about 12-14 m in length) shows that, similarly to the case of *Zalmoxes*, dwarfing did not affected all sauropods in a uniform way.

In conclusion, even the presence of the small-sized taxa documents possible cases of insular dwarfism in the Haţeg fauna, this included large-sized taxa as well, comparable in dimensions to their close relatives in the mainland. This observation suggests that the answer of the different dinosaur taxa to a potentially restrictive habitat and resource shortage was differential, probably depending also on the ecological requirements and the particular evolutionary-paleobiogeographic history of each taxon as well.

(4) **low diversity** of the Haţeg fauna.

The most important reassessments of the original Nopcsa arguments for an insular theory occurred probably in the case of the faunal diversity. The discovery of a large number

of vertebrate taxa, including dinosaurs, in the Haţeg Basin showed that the local biodiversity was significantly higher than that known a century ago. The total count of 69 vertebrate taxa represents a much higher figure than anything reported from other Late Cretaceous European faunas. To preserve the terms of comparison mentioned above, only the reptilian component was considered in the different Late Cretaceous faunas, with a specific regard to the dinosaurs. This analysis suggests that the diversity of the Haţeg reptilian assemblage (17 taxa of dinosaurs, 41 of reptiles) matches that seen in much better studied faunas occupying larger continental areas, such as those from the Hell Creek or the Kirtland formations from North America, and the Djadochta or Nemegt formations from Mongolia, being surpassed only by the exceptionally fossil-rich fauna of the Judith River Group of North America or, marginally, by that from the Barun Goyot Formation of Mongolia (WEISHAMPEL & all. 2004 b, CSIKI 2002, unpublished). Moreover, the well-balanced faunal composition, including representatives of all major vertebrate groups and trophic levels and guilds (herbivores, insectivores, omnivores, predators, scavengers) from different size categories and habitat types (aquatic, terrestrial, arboricole, flying), suggests an old, stabilized fauna instead of a recent one established accidentally and by chance on an insular area.

Some features of the fauna are still remarkable:

- the lack of a large-sized predator in the top of the food chain. Although several discoveries of theropods were published (e. g. CODREA & all. 2002, CSIKI & GRIGORESCU 2003, KESSLER & all. 2005), suggesting a high diversity of them, large-sized theropods, usually representing the top predators in Mesozoic ecosystems, are missing. The recent report of one isolated remain of a middle-sized theropod (SMITH & all. 2002) does not change this picture in its essence. Most Haţeg Basin theropods have small sizes. The situation is reminiscent of those from the Early Cretaceous of China (the Yixian fauna) or the Late Cretaceous of Mongolia (the Barun Goyot and Djadochta faunas) (WEISHAMPEL & all. 2004 b), all of these being dominated by a diverse assemblage of small theropods, including representatives of trophically specialized, omnivorous-herbivorous taxa, that are also present in the Haţeg fauna (e. g. CSIKI & GRIGORESCU 2005; KESSLER & all. 2005). It is remarkable, however, that both the Chinese and the Mongolian faunas, although coming from continental settings occupying large areas, represent ecosystems developed under severe environmental stress: the presence of a habitat dominated by intense volcanic eruptions (Yixian) or by an arid, desertic climate (Mongolia). By comparison, it is thus conceivable that the special faunal composition of the Haţeg assemblage is similarly indicating a stressed environment – which supports, although not directly suggests, the idea of an insular fauna, with severe control on the resources (food, space).

- a low-diversity large-sized herbivore assemblage, which, together with the absence of the large-sized predators, might be indicative a restrictive, possibly insular, habitat.

- the presence of several groups of small, invertivorous/omnivorous, possibly opportunistic organisms showing high levels of diversity (lizards, multituberculates). Especially interesting is the case of the multituberculate mammals, represented by an endemic clade known only from the Haţeg Basin in the European Late Cretaceous, but which underwent here an important intra-clade radiation (e. g. CSIKI & GRIGORESCU 2006 b), suggestive of an adaptative radiation leading to diversification and to filling in of several ecological niches left empty by the isolated nature and filtered immigration pattern of a presumed insular habitat.

All these paleoecological features supports, although not directly and exclusively, the idea of an insular fauna; on the other hand, the balanced structure of the fauna suggests that it resulted from a long-term evolution that allowed reaching a state of dynamic equilibrium characterizing the mature island faunas.

CONCLUSIONS

The hypothesis of NOPCSA (1923 a) concerning the insular character of the Cretaceous vertebrate assemblage from the Haţeg Basin represented an innovative solution to explain a number of outstanding paleobiological features observed within this fauna. The hypothesis was afterward retaken by most of the researchers, being cited as a standard exemplification of Cretaceous insular faunas (e. g. MOLNAR & WIFFEN 1994) or representing the general explanatory background for the origin and evolution of the Haţeg fauna (e. g. WEISHAMPEL et al. 1991). However, the hypothesis itself was never reinvestigated, in order to assess to what measure the new discoveries and theoretical advancements support or contradict the original idea. Moreover, recent studies put into question arguments used by Nopcsa to support the insular status of the fauna (e. g. JIANU & BOEKSCHOTEN 1999; LE LOEUFF 2005). For these reasons, the reassessment of this hypothesis was considered necessary, looking especially at the paleobiological characteristics used to lay the foundations of the idea of " Haţeg Island", in the light of the newest discoveries and progresses made in fields such as Mesozoic continental vertebrate paleontology, systematics, phylogeny, stratigraphic and paleobiogeographic distribution of the taxa, as well as in the paleogeography and regional tectonics of the Central Tethyan region.

Analyzing the paleobiological arguments given by Nopcsa to support the idea of the Haţeg fauna as an insular one (*primitiveness of the taxa*, *highly endemic composition*, *small*

size of many dinosaurs, *low diversity of the fauna*), it is not less than remarkable that these are still valid, even if the accent put on the different arguments changed over the time due to the newest discoveries (locally, in Europe or worldwide), and especially due to the new concepts and methods of phylogenetic and paleobiogeographic analysis.

Thus, the argument of the primitiveness of the taxa, in the case of most of the better known ones (turtles, crocodilians, dinosaurs, multituberculates), is still upheld; actually, the primitive character is even better argued in many of these cases by placing the respective taxa into comprehensive phylogenetic analyses (dinosaurs, turtles), or was even only recently demonstrated in the case of others (*Allodaposuchus*). The overall assemblage has an atavistic, primitive aspect compared to other contemporaneous faunas from outside Europe, especially taking into account its late chronostratigraphic setting; it is more reminiscent of the late Early Cretaceous Euramerican faunas. The relict character of the fauna suggests that the Haţeg area functioned as a sort of evolutionary refugium.

The degree of endemism of the fauna is even greater than was known to Nopcsa, being underscored by the discovery of numerous new vertebrate taxa. Within the framework of the Late Cretaceous European faunas, it shows a degree of endemicity of at least 35-40% (depending on the taxonomic resolution), but this can be as much as 90%. In a larger, global context, the endemicity of the fauna is even more pronounced. This feature of the Haţeg fauna suggests the presence of a long hidden evolutionary history (not yet documented by fossils).

The small size of several of the dinosaurian taxa (*Telmatosaurus*, *Zalmoxes*, *Struthiosaurus*, *Magyarosaurus*), compared to that of their close relatives, represent probably cases of dwarfism (and possibly autapomorphic, insular dwarfism), even if these hypotheses were not yet supported by independent evidence (bone histology, e. g. SANDER et al. 2006). On the other hand, apparently not all dinosaurian taxa were affected by dwarfism, at least *Zalmoxes shqiperorum* (WEISHAMPEL & all. 2003) and "*Magyarosaurus*" *hungaricus* (CSIKI & GRIGORESCU 2006 a) reaching larger sizes, comparable to those of their relatives from the French-Iberian Landmass (*Rhabdodon*, *Ampelosaurus*) or other continents. This observation suggests that the evolution of the fauna was not a simple, linear one, with a single moment of immigration followed by the adaptation to the insular environment, but instead a complex one in which some taxa avoided to be influenced by the reduction in the available resources, either due to the lack of time necessary to achieve these adaptations (i. e. reaching the island later than other taxa, and not having time to reduce their size, or, alternatively, arriving at a moment when the size of the island augmented by accretion or continental collision, thus rendering unnecessary this adaptation – a possible case being that of "*M.*" *hungaricus*), or by

adopting a different lifestyle and feeding habit, thus avoiding direct competition with their sympatric relatives (*Zalmoxes*).

Finally, the diversity, considered low by Nopcsa, proved itself to be much higher than previously thought, several other groups of vertebrates being added to the already known dinosaurs, pterosaurs, crocodilians and turtles. The comparative analysis of the Haţeg fauna shows that is more similar to the relatively rich ones from the Late Cretaceous Asia or North America, but somewhat greater than those contemporaneous from Europe. However, even if the overall diversity is not low, it shows several distinctive features such as lack of a top predator, low diversity of the mega- and mezoherbivores, high diversity of the small-sized theropods and that of the trophic specialists (lizards, multituberculates – among these, the significant adaptative radiation of the latter is especially noteworthy). All these observations are compatible, although not exclusively, with the "insular fauna" hypothesis.

The synthesis of the known paleontological – paleoecological data shows that the Maastrichtian fauna from Haţeg presents several features that characterize modern (Recent or Plio-Pleistocene) insular faunas. Even if these characters do not prove definitively the insular character of the Haţeg fauna, they are supporting it and, along with the paleogeographic-paleotectonic arguments, represent support for the hypothesis put forward by Nopcsa a century ago – that of the insular character of the Maastrichtian vertebrate fauna from the Haţeg Basin.

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NATURALISTS FROM SIBIU AND THEIR FOSSIL COLLECTIONS AT THE NATURAL HISTORY MUSEUM FROM SIBIU

RODICA CIOBANU

Rezumat

Naturalişti sibieni şi colecţiile lor de fosile din Muzeul de Istorie Naturală din Sibiu

Intelectualii saşi transilvăneni, ai veacul XVIII, şi-au putut extinde studiile şi în domeniul naturii. Bucurându-se de autonomie politică, relativ bine situaţi economic, având strânse legături cu ştiinţa apuseană şi în primul rând reuşind să invite personalităţi ştiinţifice din ţările germanice, saşii erau purtătorii noilor curente în ceea ce priveşte cercetarea naturistă.

În Europa veacului al XVIII-lea era un larg curent, la modă, prin care reprezentanţii de seamă ai societăţii îşi întăreau statutul în societate şi prin strălucirea unor colecţii artistice-ştiinţifice de valoare; acestea reprezentând investiţii sigure, chiar dacă nu erau rentabile.

Sibiul, ca centru administrativ al Provinciei a contribuit la mişcarea naturalistă prin colecţiile sale, bibliotecă, ajutoare băneşti care, au făcut, ca în scurt timp, acesta să devină şi centru cultural-ştiinţific de notorietate internaţională. În lucrarea de faţă dorim să readucem în atenţia cititorilor trei colecţionari de fosile, cu cercetări importante în domeniu care deşi au trăit în epoci diferite au dovedit aceeaşi pasiune în activitatea de colecţionar: MICHAEL JOHAN ACKNER (1782-1862) profesor şi pastor, arheolog şi mineralog; LUDWIG JOHANN NEUGEBOREN (1806-1887) profesor, pastor, mineralog şi paleontolog şi RICHARD ERNST BRECKNER (1900-1979) licenţiat în arte, în jurnalistică, teatru – secretar şi dramaturg a fost, şi în intervalul 1944 - 1946, custode al colecţiilor paleontologice la Muzeul Societăţii. Toţi trei au fost membrii Societăţii Ardelene pentru Ştiinţele Naturii (*Verhandlungen und Mitteilungen des siebenbürgischen Vereiens für*

Naturwissenschaften zu Hermannstadt) cea care a fondat Muzeul de Istorie Naturală Sibian.
Key words: M. J. Akner, L. J. Neugeboren, E. R. Breckner, the fossil collections, Natural History Museum from Sibiu.

The Romanian Transylvanian intellectuals, determined by the necessity of stating their national, political and social rights, were especially preoccupied with researches concerned with topics from history and philology. On the other hand, the Saxon Transylvanian intellectuals form the 18th century extended their studies to the field of nature. Since they enjoyed political autonomy and were relatively wealthy, having close connections to the western science and especially because they managed to invite scientific personalities from the German countries, the Saxons represented the new trends in natural research. In 18th century Europe, there was this trend in fashion according to which high ranked representatives of society used to strengthen their statute also thorough the glow of several valuable artistic–scientific collections; these represented secured, even profitable investments. Transylvania owes a special qualitative leap in the activity of collecting to the baron SAMUEL VON BRUKENTHAL, who even reached the high rank of governor of Transylvania, an important personality of those eras, for whom collecting was not a purpose but a way of getting to know more about the past and the country history, about the natural resources, or to encourage the science men to study them. He is one of those who created the interest for collecting native values and thus contributing to saving and conserving them.

For a good period of time, ever since the 2nd decade and until the 8th decade of the 18th century, the most important part of the naturalistic literature in what concerns Transylvania was made up by monographical works about the Principality minerals, as an expression of the exquisite interest in the mining wealth of Transylvania. This was reflected in a generalization of the mineralogical and petro graphical knowledge needed for the activity of collecting; the mineral collections grew in numbers to such an extent that the foreign travelers would stop in various centers of Transylvanian culture, to study them. The fame of the mineral richness of Transylvania leads to an increase of the interest of the European museums to ensure samples from Transylvania in their collections.

In the current paper we intend to present three of the fossil collectors, famous and Sibiu and who stood out through their collections and through the writings about fossils, and who also contributed through their activity to the setting up of the Natural History Museum from Sibiu–to the deposit of its paleontological collections. We focused in the current paper on the fossil collections of L. J. NEUGEBOREN, M. J. ACKNER and R. BRECKNER.

Being the administrative center of the Province, Sibiu has contributed to the naturalistic movement through its collections, library, financial contributions which made it possible in a short while for the city to become a cultural – scientific city internationally known. A special impulse in promoting the native research, on scientific basis, had the constitution on May 4th 1849 of the Transylvanian Society for Natural Sciences (*Siebebürghische Vereins für Naturwissenschaften zu Hermannstadt*) located in Sibiu. The Society (is the abreviation for the *Transylvanian Society for Natural Sciences from Sibiu*) aimed at the ”thorough knowledge and ever more consistent research in the field of natural sciences, the arduous colleting...of the natural resources...the facilitation of the study by setting up a collection”. According to the statements from the Bylaws of Constitution, the Society did no restrains from a territorial perspective, neither from a national one – it was opened to all the researchers who dealt with the scientific study of nature.

The initiative committee also included those whose activity of collecting and collections make up the object of this attempt. Thus, MICHAEL JOHAN ACKNER (1782-1862), professor and preacher, archaeologist and mineralogist, and LUDWIG JOHANN NEUGEBOREN (1806-1887), were not only the initiators, but also the supporters of the Society. One of the arguments which can be brought to support this information is the frequent appearance of their names related to almost all the activities of the Society. The *Vereinsnachrichten* column of the Society journal (*Verhandlungen und Mitteilungen des siebenbürgischen Vreiens für Naturwissenschaften zu Hermannstadt*) records this fact.

The love for nature as well as for man as integrating part of the environment, his education, determined them to make great sacrifices in order to collect and study representative items from the flora and fauna of the past eras, in a time when the natural sciences were at their very beginnings and people only considered exploiting the natural resources of the Earth. The Transylvanian collectors have the merits of having foreseen the utility for the future of collecting and systematically studying of representative pieces of the fossil fauna of the Province.

The statement made by FICHTEL in 1778 in the paper ”Beitrag zur Mineralgeschichte von Siebenbürgen”, that he regrets the absence of mineral collections in Transylvania but by judging the number of natural science volumes in the baron SAMUEL VON BRUKENTHAL’s library he believes that this activity would begin and would intensify, supports the opinion that the interest for the activity of collecting emerged towards the end of the 18th century.

The private libraries of the intellectuals from Sibiu, and especially that of the baron, have represented the starting points of a collecting activity undergone by scientific methods. Upon returning from the studies they had done in the big cultural centers of Europe, the

intellectuals from Sibiu were not only the supporters of the most advanced spiritual, cultural and scientific trends, but also of setting up libraries at the level of those they had found abroad.

Although the established natural science literature in end of 18th century and beginning of 19th century Transylvania was, like we mentioned before, represented especially by monographical papers about the mineral of the Principality, as a result of the necessity of exploiting the Transylvanian underground richness. In a paper on fossils, ACKNER (1849-1850) underlined that paleontology was a young science ”highly instructive, forgotten for a long time by geologists and mineralogists”.

The society members have noticed the importance of paleontology and have granted it a special interest. Thus, ever since the emergence of the Society there has been a section which had paleontology as subject of study, and one may say that the grounds for the personal paleontological collections of the founders, as well as of the museum were set together with the grounds for the founding of the Society. One of the objectives of the Society was also the creation of a museum. Their wish came true in 1895, when the natural History Museum of Sibiu was opened to the general public. Among the founding members of the Society there were naturalists who became through their researches internationally known paleontologists, promoters of several paleontological fields for this territory and not only. Among these were NEUGEBOREN and ACKNER. To this one may add later on, though not at the same level, BRECKNER.

There are no direct data connected to the numeric evolution of the personal collections of the three collectors which represent the topic of this study, but one may estimate their evolution from their activity of collecting for the museum, since the increase of the paleontological collections of the Natural History Museum from Sibiu is mostly due to the activity of the Society members. NEUGEBOREN, the caretaker of the mineralogical, geologic and paleontological collections, announced at a meeting of the Society in 1854, that these collections already encompass 950 ordered, labeled pieces to which other unordered, unlabeled pieces are added. 11 years later, in 1865, the paleontological collection already reached over 10,000 items belonging to 1, 325 species of fossils. In the Society journal, *Verhandlungen und Mitteilungen des Siebenbürgischen Vereins für Naturwissenschaften zu Hermannstadt*, all the activities undergone are recoded with German meticulosity. Therefore, one may draw the conclusion that the personal collections of the three naturalists – which represent the topic of the current study- have increased, based on the fact that the number of paleontological items of the Museum has also increased.

The main way to acquire paleontological pieces was represented by field collecting, organized in the form of trips in rich fossil areas. For example, in 1866 the Society organized a trip meant to have as purpose the collecting of minerals and fossils from the Petroşani areas, the Zănoaga Mountains, Vulcan, to which especially the Society members participated. It was again the Society which gave travel scholarships having as purpose - the collecting of paleontological material. Such scholarships were given to each of the three scholarships who we studied.

Both the museum and the private collections have also increased through donations, acquisitions and exchange with significant universities, museums, institutes from Romania and from abroad. NEUGEBOREN, ACKNER, personalities of important position in the Saxon society of Sibiu have close connections with the geological, paleontological specialists from the Empire and not only. Most of the donations for the museums are due to the Society members, thus proving one more time the main purpose of the activity of the Society and of the museum: of increasing the level of culture of their fellow citizens, especially of the younger ones.

In 1852, the paleontological collections of the museum were made up of 1,800 items, organized in such a way so that the visiting public could see ”great chunks of buck horns and diluvia skull, fish remains from crystalline”, pointed out NEUGEBOREN (1852) in the Society journal.

The personal paleontological collections contained also doubles for various species which the collectors either sold or donated to the Museums. The acquisitions were necessary because those who were members of the Society were not rich people, who made a living from their own work and throughout all times the research and collecting required significant funds (many have bought pieces from other areas besides the local horizon). However, there were cases in which great collectors have bought small collections from their contemporaries because neither the Society, nor the Museum had the needed funds. This is the case of BIELZ, president of the Society, who in 1860 bought a collection of fossils from ZACHARIAS from Sibiu.

The great collectors from Sibiu have gathered fossils from various regions with the help of the un specialized collectors. Thus it is eloquent the correspondence carried out by the collectors with various people of diverse professions who at the same time with asking for advice related to social fields were also offering information related to the collecting spots of the fauna and were asking for help, for advices related to the determination and collecting of fossils. The professional contacts enabled also an exchange of information related to the fossils.

In the period when these collections were set up, the collectors – hobbyists according to the current denomination of this activity – are the ones who are sought after for collecting of information related to the paleontology of the local horizon and even for guiding in the field of those who came from across the borders and were interested in the geology of Transylvania.

THE MICHAEL JOHANN ACKNER COLLECTION

MICHAEL JOHANN ACKNER played an important role in the evolution of the Society in the field of mineralogy and paleontology, an important personality of the Society in Sibiu who distinguished himself in various fields: education, mineralogy, paleontology, archaeology. After finishing his studies in Germany and several voyages in Renania, Italy and France, he comes back to Sibiu with a great passion for archaeology and geology. After a short period of teaching in the gymnasium of Sibiu, he settles in the Guşterița village, situated in the south – east of the city of Sibiu. Today a neighborhood of the city places at the bottom of the Pădurea or Guşterița Hill, it became famous among paleontologists due to the fossils discovered here by ACKNER, especially the quaternary vertebrates.

The priest and royal counselor, Ackner was known especially through his collection and archaeological researches and was members of the two Saxon cultural Societies of Sibiu: *Verein für Siebenbürgische Landeskunde* and *Siebenbürgische Naturwissenschaften zu Hermannstadt* (NEUGEBOREN 1866) Besides being the founder of the latter, he was one of its active members and an assiduous collector. This is proven by the often mentioning of his name in Vereinsnachrichten connected to the collecting activity of fossils for the Museum.

Michael Johan Ackner (1782-1862)

The collecting activity, started in the 20th decades of the 19th century represented the materialization of the studies and researches undergone in the field of geology (mineralogy, paleontology). An important paper with paleontologic subject is *Contribuţia la geognosia şi paleontologia fosilelor pietrificate din sud-vestul Transilvaniei* (1945) and for the first paper dealing with the ores from Trasylvania *Mineralogia Transilvaniei cu observaţii geognomice* (1855) Ackner received the award of "The Association for Transylvanian Geography" („Asociaţia pentru Geografia Transilvaniei").

The works published in this field did not remain without any echoes. His contemporary L.J.Neugeboren, a member of the same Societies and having similar activities, used to eulogistically appreciate Ackner's scientific attempts (NEUGEBOREN 1852). The often trips to Cisnădie (Heltau), Cisnădioara (Mischelsberg), around Cluj (Klausenburg) and across the Carpathians (WOLLMANN 1982) represented occasions for ACKNER to collect fossils. One can thus explain the fauna diversity of his collection. Compared to NEUGEBOREN's collection, ACKNER's is far richer as from the point of view of the fossil types and collection points, such as: Agnita, Bruiu, Săcădate, Ilimbav, Daia.

The acquisition of the **ACKNER collection** from Hermann Ackner, his eldest son, for the sum of 4,500 florins, was recorded in Vereinsnachrichten (1866) in 1866. CZEKELIUS, caretaker of the paleontological collection of the Museum mentioned upon taking over the collection that it has a "strong Transylvanian character" and that the items of the ACKNER collection were personally collected and obtained from other collectors through exchange or acquisition.

The catalogue of the ACKNER collection, already renowned among the Transylvanian naturalists is published in the first issue of the Society journal (1850).

By studying the catalogue one may notice that it contained fossil items from almost all of the systematic groups (table 1).

Table 1

Fossils – systematic groups	Places of collecting
Plants	Daia, Săcădate, Cornățel, Glâmboaca, Băile Lăpuş
Sponges, corals	Săcele, Zărneşti, Braşov, Turnu Roşu, Dobârca
Echinodermes	Turnu Roşu, Cisnădioara, Cluj,
Cephalopodes	Cisnădioara, Săcel, Braşov
Brachiopods	Braşov, Turnu Roşu
gastropods	Turnu Roşu
Crustaceans	Turnu Roşu
Bivalve	Turnu Roşu, Dobârca

In a paper referring to the mineralogical and paleontological collections from Transylvania, NEUGEBOREN (1866), eulogistically talked about the ACKNER collection and pointed out that it was bought with the support of the ”National Saxon House and of the Societies: ”the Transylvanian Society for the Study of Nature from Sibiu” (*Siebenbürghische Verein für Naturwissenschaften zu Hermannstadt*) and ”the Society for the Study of Transylvania” (*Verein für Siebenbürgische Landeskunde*)(Verhandlungen, 1867). In 1867 the doubles of the ACKNER collection were given to the Evangelic School from Sibiu (Verhandlungen, 1867:1). The collection was enlarged at a short time after the acquisition. Thus, NEUGEBOREN, as caretaker of the paleontological collections, thanks in a meeting of the Society to CZEKELIUS and MOEKESCH for the enlargement of the ACKNER collection with fossils from the surroundings of Cluj and Alba Iulia (Verhandlungen, 1867:238).

NEUGEBOREN mentioned in 1866 that in the ACKNER collection there were 3,791 items out of which 1, 728 were fossils (geognostical items) in which the following were represented: the ”diluvia from Guşterița, the petrified plants from Thalheim – Daia- tertiary, Sebeşul de Sus, Porceşti (lower tertiary), Cisnădioara (chalk formation and Gosau), Răşinari”. The collection also included fossils belonging to the 1,315 species, the most valuable being those from Guşterița (mammal bones), from the Hârtibaciu Valley (plants, fossil fish, mammal bones), the Braşov area (certain corals), Săcădate (plants, tertiary fish), Turnu Roşu (Porceşti), Cisnădioara, Buituri, Racoş, Muncelul Mic, Lăpuşul de Sus, Cluj (NEUGEBOREN 1866).

The discovery of the many fossils from the Guşterița Hill, where ACKNER was priest, drew the attention of the paleontologists towards this fossil point. The geological works from the end of 19th century and from the first decades of the 20th century remind the fossils studied in the ACKNER collection from Sibiu, when presenting the potential from Guşterița. If

the fossil area from Turnu Roşu is known especially due to the works and collection of NEUGEBOREN, Guşterița is known due to the discoveries of ACKNER. The naturalist ACKNER, unlike NEUGEBOREN, did not work, outside volunteering as member of the Society, inside the museum, and obtained special performance in the field of archaeology. The papers with exclusive paleontological theme are few and the ad notations made by NEUGEBOREN and later on by KOCH related to incorrect determinations, point to the fact that time was not on his side in going deep into this field. However, NEUGEBOREN did not lose the opportunity to praise ACKNER's collecting activity, mentioning that through his collection several fossil groups were completed and dedicates him a species of bivalve *Cardium acknerii* (NEUGEBOREN 1851).

From the records from the Vereinsnachrichten column of the Verhandlungen journal one might notice the continuous increase of the ACKNER collection after its acquisition by the museum. It was only in 1891, that VON SACHSENHEIM, caretaker of the collection of the Museum from that period, worked on recording the collection (Verhandlungen, 1891:XV). Unfortunately, this registry was not kept and an inventory registry made by BRECKNER, at the beginning of the 20th century and kept in the Natural History Museum does not point out data referring to the ACKNER collection, but only the existence of isolated pieces donated by ACKNER. The entire collection, as museum entity, used to exist in the museum before 1955. We conclude this from the fact that Ilie (1955) makes references to the ACKNER collection when he presents the Pontian and the Pleistocene from Guşterița, in the geologic research of the Alba-Iulia-Sibiu-Făgăraş-Rupea area, namely in the stratigraphic descriptions. Currently, the ACKNER Collection does no longer exist in its form from the time of the acquisition, but only as isolated pieces among the *"Old collection of the museum"*, also called *"the Society Collection"*.

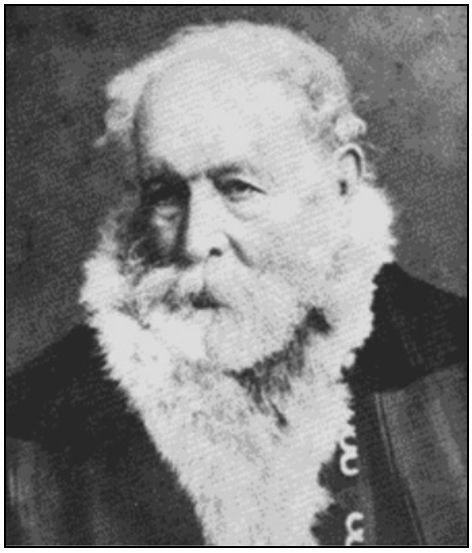
Although the collection does no longer exist as ACKNER left it, important items of this collection are presented and scientifically rendered. Had there been drawings of the fossil items, the reconstitution of the entire collection would have been possible.

THE LUDWIG JOHANN NEUGEBOREN COLLECTION

Towards the end of the 18th century, Sibiu was the residence town of the governor of Transylvania and at the same time it came to be one of the important centers of natural science researches. In was in this context that **JOHANN LUDWIG NEUGEBOREN,** an important personality of the 19th century, risen from among the Transylvanian Saxons, completed his education, clerical and scientific activity.

NEUGEBOREN was born on August 2nd 1806 in Sebeş in the family of the high steward DANIEL GEORG NEUGEBOREN. He began his studies at the Gymnasium from Sibiu, and carried them on in Vienna, starting with 1822, where he attends the courses of the Protestant Theological Seminary. He remained in Vienna four years and a half, as he himself confesses later on. He dedicated his fourth year to the study of natural sciences. NEUGEBOREN has studies physics with professor dr. BAUMGARTEN (the future president of the Austrian academy), chemistry with professor MEISSER, mineralogy and crystallography with professor MOOS – from the Mineralogical cabinet of the Imperial Court from Vienna (all of whom are personalities of sciences who are still famous nowadays). During this time, NEUGEBOREN has acquired the knowledge necessary for the collector and researcher that he would later on come to be.

After spending a short while as professor at the Saxon Gymnasium from Sibiu (1834 - 1840), he changed the lecturing desk for the position of librarian and caretaker of the Brukenthal Museum. In the years following his superior studies he takes up a typical career – starts as lecturer and gymnasium teacher and later on works as clergyman. The school being a church institution which directly belonged to the religious community, there was this unwritten rule according to which every clergyman had to undergo a stage of school servicing. On the other hand, the clergyman was usually the bearer of a general knowledge, with inner vocation for scientific work and research, besides theology and a philosophical preparation. It is the period when NEUGEBOREN came to know the problems connected to the education of the youth in the field of natural sciences. And his having worked at the Museum of the baron Samuel von Brukenthal contributed to his acquiring the knowledge and the needed experience in museum activities (recording, conservation, etc.).



Ludwig Johann Neugeboren (1806-1887)

The year 1840 represents the beginning of this activity as paleontologist: NEUGEBOREN starts his trips in areas which would become famous in the field of paleontology also due to him. Thus as a result of the often trips to Porceşti (Turnu Roşu, jud.Sibiu) he gathers Eocene fossils, especially shark teeth which represented an important collection of the Society Museum. The Eocene sharks fossil fauna from Turnu Roşu has provided him the material to write the first systematic monography from Transylvania and from the entire Romania - considering the current state limits (NEUGEBOREN, 1850).

Through the studies undergone on the foraminifera collected from Lăpugiu (Hunedoara), NEUGEBOREN can be considered **the founder of micropaleontology in Romania**. He wrote 15 papers in the field of micropaleontology, studies in which he described and illustrated a new genus and 147 new species of foraminifera. "The NEUGEBOREN collection of foraminifera" housed at the Natural History Museum from Sibiu has a special scientific value since it is made up of unique pieces with universal heritage value. The doubles of the micro paleontological material collected by NEUGEBOREN from Lăpugiu were sent to Vienna. At present they are hosted in the "K. K. Hof.Mineralien-Cabinett" collection from Vienna, accompanied by the items list written by NEUGEBOREN himself (CIOBANU 1996).

As recognition of this activity in the field of geology and paleontology, at January 1st 1855 the board of the Imperial Geological Institute if Vienna notified NEUGEBOREN that he was nominated corresponding member of this institution and two years later he was elected honorary member of the Belgian Royal Academy.

The NEUGEBOREN collection was bought on may 8th 1910, and it included fossils from Lăpugiu de Sus and Porceşti (foraminifera, sharks remains, mollusks). Among these, the foraminifera from Lăpugiu and sharks teeth from Turnu Roşu are very valuable.

The Eocene sharks teeth collection from Turnu Roşu, based on which NEUGEBOREN has written his famous monography related to Eocene selachians was not maintained entirely. However, the foraminifera' collection from Lăpugiu de Sus (Hunedoara), far more fragile than the previous one, which contained 1,636 pieces out of which 403 are types for 79 species, was maintained. The collection material was gathered by NEUGEBOREN in 1846 – 1872 and used to write 12 scientific articles; however, he did not exhaust the entire material. The collection was partially revised by GHEORGHIAN (1968, 1998). The foraminifers' collection is very valuable, since it is the only one which contains micro paleontological materials from the type location and stratus.

The NEUGEBOREN collection has represented and still represents a starting point for two foraminifera and sharks fossil groups and made famous two fossil areas: Porceşti and

Lăpugiu. Upon its acquisition, NEUGEBOREN's collection, unlike ACKNER's, was not so diverse from the fauna point of view, or from the collecting areas perspective. NEUGEBOREN on the other hand was a field opener for the paleontological research through the study of these two fossil groups, and his studies were accomplished at a high scientific level.

THE RICHARD ERNST BRECKNER COLLECTION

The RICHARD ERNST BRECKNER Collection was bought in 1954 and it includes Miocene fossils from Lăpugiul de Sus and Eocene fossils from Porceşti (Turnu Roşu).

BRECKNER (1900-1979), bachelor of arts with a prolific activity in journalism, theatre – secretary and play writer, despite his illnesses, was caretaker of the paleontological collections of the Society Museum in 1944 – 1946; during this time he collected the shark fossil teeth.

The collection was bought in 1954 by the museum from H.BRECKNER, a typography worker from the same village - data from accounting documents belonging to the archive of the Brukenthal National Museum. Next to the Eocene selaciens (teeth) from Turnu Roşu the collection also includes molluscs, echinoderms from the same fossil point, as well as mollusks from Lăpugiu de Sus (Hunedoara).

In the lexicon coordinated by SCHULLER and HEINZ (1995) it is stated that in the period 1933-1938, BRECKNER lived as free lancer from writing and from the scientific papers about the collection of Transylvanian fossils, with no mention of the name of these papers or where they were published.

BRECKNER's name, who has put together this valuable collection, is frequently quoted in the report of Binder starting with 1937, caretaker of the geological and paleontological collections (Verhandlungen, 1937/1938). In 1938, is a similar report, after praising BRECKNER's activity from the previous year, Binder stated that for the future the paleontological collections have found a zealous and competent caretaker in BRECKNER, who, after having dealt with "years of petrified tertiary's from Porceşti especially with shark teeth", has taken over not only the Society collection, but also the Brukenthal collection and besides tedious activities of ordering, cleaning and maintaining the items, has taken over redeterminations of shark teeth. The catalogue of the paleontological collections initiated by BRECKNER in 1938 is kept at the National History Museum from Sibiu. Since the last issue of the Society journal dates from 1946, there are but few data regarding BRECKNER's activity.

The nationalization process, the often changes of the deposit locations, the absence of a paleontologist at the museum have all left their touch on the paleontological collections, to

such an extent that at the museum, besides the collection no other document related to the personality and activity of BRECKNER were kept. Since the Society journal presents his activity only up to 1944, fragments of his activity following this year are to be found in the documents of the museum archives. In 1944, the caretaker of the paleontological collection from that time, BARTMUS, thanks Richard Breckner for his continuous activity in this section and refers to him as caretaker of the paleontological collection.

Fortunately, the same as in NEUGEBOREN's case- though taking into consideration the proportion, both the activity and the collections are hardly knows in the country and almost unknown abroad. A small part of the sharks teeth collection was determined by Breckner and the determinations prove the knowledge of the fundamental papers related to sharks teeth. He had in his care the entire paleontological collection of the museum. The Breckner collection is kept at the Natural History Museum from Sibiu, inv. nr, 34.145 – 43.457.

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Paleontology has never been a priority field for the research of the collections and their processing. Perhaps the number of museum employees has always been reduced, the lack of specialized literature, the fact that unlike the zoological and botanic items requested immediate processing, have represented the reasons why fossils have been less processed, have been less inventoried etc. Nevertheless, the paleontological collections of the three collectors from Sibiu represent landmarks in the study of the fossil groups and of the stratigraphy of areas such as: Turnu Roşu, Lăpugiu, Guşterița which became *locus tipus* also due to their contribution.

Regardless of the place in which he underwent his activity – school, museum, church – he fulfilled his duty not only with conscientiousness but also with a lot of passion, since he was constantly preoccupied with perfecting the respective field.

If today the Natural History Museum of Sibiu hosts one of the richest paleontological collections in the country, which it is used with the purpose of improving the relation man – nature, this is only the merit of the collector forerunners from the 18th century. One could to claim neither that these passionate collectors and researchers at the same time foresaw the aggression deployed by man against nature, and therefore nor that they had an ecological conscience, but in fighting against the degradation of the environment, knowing it deeply is the first step. In this sense the example of their commitment for the knowledge and profound understanding of nature is strictly updated.

The personal paleontological collections, later on donated or sold to the museum point out the level of the paleontological research in Transylvania and especially towards the south of the depression.

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DONNEÉS CONCERNANT LES RECHERCHES PHYSICO-GÉOGRAPHYQUES DANS LE COULOIR DU STREI INFÉRIEUR (LE SECTEUR SUBCETATE-SIMERIA, LE DÉPARTEMENT DE HUNEDOARA, ROUMANIE)

DANIELA MARCU

Rezumat

Date privind cercetările fizico-geografice în Culoarul Streiului inferior (sectorul Subcetate-Simeria, județul Hunedoara, România)

Culoarul Streiului inferior (sectorul Subcetate-Simeria), subunitate distinctă a Depresiunii Hațeg-Orăştie (județul Hunedoara, România), a fost mai puțin cercetat din punct de vedere geografic.

Sunt prezentate rezultatele cercetărilor personale efectuate în sectorul inferior al văii Streiului, cunoscut sub numele de Culoarul Streiului, coroborate cu datele publicate anterior de către alți autori.

Investigațiile geomorfologice s-au desfăşurat pe parcursul anilor 2004-2006.

Sunt abordate aspecte preliminare privind geologia, geomorfologia, clima, hidrologia, solurile precum şi principalele ecosisteme din zona cercetată.

Mots clé: Le Couloir du Strei inférieur, le département de Hunedoara, Roumanie, données physico-géographiques

INTRODUCTION

La rivière de Strei, l'une des principales eaux courantes du département de Hunedoara (S=1926 Km^2, L=92 km) a son origine dans les Monts de Şureanu (Carpates Meridionales, Transsylvanie, Roumanie). Elle résulte de la confluence de trois ruisseaux: Cald, Rovina et Gruişoara. Le premier prend sa source sous le Sommet Bătrâna (1792 m alt.), le deuxième dans une petite depression nommée Şinca et le troixième sous le Sommet de Vârfu Negru

(1862 m). La rivière de Strei est l'un des principaux affluents de la rivière de Mureş, qui traverse le département de Hunedoara de l'Est à l'Ouest.

La rivière de Strei présente trois secteurs principaux: *le secteur supérieur*, entre ses sources et la localité de Baru, ayant un cours typique montangneux, *le secteur moyen* – entre les localités Baru et Subcetate, et *le cours inférieur*, de la localité Subcetate jusqu'à l'embouchure dans la rivière de Mureş.

La rivière de Strei forme dans la zone de Subcetate un défilé épigénétique. Au-délà de cette zone, la Vallée de Strei s'élargit jusqu'à l'embouchure dans la rivière de Mureş, ayant l'aspect d'une depression; C'est la Depression de Strei (Le Couloir du Strei). Vers la Vallée de Cerna, située au SV, le couloir forme une extension.

Le Couloir du Strei représente principale composante de la Dépression de Haţeg-Orăştie, individualisé comme une sousdivision distincte. La vallée du Strei présente dans ce secteur un système de terrasses, le lit majeur et le niveau d'erosion de 350 m-400 m.

LES LIMITES GÉOGRAPHIQUES

Au sud, Le Couloir du Strei est delimité par la zone de Subcetate, coupée dans le crystalline des Monts de Şureanu. Cette zone relie la depression de Haţeg qui se trouve au sud et celle de Strei (le couloir de Strei). Au nord, le couloir est entouré par la Vallée de Mureş. A l'ouest, la limite est représentée par Les Collines de Hunedoara qui descendent graduellement vers l'Est jusqu'au Couloir du Strei. Les limites estiques et sud-estiques sont représentées par les Collines d'Orăştie et la Plate-forme de Luncani, la dernière étant une partie composante des Monts Şureanu, avec des altitudes de 800-1100 m. Ses cimes montagneuses se terminent dans le lit de la rivière, le long d'un glacis étroit, resulté de la réunion des cônes de déjections (Fig. 1).

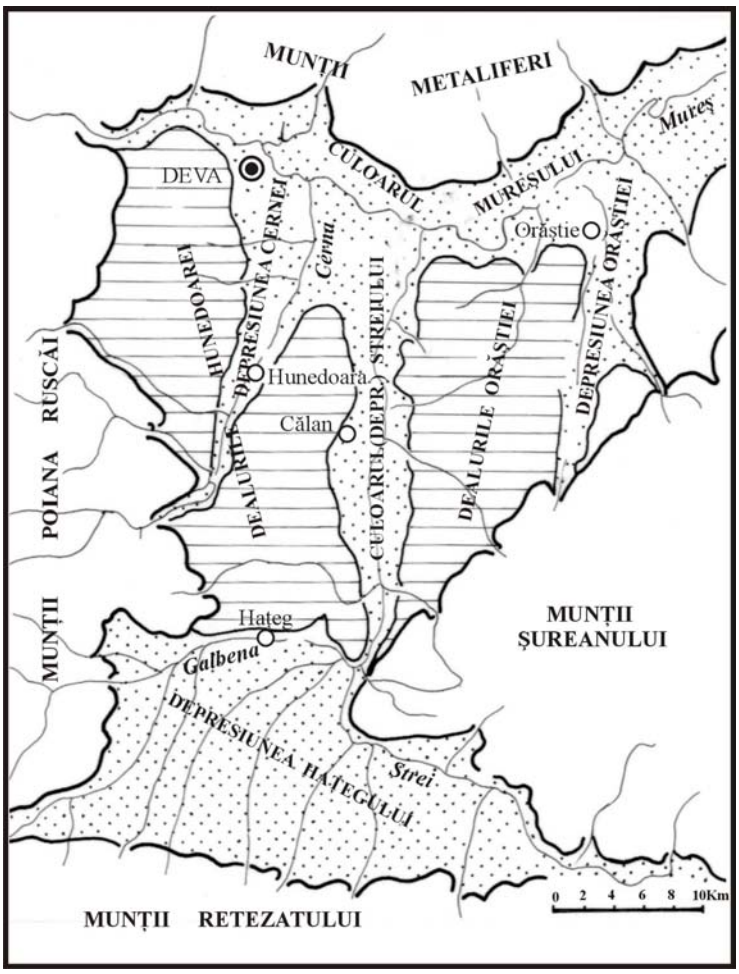

Fig. 1 – Le Couloir du Strei inférieur et les unités de relief limitrophes (après BADEA, BUZA & JAMPA, 1987)

L'HISTORIQUE DES RECHERCHES PHYSICO-GÉOGRAPHIQUES DANS LE COULOIR DU STREI

Du point de vue physico-géographique, le Couloir du Strei, comme d'ailleurs toute la Vallée du Strei, a été moins étudié. On mentionne seulement les ouvrages publiés par BADEA, BUZA & JAMPA (1987), VULCU (1971, 1976), TRUFAȘ (1960), TRUFAȘ CONSTANȚA & TRUFAȘ (1972), TRUFAȘ, RICU, VLAD & VRABIE (1972), TRUFAȘ & ADRIANA POP BADEA (1986-1987), JAMPA (1993). Des données concernant cette zone géographique ont été également publiée dans "L'Encyclopédie géographique de la Roumanie" (1982, 1986) et dans "La Géographie de la Roumanie" (vol. III, 1987). Les études concernant les écosystèmes du Couloir du Strei sont limitées à la recherche des prés situés au contactde celui-ci avec la Depression de Hațeg (CERNELEA 1975-1976). DOMNARIU (1999) a publié les résultats des

recherches ichtyologiques effectuées pendant les années 1996-1998, en six stations situées le long de la vallée: Subcetate, Călan, Simeria, Nălați, Păclişa şi Ostrov.

LA SITUATION ACTUELLE DES ASPECTS PHYSICO-GÉOGRAPHIQUES DU COULOIR DU STREI SUR LA BASE DES RECHERCHES PERSONELLES EFECTUÉES EN 2004-2005

Dans une première étape ont été identifiées les formations caractéristiques du substrat géologique et les unités géomorphologiques existantes dans le Couloir du Strei. Les éléments hydrologiques et climatologiques ont été etudiées en utilisant le matériel bibliographique et des données mises à la disposition par L'Agence pour la Protection de L'Environnement de Hunedoara et par la Societé Hidroelectrica Hațeg (le département de Hunedoara).

LA GÉOLOGIE DU COULOIR DU STREI (LE SECTEUR SUBCETATE-SIMERIA)

Le Couloir du Strei fait partie d'un bassin posttectonique qui a percé comme un golfe à l'intérieur de la masse cristalline des Carpates Meridionales, il est consideré un prolongement du Bassin de la Transsylvanie, vers le sud-ouest, affecté par des failles orientées NO-SE et NO-SO et comblé des sédiments crétacés et miocènes (TRUFAŞ 1986-1987).

Du point de vue géologique, le Couloir du Strei est formé par des formations cristallines de Nappe Getique de l'ouest des Monts de Şureanu et des formations sédimentaires néogènes qui appartiennent à la Depression de Hațeg.

Les formations cristallines qui appartiennent à la série Sebeş-Lotru (gneiss, mica et micaschistes) sont representées par les roches métamorphiques, qu'on trouve tous les cotés de la vallée de Strei. On peut suivre la limite des formations cristallines aux environs du village de Gânțaga, sur la rive droite. Sur la rive gauche, ces formations, qui s'étendent sur 3 km, sont visible à Subcetate, dans la Colline d'Orlea. Les formations sédimentaires appartiennent au Miocène (Aquitanien, Badénien, Sarmatien, Buclovien). Les plus variés du point de vue lithologique sont les dépôts badénienes qui sont formées des conglomérats, graviers, sables, marnes argileuses, piroclastites et marnes grisâtres.

Aux environs de Călan, sur la rive gauche du Strei, on peut observer des gypses compacts de 12-14 cm, qui présentent des passages graduels vers les marnes gypsifères.

Les dépôts du Buclovian, présents sur la rive gauche de la vallée du Strei, sont representées par marnes et argiles avec des intercalations des sables benthoniques. Les dépôts sarmatiens s'étendent sur la rive droite du Strei, en aval de Săcel. Ici on peut distinguer des conglomérats polygènes, des grès sableux ou calcareux, des calcaires organogénes ou oolithiques, des marnes sableuses, etc. Des formations sédimentaires quaternaires (graviers, sables, argiles) reposent sur les dépôts sarmatiens. Les formations magmatiques néozoïque sont rares dans le Couloir du Strei étant representées par des tufs et autres roches d'origine magmatique.

L'élément tectonique principal dans la zone etudiée est représenté par le contact entre le cristalline et le sédimentaire, avec une inclinaison de $67\text{-}70^0$. Les excavations effectuées dans la zone du barrage et de la centrale éléctrique de Subcetate ont mis en évidence des formations cristallines fortement affectées du point de vue tectonique. Les accidents tectoniques qui ont affectés la base et les dépôts sédimentaires ont conduit à l'apparition des sources d'eau ayant un riche contenu en CO_2.

LE RELIEF DU COULOIR DU STREI DANS LE SECTEUR SUBCETATE – SIMERIA

Du point de vue de l'évolution du relief, la Dépression de Haţeg-Orăştie, dans laquelle le couloir est englobé comme une sousunité distincte, est une conséquence de l'affaissement du fondement crystallin (mésosoïque) le long des failles actives. L'affaissement du fondement a commencé au Cretacé supérieur et s'est terminé à la fin du Miocène. Des périodes de sédimentation et notamment de modelage (ex. erosion) ont existé dans cet intervalle. Le relief actuel s'est formé à la fin de ce modelage, deroulé en 3-4 phases. Il est representé actuellement par une vallée bordée par de basses collines.

Dans le secteur Subcetate - Simeria, le Couloir du Strei représente en realité un élargissement de la vallée de la rivière jusqu'à la dimension d'une dépression, caracterisée par un relief collinaire avec des petites pantes, relativement uniformes.

Le Couloir du Strei comprend le lit majeur, un système de terrasses, les versants, la surface d'erosion et les collines qui le limitent (Fig. 2).

1. Le lit majeur du Strei

Dans la zone etudiée, le lit majeur du Strei a une largeur d'environ 3-4 km. Vers le sud, le lit majeur du Strei est étroit.

Consequemment, la déviation du Strei, le lit majeur de la rivière est repartisée d'une manière par rapport au lit de la rivière, étant plus développé du coté gauche que du coté

droite. Dans quelques endroits de la partie droite, le lit majeur est inexistant. Aux environs des localités de Subcetate et Băcia, le lit majeur présente un microrelief spécifique (de nombreux bras abbandonés, méandres, des grinds. On ajoute aussi les canaux de dessication et les digues de protection contre les innondations.

Ce microrélief résulte du fait que de grandes quantités d'alluvions ont été deposés dans la région.

Les ruisseaux qui drainent le territoire: Le Grid, La Vallée de Luncani, Gânțaga, La Vallée Seche (Valea Seacă), La Vallée de Sâncrai, La Vallées des Ravins (Valea Râpelor) ont des lits majeurs developpés et parasités par des dépôts des matériaux accumulés à la base des pantes.

2. Les terrasses

Les terrasses présentes dans la Vallée du Strei sont le résultat d'érosion et des sédiments des rivières dans le cadre des surfaces de nivellement des piémonts, avec une altitude relative de 130-150 m. En dessous de cette altitude, les rivières se sont creusées successivement pendant le Quaternaire, en formant les terrasses.

Les résultats des recherches concernant le nombre et la hauteur des terrasses diffèrent d'un auteur à l'autre.

VULCU (1971) a identifié 5 niveaux des terrasses dans le secteur inférieur du Strei: T1 (4-5 m), T2 (8-12 m), T3 (18-20 m), T4 (27-32 m), T5 (45 m) et 4 niveaux dans le petit bassin de Călan – Subcetate T1 (4-4,5 m), T2 (8-10 m), T3(17-20 m) et T4 (26-30 m).

TRUFAŞ (1986-1987) a etabli, sur la base des ses propres recherces, 6 niveaux des terrasses: T1 (8-12 m), T2 (18-22 m), T3 (28-32 m), T4 (45-55 m), T5 (70-80 m), T6 (90-110 m) (Fig. 2).

Nous avons établi, à partir des nos recherches, la disposition suivante des terrasses: T1(4-5 m) (le haut lit majeur du Strei), T2 (8-12 m), T3 (18-22 m), T4 (28-32 m).

La terrasse T1

La terrasse T1 (le haut lit majeur du Strei) a une altitude relative de 4-5m. Elle est moins développée sur la partie gauche de la rivière, dans le secteur Tâmpa-Băcia-Batiz, et plus développée au sud de Călan Băi, où elle traverse la ville de Călan et devient plus restreinte au sud de Strei. Sur la rive droite, à partir de l'ouest de la localité de Bățălar jusqu'à Bretea Română, T1 a un développement plus large.

La terrasse T2, a une altitude relative de 8-12 m et une développement plus large du coté gauche de la rivière, où elle est parasitée de glacis, et fragmentée par les ruisseaux de Nădăştie, Râpelor et Slivuț. Sur la rive droite la Terrasse T2 est bien développée entre Streisângeorgiu et Bățălar, où elle est parasité par des sédiments déposés par le ruisseau de

Voinii (Pârâul Voinii) jusqu'à la localité de Covragi. Dans le secteur Simeria-Călan, on peut voir des fragments de cette terrasse. Le pont de la terrasse T2 est parasité par de nombreux cônes de déjections qui, dans la zone Gânțaga – Balomir, ont généré un glacis de piémont.

La terrasse T3, avec une altitude relative de 18-22 m, est moins développée sur la rive gauche du Strei. Ou peut distinguer cette terrasse entre la ville de Simeria et la zone située à l'ouest. Des fragments de cette terrasse s'étend aussi au sud de Călanu Mic. Entre les localités Călan et Subcetate, T3 est parasitée d'un glacis et elle continue jusqu' à la Vallée de Slivuț. Sur la rive droite, T3 est présente au contact avec le lit majeur du Strei (Simeria Veche, Totia, O de la localité Sântămăria de Piatră)

La terrasse T4, située à l'altitude relative de 28-32m est moins développée dans le secteur du couloir. On distingue seulement quelques fragments dans ce secteur.

3. La surface d'érosion, de 350-400 m d'alt., représente le résultat de l'erosion post-pliocène. Elle se caractérise par des cimes aplaties ou légèrement ondulées.

4. Les collines

Le Couloir du Strei est limité par Les Collines du Strei à l'est et Les Collines de Hunedoara à l'ouest. Les Collines de Strei sont représentées par le Piemont de Vâlcele et les collines des localités Ocoliş, Grid, Măgura Jeledinți. Les Collines de Hunedoara sont representées par Les Collines de Silivaş-Hațeg – une zone de transition entre la Dépression de Hațeg et la Dépression Cerna-Strei. Les altitudes moyennes des collines dans cette region sont de 400-500 m.

La zone collinaire qui forme les limites du Couloir du Strei est développée sur des dépôts miocènes. Les collines gardent encore les traces des niveaux d'érosion et présentent quelques formes structurales representées par des cuesta: La Colline d'Ocoliş, La Colline de Măgura (593 m). À cause de l'inclinaison vers le nord, les côtés sont orientees vers le Sud, le SO et SE. Dans l'aire de développement des sables badéniennes l'abrupt des côtes est plus estompé que dans les zones de marnes à intercalations fines de grès. L'érosion torentielle et les glissement de terrains ont contribué à leur forte fragmentation et estompage.

Au sud-est, entre les villages de Gânțaga et Covragiu il n'existe pas de collines. Dans ce secteur, quelques cimes descendent vers l'ouest et le nord-ouest, étant assimilées aux glacis d'érosion développés sur des roches métamorphiques (TRUFAS & ADRIANA POP-BADEA 1986-1987).

5. Les versants

Les versants sont affectés par l'érosion et par de nombreux glissements de terrains. Aussi on les rencontre dans la zone de Râpaş -Totia et Petreni (fig. 7-8), Sântămăria de Piatră,

Turdaş, Simeria Veche. Leur déclenchement est facilité par l'alternance de marnes, grès, argiles et sables.

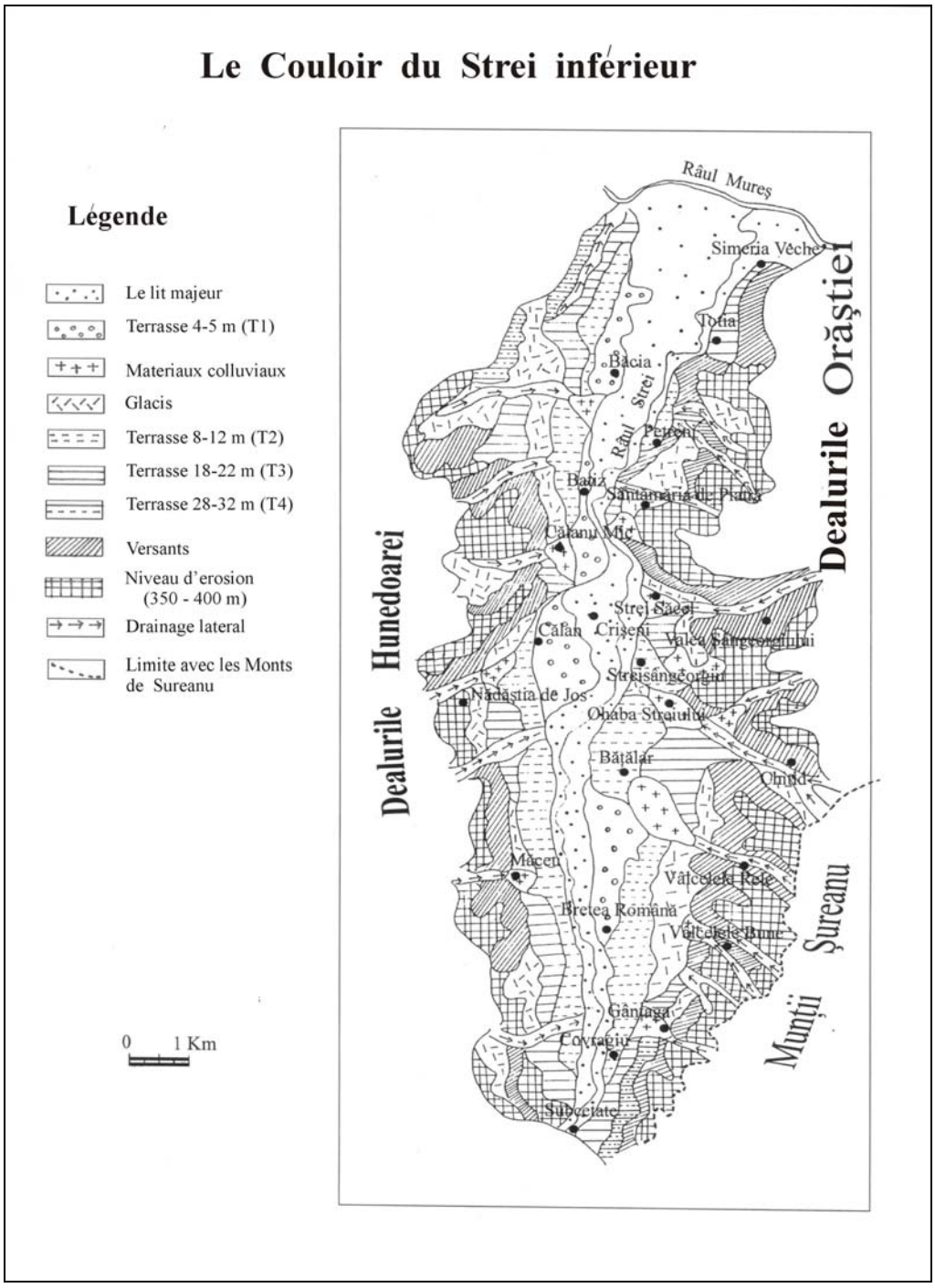

Fig. 2. – Le Couloir du Strei inférieur. La carte du relief

DONNÉES CLIMATIQUES

Du point de vue climatique, Le Couloir du Strei s'inscrit dans le climat tempéré-continental.

Les caractéristiques des éléments climatiques sont les suivantes:

1. La température atmosphérique

La température moyenne annuelle a des valeurs de 9-10^{0}C, grâce à la pénétration des masses d'air chaud de la Plaine de Banat et de Crişana. La température moyenne du mois de janvier est de - 2^{0}C à3^{0}C. Pendant l'hiver, les inversions de température sont fréquentes grâce à l'accumulation d'air froid qui contribue à la modération du climat le longue du Strei. En avril, les températures moyennes sont plus hautes que celles de janvier avec 7-12^{0}C. En juillet, les températures moyennes dépassent 20^{0}C grâce à l'intensification de la radiation solaire. En octobre, les moyennes thermiques sont de 10-14^{0}C.

Les amplitudes thermiques annuelles qui expriment le contrast entre l'été et l'hiver dépassent 21^{0}C.

Les températures minimales absolues sont déterminées par les invasions de l'air froid de N et NE, nommées par les habitants de la région "Le Vent d'Orăştie". Ce vent, froid et sec, éparpille la neige. Les températures minimales absolues enregistrées pendant les années1931-1970 ont eu la valeur de –31,6^{0}C en janvier et –28,1^{0}C en février. Les températures maximales absolues dépassent dans quelques annnées 39^{0}C. Elles résultent de l'influence des aires anticyclonales de l'Est et du Nord de l'Afrique.

Sur le cours inférieur du Strei, le nombre de jours avec des températures minimales ≤ 0^{0}C est d'environ 105.

Le nombre de jours de l'hiver exprimé par des températures maximales ≤ 0^{0}C est d'environ 27.

Le nombre moyen des jours avec la température maxima ≥ 25^{0}C est de plus de 100 jours. Les jours tropicaux, exprimés par des températures maximales ≥ 30^{0}C sont de 25-35.

2. La nébulosité

Dans le Couloir du Strei, la nébulosité moyenne est plus elevée grâce à la pollution industrielle (environ 6 dixième). Les jours à ciel nuageux s'enregistrent d'habitude pendant l'hiver. Pendant l'année, le nombre moyen des jours avec un ciel serein dépasse 100 jours.

3. Les précipitations atmosphèriques

La quantité moyenne multiannuelle des précipitations est près de 600 mm. Les précipitations moyennes mensuelles, avec les valeurs les plus elevées, de 65-70 mm (mai-juillet), sont dues au chauffage de l'atmosphère.

Le maximum de précipitations/24 h a été enregistrés à la fin du printemps et au debut de l'été.

Le maximum absolu, de 662 mm, a été enregistré au mois de mai 1942. Les quantités maximales de précipitations tombent au mois de mai, juin, juillet et même au mois d'août, grâce aux invasions d'air océanique et aussi au déplacement de l'air sur verticale. En hiver

(janvier-mars), les précipitations sont réduites grâce à la diminution du déplacement de l'air sur verticale et aussi à la prédominance du régime anticyclonique. Les plus grandes quantités des précipitations ont été enregistrées pendant les années caractérisées par une intense activité cyclonique (Tab. 1).

Les chutes de neige durent environ 80 jours/an, les premières s'enregistrant à la fin du mois de novembre et les dernières, à la fin du mois de mars.

L'épaisseur de la couche de neige a des valeurs maximes de 8-10 cm à la fin du mois de janvier et au debut du mois de février.

4. La dinamique de l'atmosphère (les vents) est déterminé par les caractéristiques et les rapports existantes entre les systémes bariques qui affectent l'Europe (azorique, euroasiatique, méditerranéen).

Le vent qui souffle dans le Couloir du Strei est Le Grand Vent (Vântul Mare), du coté des Carpates Meridionales. Il produit au printemps la fonte précoce des neiges. Un vent zonal, de NE, nommé Le Vent d'Orăştie, froid et sec, éparpille la neige pendant l'hiver.

Dans la zone de confluence avec la rivière de Mureş sont prédominants les vents de l'ouest.

Dans le Couloir du Strei, la vitesse moyenne du vent est de 1-3 m/s. Des vitesses plus grandes, de 10 m/s, s'enregistrent en moins de 20 jours/an. Les vitesses maximales sont plus fréquentes en été. Dans cette période, les jours calmes dépassent 50% au contact avec le Couloir du Mureş.

5. Des phénomenes et des processus météorologiques

Des autres phénomenes atmosphèriques se produisent dans cette zone: le brouillard, le givre, l'orage et les tempêtes de neige.

Le brouillard se produit avant tout dans les périodes froides de l'année. Parfois se forme en brouillard industriel.

Le givre se forme par temps brumeux, caractérisé par des températures négatives de l'air, d'habitude pendant les mois de janvier et février. Le nombre moyen de jours avec du givre sont de 4 jours/an.

Le frimas, formé par des cristals fins de glace se produit dans les nuit claires du printemps ou de l'automne, quand la température du sol est moins de 0^0C.

Les tempêtes de neige sont fréquentes pendant l'hiver. Elles se caractérisent par des chutes de neige accompagnées par des vents intenses, ce qui détermine l'accumulation de grandes quantités de neige dans les zones protégées.

Les orages se produisent de mars jusqu'en novembre et se manifestent par de décharges électriques accompagnées par de intenses vents, par des foudres et d'éclairs.

L' hydrographie

Le réseau hydrographique du Strei est représenté par des rivières et ruisseaux permanents ou torrentiels.

Par la position géographique et par les caractéristiques hydrologiques, les rivières du Couloir du Strei font partie de la groupe de l'ouest du pays. La densité du réseau hydrographique est de 0,3-0,4 km/km^2.

Du point de vue hydrographique, le territoire étudié appartient au bassin de la rivière de Strei qui amasse les eaux courantes de la Depression de Haţeg, des Monts Şureanu et de la zone de Subcetate-Simeria.

Le plus important affluent du Strei, avec l'origine dans les Monts de Retezat (Gura Apei), est Râu Mare (La Grande Rivière) (S=836 km^2; L=65,8 km). Après le confluent avec cette rivière, le Strei perce la zone montagneuse de Subcetate et forme ultérieurement une dépression connue sous le nom de Couloir du Strei.

Dans le secteur du couloir, à partir de Subcetate jusqu'à la localité de Simeria, le Strei a beaucoup d'affluents. Ainsi, les principaux affluents de la rive droite sont les ruisseaux Gânţaga, Voinii et la rivière de Luncani qui traverse le système carstique Ponorici-Cioclovina (Les Monts Şureanu). Tout aussi, sur la rive droite, un canal conduisit une parte des débits de la rivière du Strei vers l'usine électrique de la localité de Streisângeorgiu. Les principaux affluents de la rive gauche du Strei sont: Galbena (Fig. 5-6), la Vallée de Slivuţ, Râpelor, Nădăştie, Sâncrai, Valea Seacă et Tâmpa. Une adduction d'eau (prise), près de la localité de Călanu Mic, approvisione le Canal de Batiz.

Dans la zone du couloir, l'alimentation de la rivière de Strei et des ses affluents avec de l'eau, se réalise par des sources de surface (des pluies, des neiges) et souterraines. 60% de l'entiere quantité de l'eau est représenté par des sources de surface (TRUFAŞ 1986). L'alimentation des rivières avec des eaux provenues de neige se produit au printemps jusqu'au mois de mai. Si, pendant les mois d'avril-mai et juillet-août, les eaux provenues des sources de surface ont un poids important, vers la fin de l'automne, l'alimentation se fait par les eaux souterraines.

1. Le régime d'écoulement des rivières

Ce régime est conditioné, en particulier, par les conditions climatiques auquelles s'ajoutent les conditions géomorphologiques, géologiques, la végétation et les constructions

hydrotechniques de la rivière de Râu Mare et Strei, amenajées en 1986-2003 (les centrales électriques de Gura Apei - 1986, Ostrov - 1986, Păclişa - 1988, Haţeg - 1990, Subcetate - 2003).

Dans la periode 1940-1995, le régime mensuel d'écoulement a enregistré les plus grands valeurs au mois de mai. Dans cette periode, les eaux resultées de pluies s'associent aux euax provenues par la fonte de neiges. Le minimum s'enregistre pendant les mois de décembre-mars (Tab. 1).

Le régime saisonnier d'écoulement se caractérise par des valeurs elevées en printemps, en représentant 40% de l'entier volume d'eau écoulé annuel. Ce régime d'écoulement baisse pendant l'été (30%) et l'automne (15%). Les plus baissées valeurs s'enregistrent pendant l'hiver (12%). (Tab. 2)

Tab. 1. - La valeur des debits moyens mensuels dans les sections (secteurs) caractéristiques de la rivière du Strei (1940-1995)

Section	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX
Strei-en aval de Râu Mare	17,78	17,82	17,19	14,14	14,30	18,01	38,75	60,92	46,41	29,07	22,18	16,63
Strei en amont de Gânţaga	17,85	17,89	17,25	14,19	14,36	18,08	38,90	61,15	46,59	29,18	22,26	16,69
Strei SH Bretea	17,91	17,95	17,31	14,24	14,41	18,16	39,04	61,36	46,75	29,28	22,34	16,75
Strei, en aval de V. Râpelor	17,96	18,00	17,36	14,28	14,45	18,19	13,14	61,53	46,87	29,36	22,40	16,80
Strei, en amont de V. Văii	18,79	18,83	18,16	14,94	15,12	19,03	40,95	64,37	49,04	30,72	23,44	17,57
Strei-Băcia	18,81	18,85	18,18	14,95	15,13	19,05	41,00	64,44	49,10	30,75	23,46	17,59

Tab. 2. – Le pourcentage d'ecoulement saisonnier dans la rivière du Strei

La station hydrometrique	**La rivière**	**H**	**P**	**E**	**A**
		%			
Petreni	Strei	40	30	15	12

Legende: H=L'hiver; P= Le Printemps; E= L'Été; A= L'Automne

L'écoulement moyen caractérise le potentiel de l'eau des rivières (la quantité de l'eau ecoulée par une section dans l'unité de temps – m3/s et s'exprime par des débits spécifiques (la quantité de l'eau ecoulée par l'unité de surface dans l'unité de temps – l/s/km^2). Dans le bassin du Strei inférieur s'enregistre un débit spécifique de moins de 5l/s/Km^2 ou un debit de 23,8 m^3/s. Sur la base du matériel hydrometrique existent a été établi que le plus grand débit moyen annuel s'été produit en 1975 (39,4 m3/s). Le plus baissé debit moyen annuel s'été produit en 1993 (13,8 m^3/s). Cettes valeurs ont été enregistrées à la station hydrometrique de la localité Petreni (Tab. 3).

Tab. 3. – Les débits moyens multiannuels mensuels et annuels (Qm^3/s) (1965-2005)

SH	**R**	**Les mois d'année**												**DM**
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Pe-treni	Strei	13,8	15,7	20,1	39,3	62,5	48,6	30,4	22,2	20,5	19,0	16,0	15,2	26,9

Legend: SH= Station hydrometrique; R= La Rivière; DM= Le débit moyen annuel

L'écoulement minime dans le bassin inférieur du Strei se produit quand l'alimentation se réalise exclusivement de l'eau souterraines. Ce processus se deroule en deux etapes: la première, quand les précipitations sont représentées par des particules solides (de neige, de la glace); la deuxième, enregistrée à la fin de l'été et au debut de l'automne, est due à une importante évapo-transpiration qui conduit à la diminution des réserves de l'eau souterraines.

L'homme, a influencé, aussi comme les facteurs naturels, le débit de la rivière par les barrages.

Le débit minimale absolue, enregistré à la station hydrometrique Petreni a eu la valeur de 2,85 m^3/s, en 1992 (à la fin du mois d'août).

Les débit maximals s'enregistrent pendant le printemps et en automne. Ses volumes et ses durées sont liées de l'intensité et la durée des pluies ou des pluies associées avec la fonte de neige.

Le débit maximale absolue s'est enregistré à Petreni, en mai 1978. Il a été du à la crue artificielle de la quantité de l'eau sur la rivière Râu Mare, resultée à cause de la destruction d'un barrage provisoire de bois.

En plus de 80% des débits maximums sont de nature pluviale. De ce pourcentage, 50% est representé par les pluies de printemps.

2. **Le chimisme de l'eau** est influencé par les caractéristiques lithologiques.

Les eaux sont bicarbonate-calciques.

Le PH a des valeurs de 7,2-7,6 mg/l ce qui indique la faible alcalinité de l'eau.

La valeur elevée de l'oxygénation de l'eau, de 8,12-9,41 mg/l encadre l'eau de la rivière du Strei dans la première catégorie de qualité (conformement au STAS 4706/88).

Le chargement avec des substances organiques (16,10-28,98mg/l) indique l'encadrement de cette rivière dans les catégories II-ème et III-ème des eaux courrantes. Si dans la section de Subcetate le chargement avec des substances organiques a la valeur de 20,28 mg/l, on constate que dans la section de la rivière de Strei, à l'embouchure dans la rivière de Mureş, l'eau est epurée en proportion de 17%.

Les quantités d'azote mineral (nitrates, ammonium) indiquent des eaux de la première catégorie de qualité conformement au STAS 4706/88.

La quantité de phosphore (Ph) indique l'appartenance de l'eau du Strei à la categorie des eaux oligotrophes.

Les concentrations de Ca, Mg et chlorures avec des valeurs reduites encadre l'eaux de Strei dans la premiere catégorie de qualité.

Conformement aux dates enregistrées par la Societé Hidroelectrica S. A. Haţeg, on estime que la pollution de l'eau est rélativement faible.

Les sources de la pollution de la rivière de Strei dans le secteur Subcetate-Simeria sont:

- les déchets provenues des societés industrielles emplacées en amont du couloir;
- le canal d'évacuation des eaux usées par la ville de Călanul Nou et la Societé sidérurgique de la ville de Călan.

3. **L'écoulement d'alluvions en suspension** représente un aspect des processus d'érosion par l'entremise des eaux des rivières.

Une série de facteurs comme l'énergie de la rivière et les conditions physiques-géographiques de ce bassin hydrographique contribue à la formation de l'écoulement d'alluvions. Le caractère des roches, les pantes et le degré du recouvrement avec la végétation des versants et le type de végétation influencent directément le caractère de la turbidité des eaux.

L'écoulement d'alluvions en suspension est aussi influencé par l'intensité et la répartition des pluies pendant l'année.

L'écoulement d'alluvions en suspension présente un régime semblable aux debits liquides.

Les debits moyens spécifiques d'alluvions en suspension, avec une valeur de 2t/ha/an, sont en conformité aux turbidités moyennes.

Dans le Couloir du Strei inférieur, les débits maximums des alluvions ont la tendence de préceder celles de l'eau.

Les depôts de transit, avec une granulation correspondante au transport d'alluvions sont plus elevés dans le couloir que dans la zone montagneuse grâce au fait que les vitesses plus reduits facilitent leur accumulation entre les périods des crues de l'eau.

Les valeurs plus elevées de la turbidité moyenne sur le Strei inférieur sont dues aux processus de transit des alluvions du lit majeur, aux zones des roches sédimentaires et à l'éxploatation de ballast du lit majeur.

La turbidité de l'eau est de cca. 100-150 g/m^3. Dans ce secteur elle est plus elevée que dans la zone montagneuse grâce à la présence des roches sédimentaires néogenes avec une dureté diminuée, aux surfaces agricoles et aussi aux coefficients d'impermeabilité diminués.

4. **Les lacs d'accumulation**

En aval de la confluence de la rivière Râul Mare avec le Strei, à cca. 3,5 km, se trouvent quatre lacs d'accumulation qui sont en construction: Subcetate, Bretea, Călan, Băcia.

Sept centrales électriques (Subcetate, Plopi, Bretea, Strei, Călan, Băcia, Simeria), avec une totale puissance de 84,6 MW et une production annuelle de 168,30 GWh énergie électrique serront desservies par ces lacs.

La construction pour quatre de cettes centrales a debuté en 1990 (Subcetate, Bretea, Băcia et Simeria).

En présent, seulement la centrale électrique de Subcetate est entrée en fonction.

On considère que l'aménagement hydrotechnique du Strei influencera la modification du régime hydrologique du lit majeur et du régime d'ecoulement de l'eau, avec des répercussions sur les valeurs thermiques, des volumes de l'eau au-delà des barrages et sur la composition de la végétation et de la faune existentes.

Les sols

Le Couloir du Strei inférieur se caractérise par une grande varieté typologique de sols. Sur le fond général des sols argileux-luviques et cambiques se rémarque une multitude d'autre types de sols, génerés en principal par des conditions locales de pédogénese.

Le Couloir du Strei inférieur s'encadre du point de vue pédogéographique dans la Region Carpatique, le Domaine des cambisols et argiloluvisols des depressions montagneuses

avec un caractère collinaire, le Sousdomaine des luvisols albiques pseudogleisés, des sols bruns luviques et des sols bruns eumesobasiques. Ce domaine de sols se trouve dans le District de Haţeg.

La présentation des sols est en conformité au système roumaine de la classification des sols, elaboré en 1980 et mise à jour par FLOREA & MUNTEANU (2003).

Dans le Couloir du Strei sont présentes les suivantes classes et types de sols:

La classe d'argiluvisols est représentée par les types de sols bruns (préluvosols) qui occupent des surfaces reduites, les sols bruns luviques (luvosols), dominants dans le secteur cantral et sudique du couloir et les luvisols albiques (nommés anterieurement des sols podzoliques) qui occupent des grandes surfaces dans les zones avec un rélief plan (terrasses, interfleuves) où faible incliné.

La classe de cambisols est représentée par les sols bruns eumesobasiques (nommés en présent eutricambosols) caractéristiques pour un relief fragmenté et aussi pour les versants, les interfleuves baissées et les dépôts deluvio-coluviales de la basse des versants.

Les sols hydromorphes (nommés en présent gleisols et stagnosols) occupent des surfaces avec un excès temporaire, prolongé ou permanent d'humidité dans le lit majeur du Strei.

La classe des sols non-evolués, tronqués ou défoncés (nommés en présent protisols, antrisols) est representée par des sols variés, en cours de formation, qui occupent une surface rélativement grande dans le Couloir du Strei.

LES ÉCOSYSTÉMES DU COULOIR DU STREI; LA VÉGÉTATION ET LA FAUNE

Quoique les écosystemes naturels du Couloir du Strei ont été, au long des années, affectés par les constructions hydrotechniques et par le defrichement des formations forestières dans le but d'utilisation des terrains pour l'agriculture ou pour le pacage, ils sont encore présentes sur des surfaces reduites.

Les principales formations phytocoenologiques du Couloir du Strei sont représentées par les prés situés dans le lit majeur et les forêts des zones collinaires. De tous côtés de la rivière on rencontre des saulaies, des peupleraies et aunaies (As. *Salicetum albae-fragilis* ISSLER 24 em SOÓ 57, As. *Alnetum glutinosae-incanae* BR. BL. (15) 30) (Fig. 3-4). Sur les terrasses inferiéures, avec un excès d'humidité on rencontre des prés hygrophiles et mesohygrophiles (As. *Agropyretum repentis* BURDUJA & all. 56, As. *Trifolio repenti-Lolietum*

KRIPPELOVA 67, As. *Agrostetum stoloniferae* (UJVAROSI 41) BURDUJA et al. 56, As. *Festucetum pratensis* SOÓ 38).

Les associations hygrophiles (*Scirpo-Phragmitetum* KOCH 26, *Caricetum rostratae* Rubel, *Typhetum angustifoliae-latifoliae* (EGGLER 33) SCHMALE 39 sont dépendantes des étangs situés dans les zones avec un excès d'humidité.

Sur les terrasses supérieures on rencontre des prés mesophiles secondaires: As. *Festuco rubrae-Agrostietum capillaris* HORV. (51) 52, As. *Anthoxantho- Agrostietum capillaris* SILLING. 33, As. *Festucetum pratensis* SOÓ 38.

Les prés utilisés comme pâturages alternent avec des terrains arables.

Dans la zone collinaire du couloir on rencontre des forêts des arbres feuillus representées par des rouvraies (As. *Querco petraea-Fagetum* RĂSMERIȚĂ 74, As. *Lathyro hallersteinii-Carpinetum* COLDEA 75), situées aux altitudes de 300-400 m et des hetraies (As. *Carpino-Fagetum* PAUCĂ 41), aux altitudes supérieures des collines qui encadrent le couloir. À la lisière des forêts on rencontre des arbusts comme *Sambucus nigra*, *Sambucus racemosa*, *Rosa canina*, *Crataegus monogyna*, *Prunus spinosa*, *Berberis vulgaris*, etc.

La faune, tres variée, est dépendente des conditions climatique et de la végétation. Dans les prés on rencontre beaucoup de nevertébrés, en special insectes, comme: orthoptères (*Tettigonia viridissima*, *Locusta migratoria*, *Decticus verrucivorus*, etc), coleoptères (*Zabrus tenebrioides*, *Agriotes lineatus*, *Phytodecta fornicata*, etc.), lepidoptères (*Pieris rapae*, *Pieris napi meridionalis*, *Leptidea sinapis*, *Melanargia galathea*, *Argynnis paphia*, *Coenonympha pamphilus*, *Coenonympha glycerion*, *Polyommatus icarus*, etc.).

La faune des étangs est représentée par des amphibiens et des reptiles: *Rana ridibunda*, *Bombina bombina*, *Bombina variegata*, *Natrix tessellata*, *Triturus vulgaris*. Le canard sauvage (*Anas plathyrhynchos*) niche dans le fourré de joncs des environs des étangs. Aux environs des habitats humains on rencontre beaucoup d'exemplaires de *Ciconia ciconia*.

Dans les forêts collinaires on rencontre des mamifères comme *Sus scrofa ferrus*, *Cervus elaphus*, *Capreolus capreolus* et des oisseaux comme: *Oriolus oriolus*, *Parus major*, *Erithacus rubecula*, *Picus viridis*, *Garrulus glandarius*, etc.


Fig. 3 - 4: Aunaies dans la valée du Strei (aux alentours de la localité de Petreni)


Fig. 5 - 6: La rivière du Strei au confluent avec les rivières de Galbena et Râu Mare


Fig. 7 - 8: À Petreni, les versants descendent directement dans le prés du Strei.

CONCLUSIONS

Notre recherches ont mis en évidence les caractéristiques physico-géographiques du Couloir du Strei, une zone du département de Hunedoara, moin etudiée du poit de vue géographiques. À coup sûr, les recherches futures, contribueront, à la connaissance du milieu géographique de ce secteur de la rivière de Strei.

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LES ASSOCIATIONS VÉGÉTALES DE LA VALLÉE DE GOVĂJDIE (LES MONTS DE POIANA RUSCĂ, ROUMANIE) (I)

MARCELA BALAZS

Rezumat

Asociaţiile vegetale din Valea Govăjdiei (Munţii Poiana Ruscă, România)

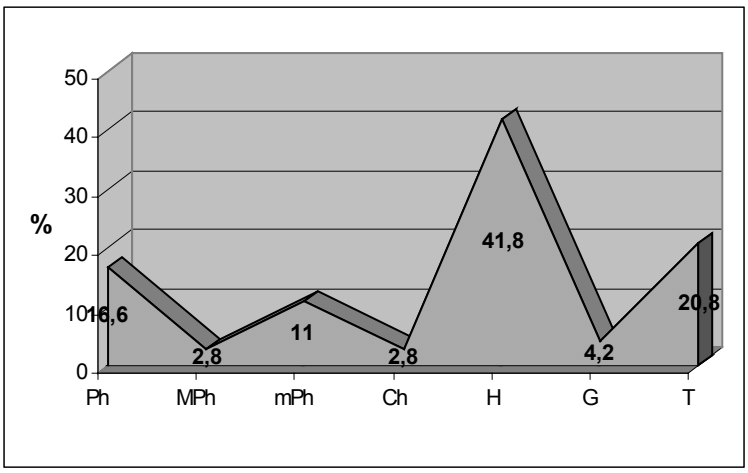
În acest articol se analizează 8 asociaţii vegetale identificate în anii 2004-2005. Aceste asociaţii sunt analizate şi caracterizate din punct de vedeve ecologic, corologic şi sub aspectul compoziţiei floristice.

Mots clé: associations vegetales, la Vallee de Govăjdie, Les Monts de Poiana Ruscă, Roumanie

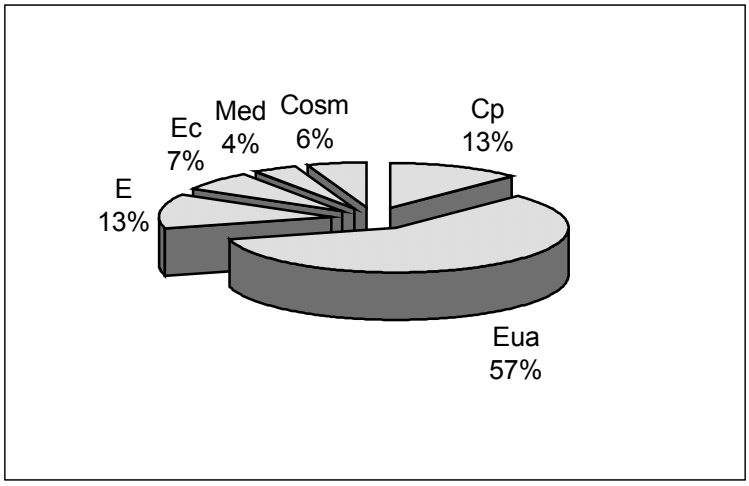
Alnetum incanae (BORCKMAN 1907) AICHINGER & SIEGRIST 1930. Les aunaies formées par *Alnus incana* peuplent les alluvions de saulaies de la Vallée de Govăjdie, à l'altitude de 500-700 m. La flore de cettes phytocoenoses est hétérogène, composée par 29 espèces de cormophytes, de quelles 35% sont caractéristique pour l'association et poue les coenotaxons supérieurs. Le reste des espèces composantes dérivent des prés et des communantés des espèces adventives.

La diversité des catégories écologiques des aunaies analisées se reflète dans l'analyse écologique qui met en valeur le pourcentage élevé de mésophytes (54 %), mésohygrophytes (22%), micro-mésothérmes (65%), des plantes euriioniques (41,7%), moins acide-neutrophiles (29%) et acidifié-neutrophyles (25%).

Le spectre des bioformes Ph-16,6%; MPh-2,8%; mPh-11%; Ch-2,8%; H-41,8%; G-4,2%; T-20,8% (Th-16,6%, TH-4,2%) :



Le spectre des géoelements: Cp-12,5%; Eua-58,3%, E-12,5%; Ec-6,9%; Med- 4,2%; Cosm-5,6% :



Alnus incana 3-4

Alnus glutinosa 2-5

Frangula alnus +

Sambucus nigra 1.1

Crataegus monogyna 2

Corylus avellana 2

Clematis vitalba 1

Cornus sanguinea 1

Salix fragilis +

Salix capraea +

Equisetum telmateja +

Stachys silvatica 1

Rubus caesius 2
Geum urbanum +
Geranium robertianum +
Aegopodium podagraria + 1
Chaerophyllum aromaticum +
Alliaria petiolata +
Glecoma hederacea +
Salvia glutinosa +
Agrostis stolonifera +
Poa trivialis + 1
Vicia cracca +
Potentilla reptans +
Lysimachia vulgaris +
Silene alba +
Mentha aquatica +
Taraxacum officinale +
Cirsium vulgare +

Les aunaies présentent une grande importance dans l'établissement des rives des eaux courantes, dans l'accelaration de la sédimentation des suspensions et dans la diminution de la vitese de l'écoulement du limons.

Aegopodio - Alnetum incanae KÁRPÁTI & JURKO 1961. Les aunaies édifiées par de gravier, riches en substances organiques, à l'altitude de 350-620 m. Cette deux associations qui édifient les aunaies sont différents grâce aux quelques espèces différentielles qui leur impriment une nuance caractaristique.

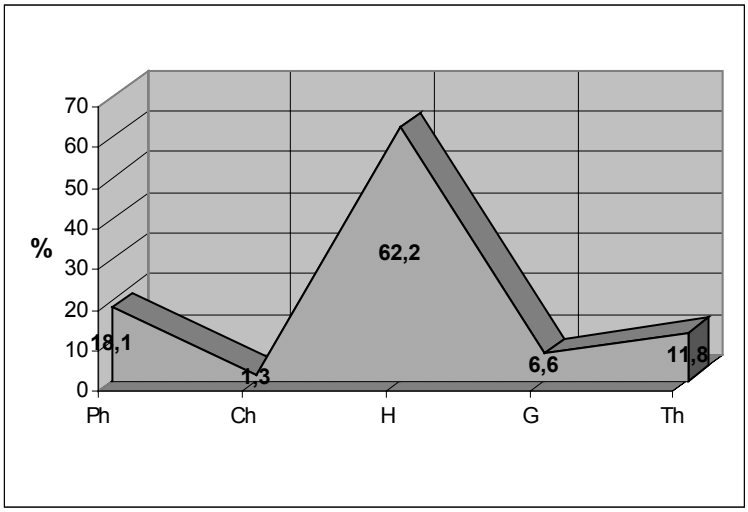
Dans la strate arborescente et arbustif, à coté de *Alnus glutinosa*, ont été identifiées sporadiquement *Alnus incana* (rare), *Frangula alnus*, *Sambucus nigra*, *Viburnum opulus*, *Clematis vitalba*, *Cornus sanguinea*, *Salix fragilis*, etc.

Les espèces herbacées caractéristiques, qui s'imposent par leur constance et abondance, sont: *Equisetum telmateja*, *Equisetum palustre*, *Brachypodium silvaticum*, *Carex lepidocarpa*, *Rubus caesius*, *Aegopodium podagraria*, *Lythrum salicaria*, *Lycopus europaeus*, *Cirsium oleraceum*, etc.

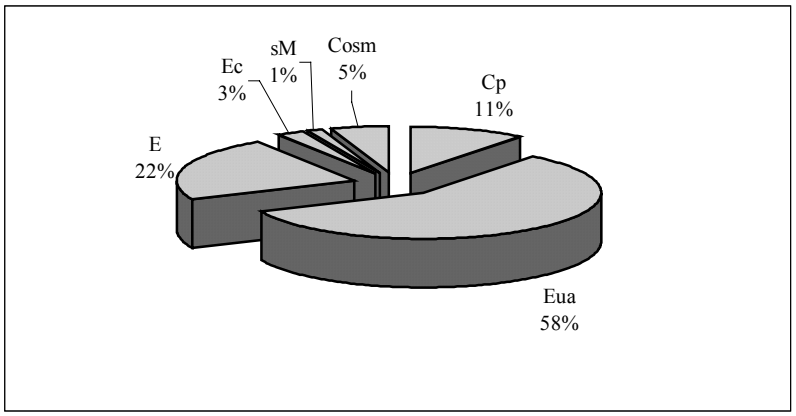
Les ressemblances d'entre les deux coenoses sont evidenciées par le comportement synécologique qui est marqué par la domination des espèces mésophyte (52,6%),

mésohygrophyte (27,6%), micro-mesothermes(69,7%), euriioniques(35,6%), faiblement acidifié-neutrophiles (34,2%) et acidifié -neutrophiles(28,9%). Leur ressemblances est due aussi aux écotopes et aux même préferences écologiques.

Le spectre des bioformes : Ph –18,1%; Ch- 1,3%; H- 62,2%; G- 6,6%; Th- 11,8% :



Le spectre des géoélements : Cp- 10,5%; Eua- 57,9%; E- 22,4%; Ec- 2,6%; sM- 1,3%; Cosm- 5,3% :



Alnus glutinosa 1

Frangula alnus 1-2

Sambucus nigra +

Viburnum opulus +

Clematis vitalba +

Cornus sanguinea 1

Ligustrum vulgare 1

Salix fragilis 1

Myricaria germanica +

Equisetum telmateja 1

Rubus caesius 2

Stachys silvatica 1

Humulus lupulus +

Rumex sanguineus +

Brachypodium silvaticum 1

Geum urbanum +

Geranium robertianum 1

Aegopodium podagraria 2-3

Glecoma hederacea + 1

Lamium maculatum + 3

Salvia glutinosa +

Lapsana communis 1

Tanacetum corymbosum +

Fragaria vesca +

Campanula rapunculoides +

Filipendula ulmaria 1

Ranunculus repens 1

Lysimachia vulgaris 1

Urtica dioica +

Galium aparine +

Valeriana officinalis +

Galeopsis speciosa +

Lycopus europaeus 1

Mentha longifolia 1

Prunella vulgaris 1

Eupatorium cannabinum 1

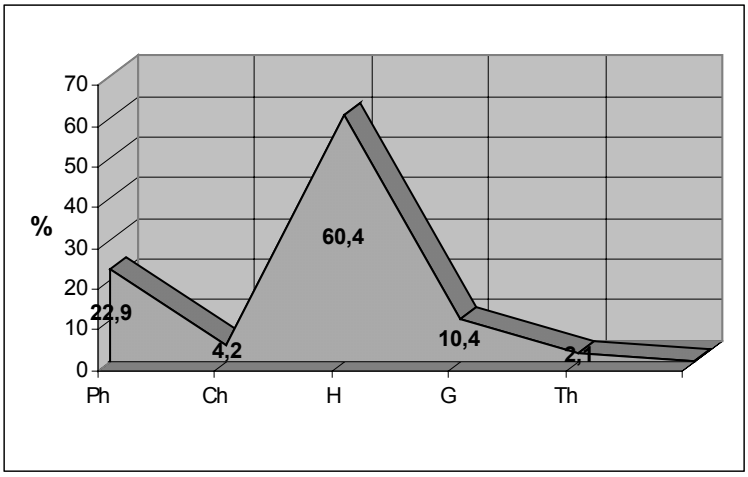
Festuco drymeiae - Fagetum silvaticae MORARIU et all. 1968. Les phytocoenoses de hêtres regroupées dans cette association ont été identifiées sur les versants prédominant ouestiques des massifs, à l'altitude de 560-800 m.

La strate arborescente, dominée par *Fagus sylvatica* près de quel poussent sporadique *Carpinus betulus*, *Acer campestre*, *Quercus petraea*, *Populus tremula* et *Betula pendula* est caracterisée par un dense couronnement (0,8-0,9), défavorable pour le développement des arbustes disséminés dans la surface de la forêt.

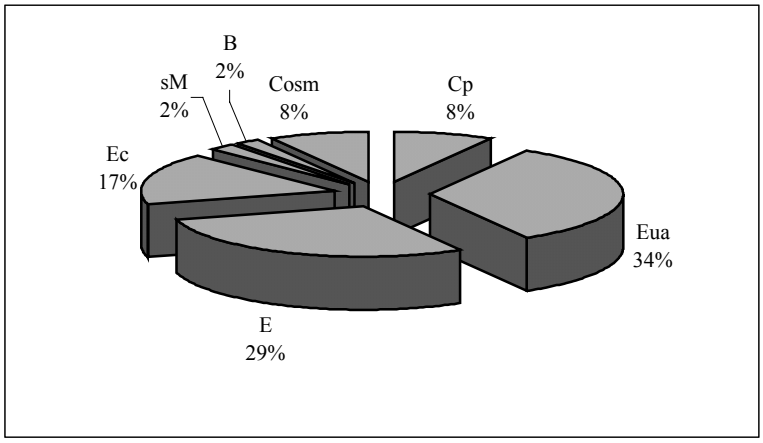
La strate herbacée réalisant des recouvrement de 60%, est dominée par *Festuca drymeia* de pair avec *Asarum europaeum*, *Luzula luzuloides*, *Scrophularia nodosa*, *Dryopteris filix- mas*, etc.

Les coenoses de *Fagus sylvatica* avec *Festuca drymeia* ont un prononcé caractère mésophile (78,7%), micro-mésotherme (57,4 %) vers microtherme (36,2 %), en peuplant les sols bruns, acides, refletées par la prédominance des plantes acidifié-neutrophiles (29,8 %), faiblement acidifié-neutrophiles (21,3 %) et euriioniques (31,9 %).

Le spectre des bioformes : Ph- 22,9%; Ch- 4,2%; H- 60,4%; G- 10,4%;Th- 2,1% :



Le spectre des géoéléments : Cp- 8,3%; Eua- 33,3%; E- 29,2%; Ec- 16,7%; sM- 2,1%; B- 2,1%; Cosm- 8,3% .



Fagus silvatica 3-5

Carpinus betulus + 1

Acer pseudoplatanus +

Quercus petraea +

Betula pendula +

Rubus idaeus +

Corylus avellana +

Sambucus racemosa +

Anthyricum filix-femina + 1

Dryopteris filix-mas + 1

Festuca drymeia 2-3

Asarum europaeum + 1

Epilobium montanum +

Mercurialis perennis +

Gentiana asclepiadea +

Asperula odorata + 1

Myosotis silvatica +

Lamium galeobdolon +

Salvia glutinosa +

Lamium maculatum + 1

Poa nemoralis +

Luzula luzuloides + 1

Stellaria holostea +

Scrophularia nodosa +

Glechoma hederacea ssp. hirsuta +

Campanula rapunculoides + 1

Dryopteris disjuncta +

Deschampsia flexuosa +

Cystopteris fragilis +

Polypodium vulgare +

Doronicum austriacum +

Aspelium trichomanes + 1

Carpino - Fagetum silvaticae PAUCĂ, 1941. Les forêts de chames et de hêtres sont les plus répandues. Elles se rencontrent sur les versants des collines avec des exposition et des inclinaison diverses, entre 500-800 m. Les sols caractéristiques sont bruns, plus on moins podzoliques. La flore de cette coenoses est riche, représentée par 65 espèces de cormophytes,

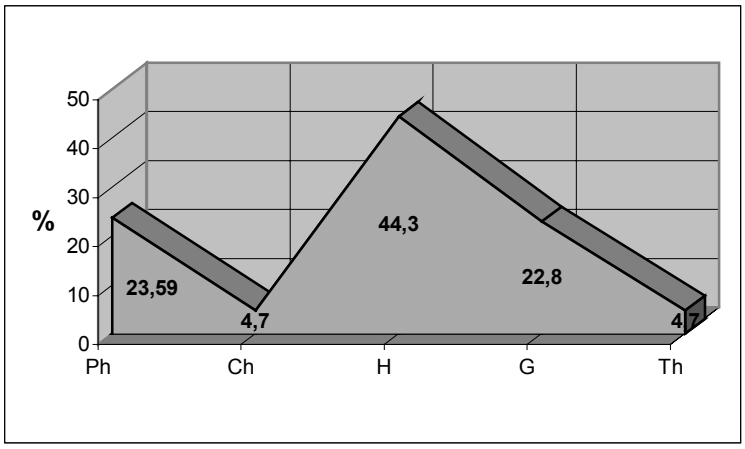
dans leur majorité caractéristiques pour les coenotaxons supérieurs auxquels l'association est subordonnée.

La strate arborescente est formé par les espcès dominantes: *Fagus sylvatica* et *Carpinus betulus* avec une consistance naturelle de 0,8-1,0. Dans les premières années de végétation, toutes les deux espèces out la même hauteur, mais comme exemplaires matures, le hâtre depasse en hauteur le charme, qui représente l'espèces dominante. Dans cette stratte on rencontre aussi, des espèces disséminées comme: *Quercus petraea*, *Acer platanoides*, *Acer campestre, Ulmus glabra,, Populus tremula, Betula pendula, Tilia platyphylos, Sorbus torminalis, Prunus avium, Malus silvestris* etc.

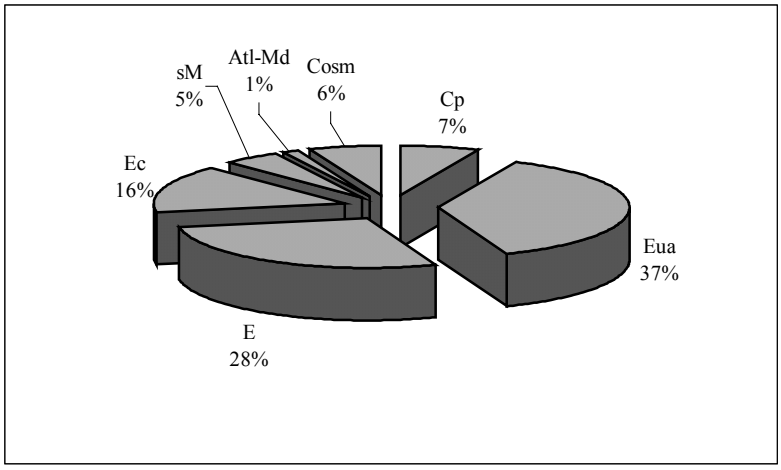
La strate herbacée est bien evidenciée et constituée par des plantes de mull, auxquelle s'associent quelques espèces acidophiles. Frequentes sont les espèces: *Athyrium filix-femina*, *Dryopteris filix-mas, Carex digitata, Carex pilosa, Maianthemum bifolium, Actaea spicata, Hepatica nobilis, Isopyrum thalictroides, Asarum europaeum, Lathyrus vernus, Euphorbia amygdaloides, Mercurialis perennis, Sanicula europaea, Cardamine bulbifera, Cardamine glanduligera, Asperula odorata, Lamium galeobdolon, Aposeris foetida, Polygonatum odoratum, Anemone nemorosa, Anemone ranunculoides, Galium verum, Pulmonaria officinalis, Campanula trachelium* etc.

Dans les forêt de charmes et de hêtres prédominent les espèces mésophiles (68,6 %), xéro-mésophiles (22 %), micro-mésothermes (72 %), faiblement acidifié-neutrophiles (34,7 %).

Le spectre des bioformes : Ph- 23,59%, Ch- 4,7%, H- 44,3%, G- 22,8%, Th- 4,7% :



Le spectre des géoéléments : Cp- 6,7%; Eua- 37%; E- 27,5%; Ec- 15,4%; sM- 4,7%; Atl-Md – 1,3%; Cosm- 6,1% :



Fagus silvatica 2-5

Carpinus betulus 1-4

Acer platanoides 1-2

Tlia platyphyllos +

Quercus petraea + 1

Acer campestre +

Betula pendula +

Hedera helix +

Crataegus monogyna +

Rubus hirtus +

Rubus idaeus +

Sorbus aucuparia 1

Sorbus torminalis +

Corylus avellana + 1

Cerasus avium +

Malus silvestris +

Ulmus glabra +

Euonymus verrucosus +

Vinca minor 2-1

Lembotropis nigricans +

Cornus mas +

Sambucus racemosa +

Anthyrium filix-femina + 1

Dryopteris filix-mas +

Gymnocarpium dryopteris +

Carex digitata +

Carex pilosa +

Actaea spicata +

Isopyrum thalictroides +

Asarum europaeum + 1

Maianthemum bifolium +

Hepatica nobilis + 1

Lathyrus vernus +

Sanicula europaea +

Aposeris foetida +

Galium verum +

Vicia silvatica +

Euphorbia amygdaloides +

Mercurialis perennis + 1

Chaerophyllum aromaticum +

Cardamine bulbifera + 1

Asperula odorata + 3

Myosotis silvatica +

Veronica urticifolia +

Lamium galeobdolon +

Salvia glutinosa + 1

Luzula luzuloides +

Polygonatum odoratum +

Neottia nidus-avis +

Anemone nemorosa +

Anemone ranunculoides + 2

Arum maculatum + 1

Geum urbanum +

Geranium robertianum +

Viola reichenbachiana +

Primula veris +

Moehringia trinervia +

Pulmonaria officinalis +

Campanula trachelium + 1

Veronica officinalis +

Trifolium medium +

Melittis melissophylum +

Cynanchum vincetoxicum +

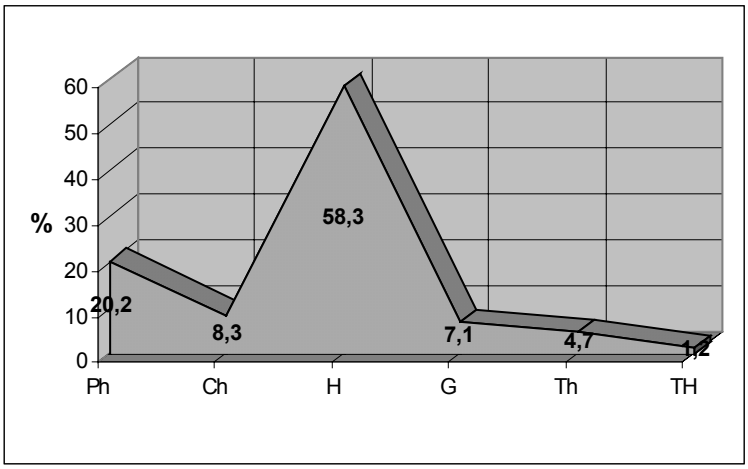
Hieracium murorum +

Ajuga reptans +

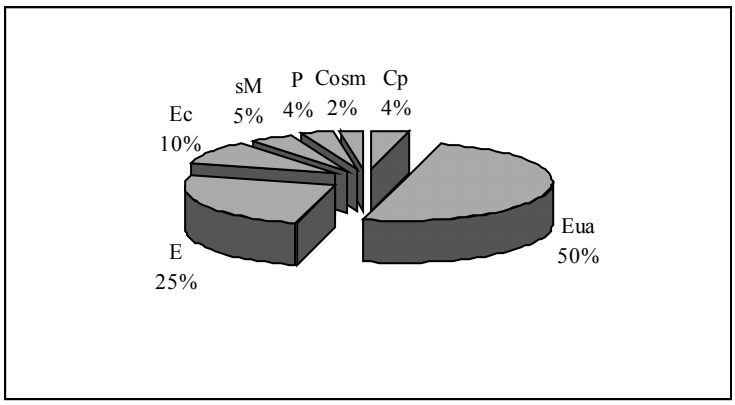
Pruno spinosae - Crataegetum monogynae (SOÓ 1927, HUECK 1931). Les coenoses de *Prunus spinosa* avec de *Crataegus monogyna* sont fréquentes dans la zone et occuppent des petits surfaces à la lisière des bois, des chemins et dans les prés. Elle s'installent habituelment sur les terrains défrichés.

La flore de cette coenoses est hétérogene, en provenant des diverses formations végétales. De cette manière, des toutes les 33 espèces de cormophytes composantes, seulement 17 espèces sont caractéristiques pour les coenotaxons supérieurs de l'association, le réste etant imigré des phytocoenoses voisins. La varieté de la composition floristique se reflète aussi dans le spectre des indices écologiques, dominées par les espèces xéro-mésophiles (53,5%), mésophiles (32,1%) et micromésothermes (62%), près de quelles on rencontre les microthermes (9,5%), moderé-thermophiles (11,9%) et thermophiles (8,3%). Le chimisme du sol est ilustré par la prédominance des espèces faiblement acidifié-neutrophiles (38%), par raport aux celles acidifié - neutrophiles (26,2%).

Le spectre des bioformes : Ph- 20,2%;Ch- 8,3%; H- 58,3%; G- 7,1%; Th- 4,7%; TH- 1,2%:



Le spectre des géoéléments : Cp- 4,2%; Eua- 49,6%; E- 25%; Ec- 9,5%; sM- 4,8%; P- 3,6%; Cosm- 2,4% :



Prunus spinosa 3-4

Crataegus monogyna 2-3

Rosa canina + 2

Corylus avellana +

Euonymus europaeus +

Viburnum opulus +

Astragalus glycyphyllos + 1

Glechoma gederacea +

Primula acaulis +

Veronoca officinalis +

Pulmonaria officinalis +

Primula veris +

Stachys silvatica +

Fragaria viridis + 1

Coronilla varia +

Hypericum perforatum +

Galium mollugo +

Teucrium chamaedrys +

Astragalus monspessulanus +

Dorycnium herbaceum +

Medicago falcata + 1

Thymus glabrescens 1

Dactylis glomerata +

Anthoxanthum odoratum +

Festuca pratensis + 1

Trifolium pratense +

Leucanthemum vulgare + 1

Origanum vulgare +

Euphorbia cyparissias +

Agrimonia eupatoria +

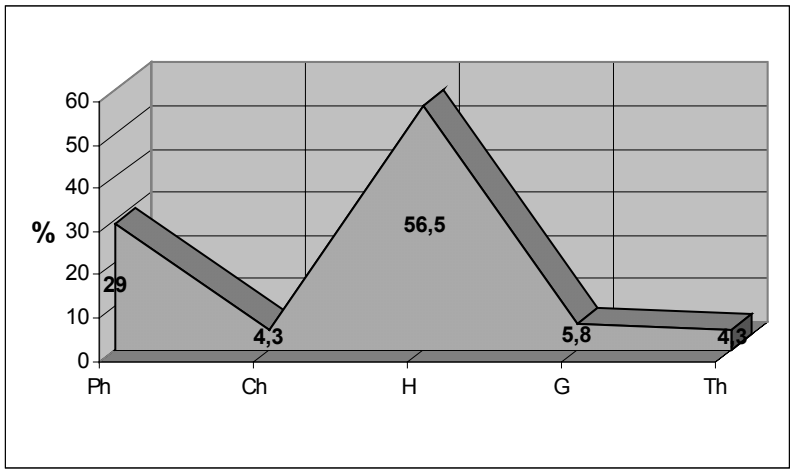
Urtica dioica +

Salvia verticillata +

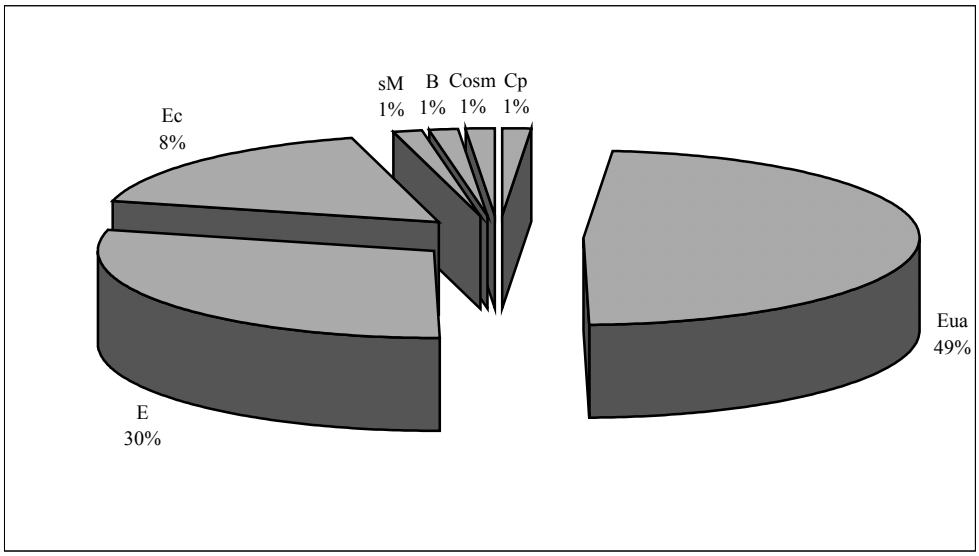
Lamium album +

Coryletum avellanae SOÓ 1927. Les coenoses de *Corylus avellanae* se rencontrent sous la forme des groupes sur la place des terrains defrichée. La flore est formée par 36 espèces cormophytes, de quelles, 54% sont caractéristiques pour les unités coenotaxonomiques. À l'exception de Corylus avellana, aucune espèces ne s'affirme pas ence qui concerne l'abondance. On remarque dans les phytocoenoses analisées les suivants catégories écologiques: mésophytes (55,7%), xéro-mésophytes (35,7%), micro-mésothermes (77,1%), faiblement acidifié-neutrophiles (41,4%) et acide-neutrophiles (31,5%).

Le spectre des bioformes : Ph- 29%; Ch- 4,3%; H- 56,5%; G- 5,8%, Th- 4,3%:



Le spectre des géoélements : Cp- 1,4%; Eua- 48,4%; E- 29,1%; Ec- 16,9%; sM- 1,4%; B- 1,4%; Cosm- 1,4%:



Prunus spinosa + 1

Crataegus monogyna + 1

Corylus avellana 3-4

Rosa canina 1

Pyrus pyraster +

Cornus sanguinea +

Ligustrum vulgare +

Rhamnus catharticus +

Fraxinus excelsior +

Berberis vulgaris +

Malus silvestris +

Salix caprea 1

Chamaecytisus albus +

Astragalus glycyphyllos +

Glechoma hederacea +

Stellaria holostea + 1

Campanula rapunculoides +

Campanula trachelium +

Poa nemoralis +

Fragaria vesca +

Aegopodium podagraria 1

Pulmonaria officinalis +

Hepatica nobilis +

Asarum europaeum +

Lathyrus vernus +

Geranium phaeum +

Lamium galeobdolon +

Aposeris foetida +

Coronilla varia +

Nepeta pannonica +

Dactylis glomerata +

Vicia cracca +

Origanum vulgare +

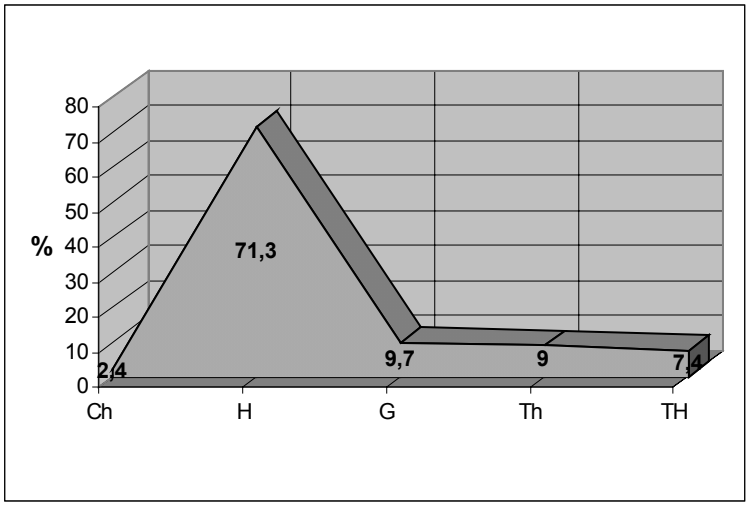
Agrimonia eupatoria +

Salvia verticilata +

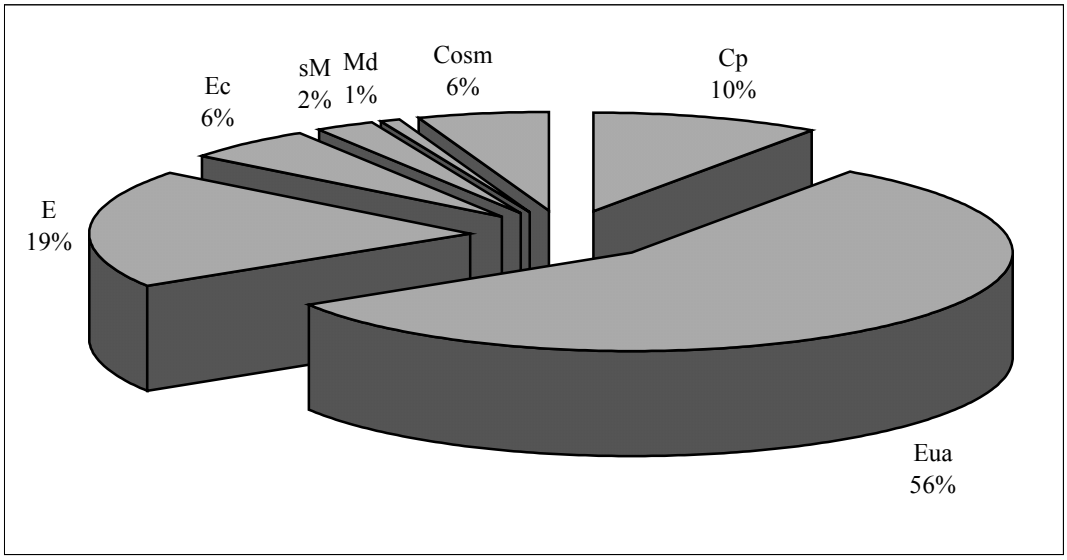
Vincetoxicum hirundinaria 1-2

Festucetum pratensis SOÓ (1938), 1955, 1969. L'association de *Festuca pratensis* include ds phytocoenoses de transition de près meso-hygrophiles vers les près mésophiles, en peuplant dans la zone recherchée les sols des terrasses des eaux courantes et les versants douces des collines. De toutes les 45 espèces de cormophytes qui forment l'association, 44% appartienent à la classe Molinio-Arrhenatheretea. L'association présent un caracter eutrophe, prédominant mésophile (47,5%), micro-mésotherme (45,9%), vers amphitolérant thermique (32,2%) et euriionique (52,4%).

Le spectre des bioformes : Ch- 2,4%; H- 71,3%; G- 9,7%; Th- 9%; TH- 7,4%:



Le spectre des géoéléments: Cp- 9,7%; Eua- 56%; E- 19,3%; Ec- 5,6%; sM- 2,4%; Md- 0,8%; Cosm- 5,6% :



Festuca pratensis 3-5

Agrostis stolonifera +

Alopecurus pratensis 1-2

Deschampsia caespitosa 1-2

Juncus articulatus 1

Equisetum palustre + 2

Trifolium hybridum 1

Symphytum officinale + 1

Anthoxanthum odoratum + 2

Dactylis glomerata 1-2

Holcus lanatus 1-2

Poa pratensis 1-2

Colchicum autumnale 1

Ranunculus acris 1-2

Medicago lupulina +-2

Trifolium pratense 1-3

Trifolium repens + 2

Vicia cracca + 1

Lychnis flos-cuculi 1

Stellaria graminea 1

Rumex acetosa 1

Rhinanthus minor 1-2
Plantago lanceolata + 2
Achilea millefolium 1-3
Leontodon autumnalis 1
Taraxacum officinale 1-2
Ononis arvensis 1-2
Agrostis tenuis 1
Geranium pratense + 2
Campanula patula 1
Filipendula vulgaris + 1
Coronilla varia + 2
Medicago falcata 1
Trifolium campestre 1
Galium verum 1
Salvia pratensis + 2
Agrimonia eupatoria +
Equisetum arvense 1
Ranunculus repens + 1
Lysimachia nummularia +
Prunella vulgaris + 2
Cichorium intybus 1
Potentilla reptans + 1
Cynoglossum officinale +
Cirsium arvense +

Festuco-Agrostietum HORV.1951. Cette phytocoenose se rencontre dans les zones avec les terrains défrichés, aux altitudes de 550-620 m et l'exposition ouestique, sud-ouestique, estique et sud-estique.

Le sol est brun, légérement podzolique et faible en ce qui concerne le contenu de l'humus et des substances minérales, en particulier sur les pantes plus inclinées lavée par les eaux pluviales. Le Ph du sol très variable, de faiblement-acidifié vers neutre-basiphile est illustré par le grand nombre des espèces eurioniques.

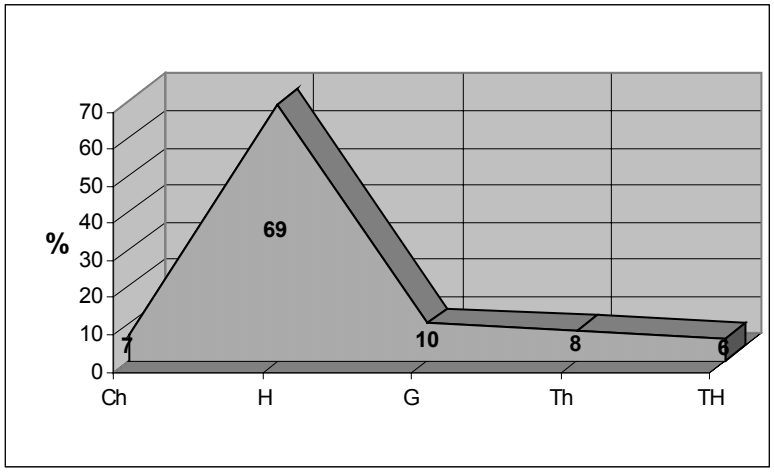
La composition de la phytocoenose est differente en fonction de l'exposition et l'inclinaison des pantes, de la grosseur et la fertilité du sol. L'utilisation de cette phytocoenose, comme pâturage peut changer sa compositin floristique.

Le tapis végétal est pas bien developpé, en ayant un recouvrement de 70-80 % et une hauteur des herbes du strat supérieur de 50-70 cm.

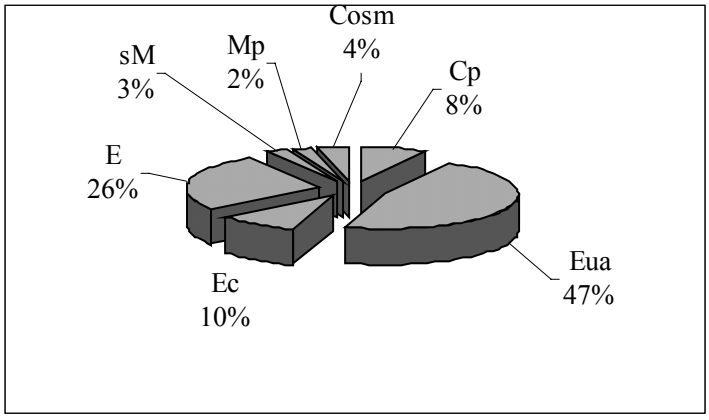
Sur les places plus exposées, avec une grande inclinaison et un sol de petite grosseur, la qualité et la quantité de la masse végétale de cette association sont déficitaires.

L'analyse de l'association végétale, du point de vue de l'exigence des espèces par rapport aux principaux facteurs écologiques releve un caractèr mésophile (48%) vers méso-xérophile (41%), moderé thermophile (38%), avec un Ph faiblement acidifié-neutro-basiphile (26,3%), expliqué par l'hétérogènité de la composition floristique.

Le spectre des bioformes : Ch- 7%; H- 69%; G- 10%; Th- 8%; TH- 6%:



Le spectre des géoélements : Cp- 8%; Eua- 47%; Ec- 10%; E- 26%; sM- 3%, Mp- 2%; Cosm- 4% :



Agrostis capillaris 3-4

Festuca rubra + 1

Festuca pratensis + 1

Anthoxanthum odoratum 1-2

Koeleria macrantha +

Cynosurus cristatus 1

Briza media +

Dactylis glomerata +

Holcus lanatus +

Trifolium pratense 2

Trifolium campestre +

Trifolium repens +

Lotus corniculatus + 1

Genista tinctoria +

Ononis hircina +

Rumex acetosa +

Stellaria graminea +

Dianthus carthusianorum +

Euphorbia cyparissias +

Hypericum perforatum +

Filipendula vulgaris +

Potentilla erecta +

Linum catharticum +

Carum carvi +

Polygala vulgaris +

Vincetoxicum hirundinaria +

Plantago media +

Prunella vulgaris +

Thymus chamaedrys +

Rhinanthus rumelicus +

Melampyrum arvense +

Veronica chamaedrys +

Euphrasia stricta 1

Echium vulgare +

Campanula patula +

Campanula persicifolia +

Knautia arvensis +

Hypochoeris radicata +

Centaurea austriaca +

Achillea millefolium +

Leuchanthemum vulgare 1-2

Taraxacum officinale +

Crepis praemorsa +

Leontodon autumnalis +

Tragopogon orientalis +

Gymnadenia conopsea +

Pteridium aquilinum +

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LES ASSOCIATIONS VÉGÉTALES DE LA VALLÉE DE GOVĂJDIE (LES MONTS DE POIANA RUSCĂ, ROUMANIE) (II)

MARCELA BALAZS

Rezumat

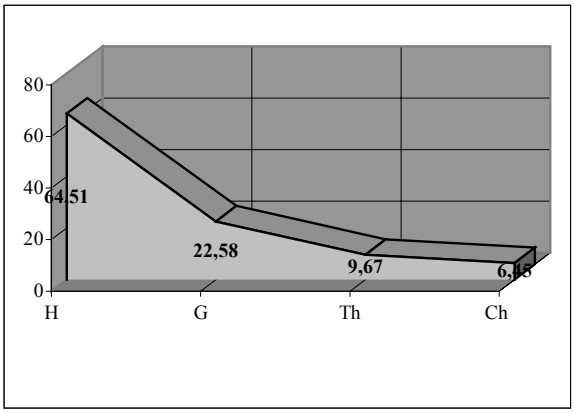
Asociaţiile vegetale din Valea Govăjdiei (Munţii Poiana Ruscă, România) (II)

În acest articol se analizează 7 asociaţii vegetale identificate în anii 2006-2007. Aceste asociaţii sunt analizate şi caracterizate din punct de vedeve ecologic, corologic şi sub aspectul compoziţiei floristice.

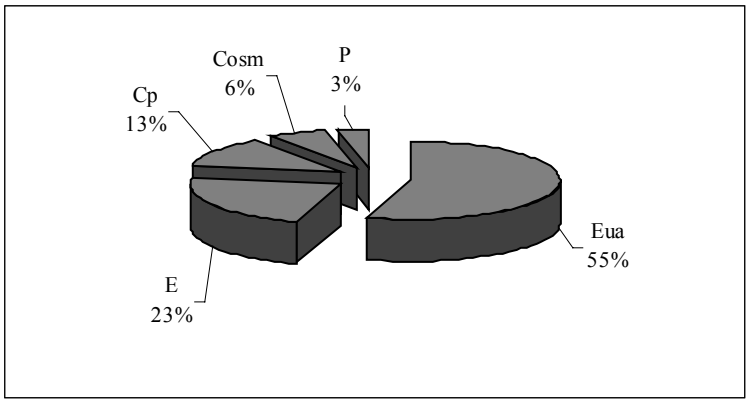
Mots clé: associations végétales, la Vallee de Govăjdie, Les Monts de Poiana Ruscă, Roumanie

L'association ***Lolio-Cynosuretum*** Br.-Bl. 1936 em Tx. 1937 a été rencontrée sur le versant sudique dans un pré mésophytique, avec seulement 31 espèces. Parmi les Fabaceae on mentionne *Trifolium pratense* et *Medicago lupulina*, uniformément répandues sur l'entière surface.

Le spectre biologique réleve la prédominance des hemicryptophytes (64,51%), suivies par les géophytes (22,58%) et halohydrophytes (6,45%):



Le spectre floristique de cette association montre une catégorique prédominance des espèces eurasiatiques (54,83%), suivies par les espèces européenes (22,58%), circumpolaires (12,90%), cosmopolites (6,45%) et pontiques (3,22%) :

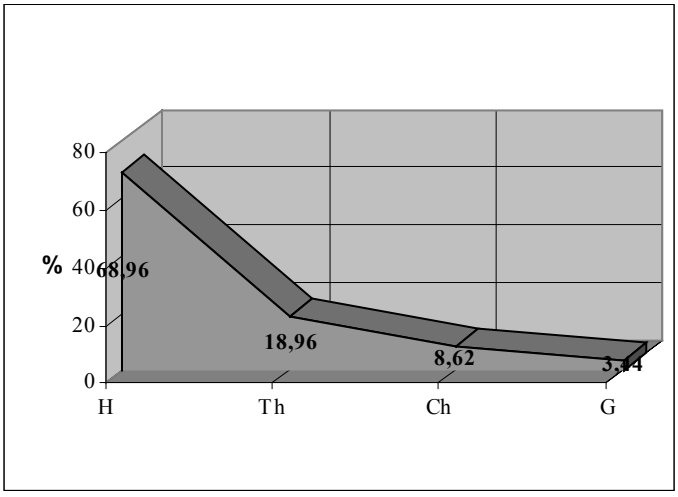


En ce qui concerne l'humidité, l'association est dominée par des éléments mésophytes (32,25%) et xéromésophytes (25,80%), suivis par les mésohygrophyles (22,58%), amphitolerantes (9,67%), hygrophytes (6,45%) et xérophytes (3,22%). En ce qui concerne la température, les espèces micro-mésothermes dominent l'association (43,38%). En ce qui concerne la réaction du sol, les espèces euriioniques réalisent 48,38% du total des espèces, les faiblement acidifié-neutrophile -38,70% et les espèces acidifié-neutrophiles – 12,90%.

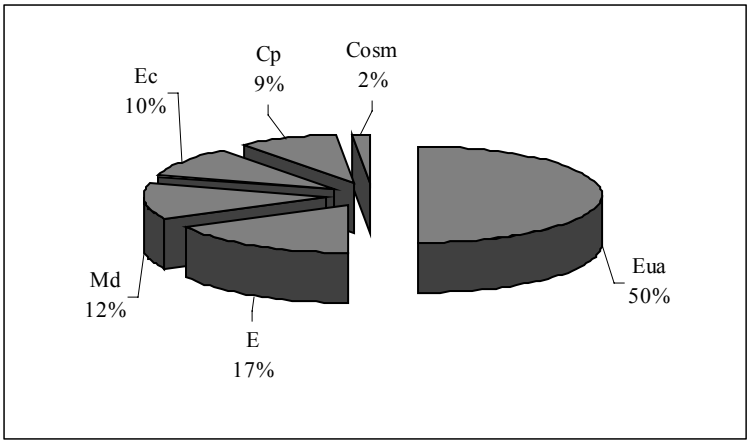
Relevé	*1*	*2*	*3*
Altitude (m):	856	800	800
Exposition:	S	S	S
Recouvrement(%):	50	60	60
Surface (m²)	100	100	100
Cynosurus cristatus	3.5	4.4	3.4
Lolium perenne	1.1	+	1.2
Poa angustifolia	1.2	1.1	2.2
Agrostis stolonifera	1.3	1.2	1.1
Festuca pratensis	2.2	1.1	+
Glyceria fluitans	+	-	+
Carex distans	1.1	+	+
Carex hirta	+	1.1	-
Carex vulpina	+	+	-
Juncus articulatus	+	+	1.2
Juncus inflexus	+	-	+
Trifolium pratense	1.3	1.4	2.1

Trifolium hybridum	+	1.2	-
Lathyrus tuberosus	+	-	+
Medicago lupulina	1.3	1.1	1.2
Ranunculus bulbosus	2.3	+.3	1.1
Stellaria graminea	+	1.1	+
Rumex crispus	+	+	+
Filipendula vulgaris	2.4	1.4	1.3
Potentilla reptans	+	+	+
Carum carvi	+	+	1.2
Eryngium campestre	+	-	+
Prunella vulgaris	1.3	1.1	+
Plantago lanceolata	1.2	1.1	+
Galium verum	+	1.2	+
Rhinanthus angustifolius	+	+	+
Leucanthemum vulgare	+	+	+
Cichorium inthybus	-	+	-
Colchicum autumnale	+	+	-
Orchis coriophora	+	+	+
Orchis laxiflora ssp. elegans	2.1	+	+

Festuco rubrae-Cynosuretum TX. 1940, SOÓ 1957, 1962. Cette association, avec un degré de couverture de 100%, a été analysée sur un terrain avec une exposition nord-ouestique, à une altitude de 620 m. Elle este caracterisée par la prédominance des hémicryptophytes (68,96%) suivies par les thérophytes (18,96%). Les chamephytes (8,62%) et les halohydrophytes (3,44%) ont une présence reduite:



Du point de vue floristique, les éléments eurasiatiques sont les plus nombreuses (50%), suivis par les éléments européens (17,24%), sudiques et continentales (12,06%), central-européens (10,34%), circumpolaires (8,62%) et cosmopolites (1,72%) :



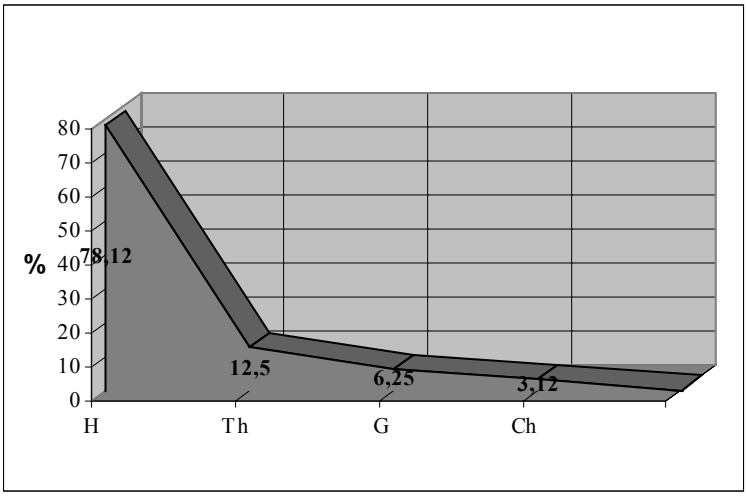
Du point de vue de l'humidité, l'association est dominée par des espèces xéromesophytes (46,55%) et mésophytes (36,20%). Elles sont suivies par les espèces amphitolerantes (8,62%), xérophytes (5,17%) et mésohygrophytes (1,72%). Du point de vue des conditions de la température, les espèces micro-mésothermes sont dominantes (56,89%) suivies par les espèces amphitolerantes (20,68%), moderé thermophiles (13,79%), microthermes (3,44%) et les espèces thermophiles (3,44%). En ce qui concerne la réaction du sol, les espèces faiblement acidifié-neutrophile dominent cette association (39,65%) suivies par les espèces euriioniques (36,20%), acide-neutrophiles (18,96%) et neutro-basiphiles (3,44%).

Relevé	*1*	*2*	*3*
Altitude (m):	620	620	620
Exposition:	NE	NE	NE
Recouvrement (%):	100	100	70
Surface (m²):	4	4	4
Festuca rubra	3.5	4.5	3.4
Festuca pratensis	+	+	1.2
Cynosurus cristatus	+	+	+
Koeleria pyramidata	1.5	1.1	+
Poa pratensis	-	-	+
Anthoxanthum odoratum	1.4	+	1.1
Briza media	+	+	-
Phleum montanum	+	+	-

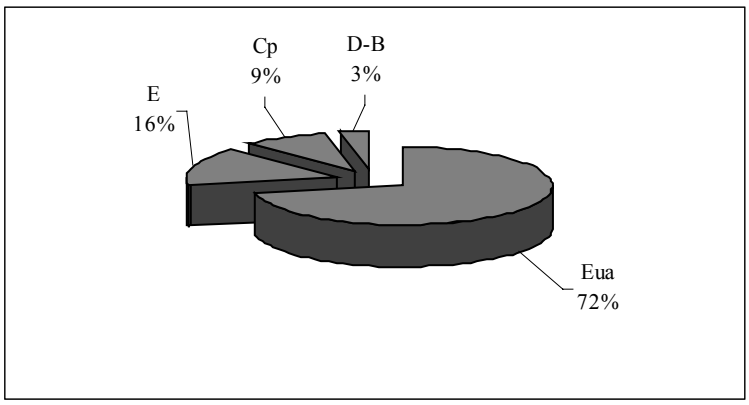
Bromus hordaceus	2.1	-	-
Carex pallescens	+	2.1	+
Luzula campestris	1.3	+	+
Trifolium alpestre	1.1	+	+
Trifolium pratense	1.1	1.3	+
Chamaespartium sagittale	1.3	1.1	1.2
Lotus corniculatus	1.1	+	+
Coronilla varia	+	-	+
Anthyllis vulneraira	+	+	+
Dianthus carthusianorum	+	+	+
Erysimum odoratum	+	+	+
Filipendula vulgaris	+	+	+
Potentilla argentea	+	-	+
Sanguisorba minor	+	+	+
Linum catharticum	1.3	+	+
Polygala vulgaris	+	1.3	+
Euphorbia cyparissias	+	+	+
Hypericum perforatum	+	-	1.1
Helianthemum nummularium	1.3	+	1.2
Peucedanum oreoselinum	+	+	+
Echium vulgare	+	+	+
Ajuga genevensis	+	+	+
Teucrium chamaedrys	1.1	+	1.1
Thymus glabrescens	+	1.1	+
Rhinanthus rumelicus	2.5	1.4	2.3
Veronica chamaedrys	+	+	+
Veronica austriaca ssp. Jacquinii	+	+	+
Plantago lanceolata	1.4	1.2	+
Plantago media	+	+	-
Scabiosa columbaria	+	-	+
Campanula patula	+	+	-
Anthemis tinctoria	+	+	-
Centaurea biebersteinii ssp. Biebersteinii	+	-	+
Leucanthemum vulgare	1.2	1.1	1.2

Agrostis canina	+	-	+
Brachypodium sylvaticum	-	+	+
Festuca rupicola	-	-	+
Dorycnium pentaphyllum ssp. herbaceum	+	-	+
Lathyrus aphaca	+	-	+
Lathyrus hirsutus	-	+	+
Viola luteola	+	+	-
Orlaya grandiflora	+	+	+
Lysimachia nummularia	+	-	+
Convolvulus arvensis	-	+	+
Myosotis arvensis	+	+	+
Salvia verticillata	+	-	+
Salvia pratensis	+	+	+
Cruciata levipes	+	+	-
Senecio jacobea	+	+	+
Sonchus arvensis	+	+	+

L'association ***Anthoxantho-Agrostietum capillaris*** SILLINGER 1933, JURCKO 1969 a été rencontrée sur les lieux moins exposés dans le voisinage des forêts ou les phytocoenoses de *Agrostis capillaris* poussent sous la forme des bandes. 78,12% des espèces de cette association sont hemicryptophytes, 12,5% thérophytes, 6,25% géophytes et 3,12% du total des espèces sont chamaephytes:



Les géoéléments dominants sont les eurasiatiques (71,87%) suivies par les éléments européens (15,62%), circumpolaires (9,37%) et daco-balcaniques (3,12%):

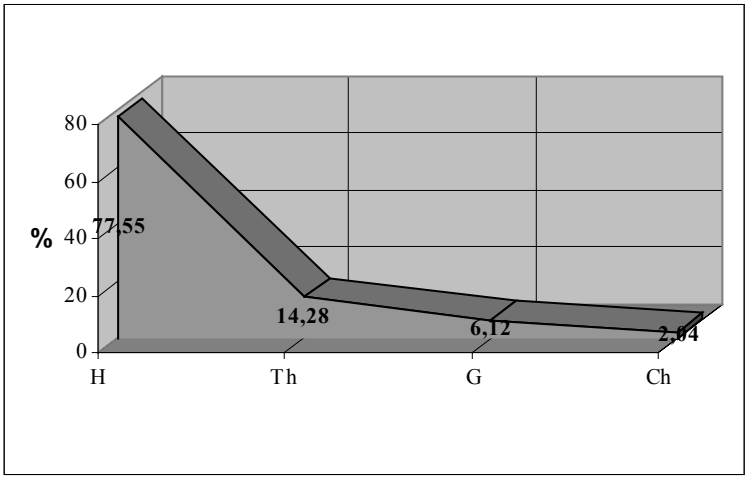


Du point de vue de l'humidité, l'association est dominée par les espèces mésophytes (56,25%) et xéromésophytes (28,12%). Elles sont suivies par les espèces amphitolerantes (12,5%) et les espèces mésohygrophytes. Du point de vue des conditions de la température, les espèces micro-mésothermes dominent l'association (46,87%), suivites par les espèces amphitolerantes (40,62%). Les espèces microthermes forment 6,25%, les espèces moderé-thermophiles – 3,12% et les espèces thermophiles – 3,12% du total des espèces. En ce qui concerne la réaction du sol, l'association est dominée par les espèces euriioniques (62,5%) suivies par les espèces acidifiées-neutrophiles - 18,75%, faiblement-neutrophiles – 12,5%, et celles neutro-basiphiles 6,25%.

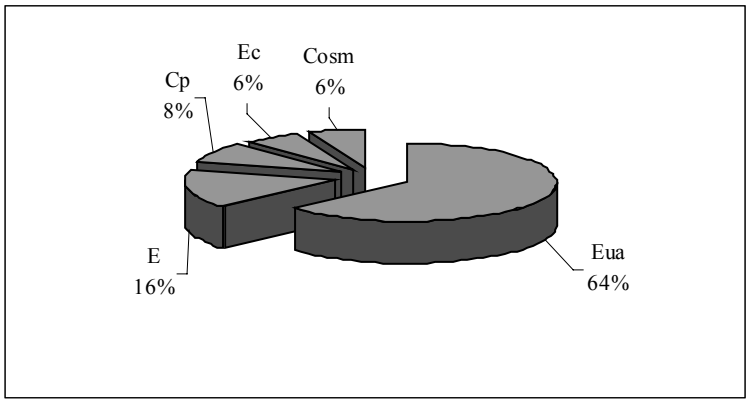
Relevé	*1*	*2*	*3*
Altitude (m):	500	475	475
Exposition:	V	V	V
Recouvrement(%):	70	60	60
Surface (m²):	100	100	100
Agrostis capillaris	3.4	3	3
Anthoxanthum odoratum	1.2	1.2	1
Festuca pratensis	1	1	+
Poa pratensis	+	+	1
Cynosurus cristatus	+	+	+
Dactylis glomerata	+	+	+
Holcus lanatus	+	+	+
Trifolium pratense	1.2	1.2	+
Lotus corniculatus	+	+	1
Medicago lupulina	+	1	+
Medicago falcata	+	1	+
Rumex acetosa	+	+	1
Dianthus carthusianorum	+	+	+

Stellaria graminea	+	+	+
Ranunculus polyanthemos	+	+	+
Hypericum perforatum	+	1	1
Filipendula vulgaris	+	1	+
Potentilla erecta	+	+	+
Carum carvi	+.1	+	+.1
Polygala vulgaris	+	+	+
Linum catharticum	+	+	+
Lysimachia nummularia	+	+	+
Rhinanthus rumelicus	+	+	+
Veronica chamaedrys	+	+	+
Prunella vulgaris	+	+	+
Plantago lanceolata	+	1	+
Plantago media	+	+	1
Myosotis sylvatica	+	+	-
Knautia arvensis	+	+	+
Achillea millefolium	+	+	+
Leucanthemum vulgare	+	+	+
Leontodon hispidus ssp. hastalis	+	+	+

Agrostidetum stoloniferae (UJVAROSI 1941) BURDUJA et al. 1956Cette association a été rencontrée sur les terrains humids. Les hemicryptophytes sont prédominantes dans cette association (77,55%), suivies par thérophytes (14,28%), géophytes (6,12%) et chamaephytes (2,04%):



En examinant le spectre des éléments floristiques on constate la dominance des éléments eurasiatiques (63,26%), auquelles s'ajoutent les espèces européens (16,32%), les circumpolaires (8,26%), central européenes (6,12%) et cosmopolites (6,12%):



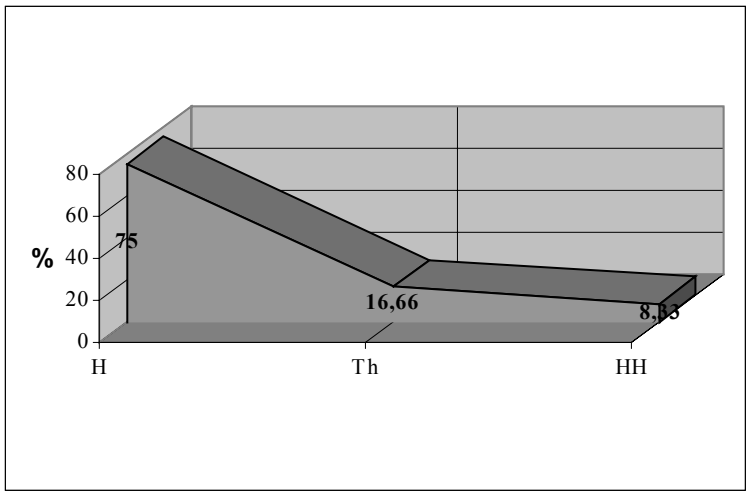
En ce qui concerne l'humidité, l'association est dominée par les espèces mésophytes (53,06%) suivies par les espèces xeromésophytes (20,40%), mésohygrophytes (12,24%), amphitolérantes (12,24%) et xerophytes (2,04%). Du point de vue des conditions de la température, cette association est dominée par les éléments amphitolérants (40,81%) et micro-mésothermes (36,73%), auquelles s'ajoutent les espèces microthermes (10,20%), moderé thermophiles (8,16%) et thermophiles (4,08%). En ce qui concerne la réaction du sol, l'association est dominée par les espèces indiférentes (61,22%) suivies par les espèces acidifié-neutrophiles (18,36%), faiblement acidifié-neutrophiles (14,28%), acidophiles (4,08%) et les espèces neutro-basiphiles (2,04%).

Relevé	*1*	*2*	*3*
Altitude (m):	500	480	500
Exposition:	S	S	SE
Recouvrement(%):	50	60	60
Surface (m²):	25	25	25
Agrostis gigantea	1.4	3.5	3
Anthoxanthum odoratum	+.1	1.4	1
Poa trivialis	+.2	1.3	1
Festuca pratensis	+.2	1.3	1
Festuca rupicola	+.2	1.3	+
Cynosurus cristatus	+.2	1.3	1
Lolium perenne	+.1	1.2	1
Poa pratensis	+.2	1.4	1
Bromus hordaceus	+	1.1	1
Alopecurus pratensis	+.1	1.2	+

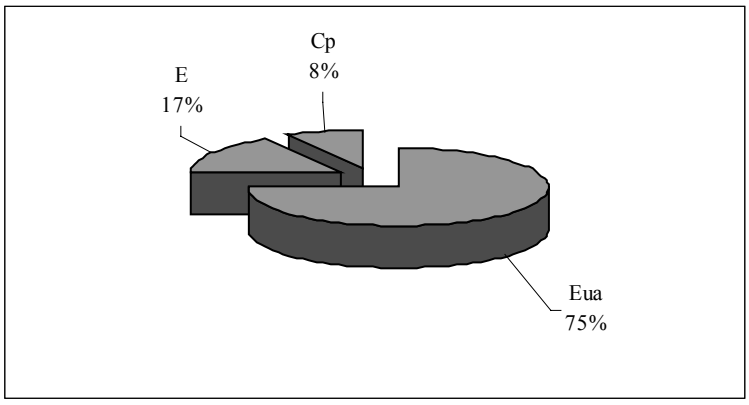
Elymus repens	+	1.1	1
Festuca rubra	+.1	1.2	1
Holcus lanatus	+.2	1.5	1
Deschampsia caespitosa	+.2	1.4	1
Briza media	+	+	1
Trifolium repens	+.3	1.5	1
Trifolium pratense	+	1	1.3
Lotus corniculatus	+.1	1.2	1
Trifolium campestre	+.2	1.3	1.2
Trifolium hybridum	+.1	1.3	1
Ononis arvensis	+	1	+
Juncus inflexus	+	1.1	1
Luzula campestris	1	+	1
Leucanthemum vulgare	+.3	1.4	1
Plantago lanceolata	+	1.3	1
Ranunculus acris	1	+	+
Cichorium intybus	+	1	1
Prunella vulgaris	+	2	1
Campanula patula	+	1	1
Achillea millefolium	1	+	+
Rhinanthus angustifolius	+	1	1
Equisetum arvense	+	1	1
Rumex crispus	+	2	+
Centaurium erythrea	+	1	+.1
Daucus carota	+	1	+
Centaurea phrygia	+	+	+
Stachys officinalis	-	+	+.1
Galium verum	+	-	+.1
Pimpinella saxifraga	-	+.1	+
Stellaria graminea	+	-	1
Rumex acetosa	1	+.1	1
Lychnis flos-cuculi	+	1	+
Knautia arvensis	1	+.1	+
Dianthus carthusianorum	+	1	1
Hipochoeris radicata	1	+	-

Euphrasia rostkoviana	+	1	+
Peucedanum oreoselinum	+.1	+	+
Orchis coriophora	+.1	+	+
Cerastium holosteoides	+	+	+

L'association *Poetum pratensis* RAV. et al. 1956 a été rencontré surtout dans les vergers ou dans la vallée de Govăjdie. Ici, *Poa pratensis* forme des groupes, sur des petites surfaces mai bien caillées. Dans la composition de l'association sont présentes 24 espèces d'entre quelles 75% sont hemicryptophytes, suivies par les thérophytes (16,66%) et hygrophytes (8,33%) :



Au point de vue chorologique les espèces eurasiatiques (75%) et européenes (16,66%) sont prépondérantes. Les espèces circumpolaires (8,33%) sont plus réduites:



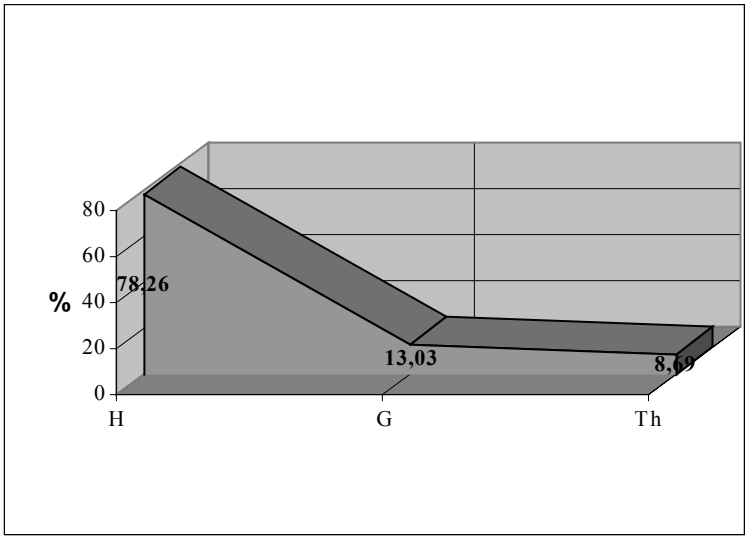
En ce qui concerne l'humidité, les espèces mésophytes sont dominantes (75%) suivies xéromésophytes (16,66%) et amphitolérantes (8,33%). Du point de vue des conditions de la température, l'association este dominée par les espèces micro-mésothermes (50%) et amphitolérantes (33,33%), suivies par les espèces microthermes (16,66%). En ce qui concerne la réaction du sol, les espèces euriioniques réalisent 54,16% du total des espèces tandis que les

espèces acidifiés-neutrophiles et faiblement acidifiés-neutrophiles forment 29,16%, respectivement 16,66% du total des espèces.

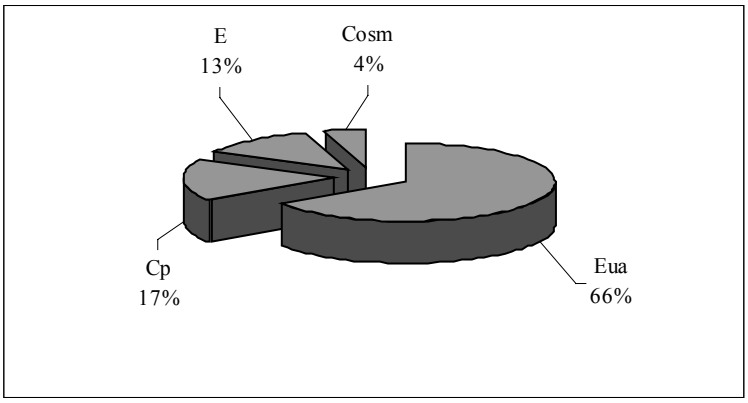
Relevé	*1*	*2*	*3*
Altitude (m):	570	500	500
Exposition:	E	N	N
Recouvrement(%):	50	70	70
Surface (m²)	100	100	100
Poa pratensis	3	4	1
Cynosurus cristatus	+	1	1
Festuca pratensis	1	+.1	1
Dactylis glomerata	+.1	1	+
Briza media	+	1	+
Anthoxanthum odoratum	1	+	+
Trifolium pratense	2	1	2
Trifolium campestre	1	1	+
Medicago lupulina	+.1	1	+
Lotus corniculatus	+	1	+
Rumex acetosa	+	+	1
Stellaria graminea	+	+	1
Ranunculus bulbosus	+	+	+
Hypericum perforatum	+	1	+
Carum carvi	1	+	+
Polygala vulgaris	1	1	+
Linum catharticum	+	+	+
Myosotis sylvatica	+	+	1
Prunella vulgaris	+	1	+
Stachys officinalis	1	+	-
Cruciata glabra	+	-	+
Campanula patula	+	1	+
Achillea millefolium	+	+.1	+
Leucanthemum vulgare	+	+	+

L'association *Poetum trivialis* SOO 1940 a été rencontrée sur les terrains avec une humidité abondante dans le pré de la Vallée de Govăjdie ou elle occuppe une superficie de 2-

3 ha. L'association est caracterisée par la dominance des hémicryptophytes (78,26%) suivies par les géophytes (13,03%) et thérophytes (8,69%):



Le spectre floristique est représenté par les éléments eurasiatiques (65,21%), suivis par les circumpolaires (17,39%), européenes (13,03%) et cosmopolites (4,34%):

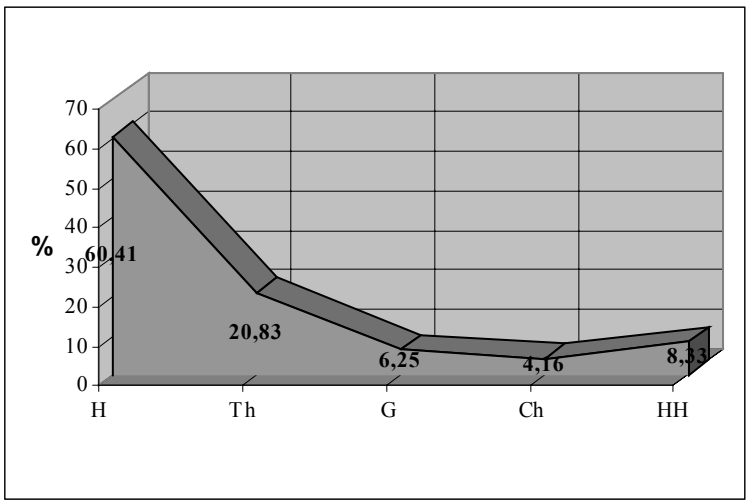


En ce qui concerne l'humidité, l'association est dominée par les espèces mésophytes (52,17%), suivies par mésohygrophytes (21,73%), xéromésophytes (13,04%), hygrophytes (8,69%) et amphitolérantes (4,34%). Du point de vue de la température, les espèces micromésothermes dominent l'association (60,84%). Elles sont suivies par les espèces amphitolérantes (34,78%) et microthermes (4,34%). En ce qui concerne la réaction du sol, les espèces euriioniques dominent l'association, par une proportion de 73,91%, suivies par les espèces acidifiés-neutrophiles (17,39%) et faiblement acidifiés-neutrophiles (8,69%).

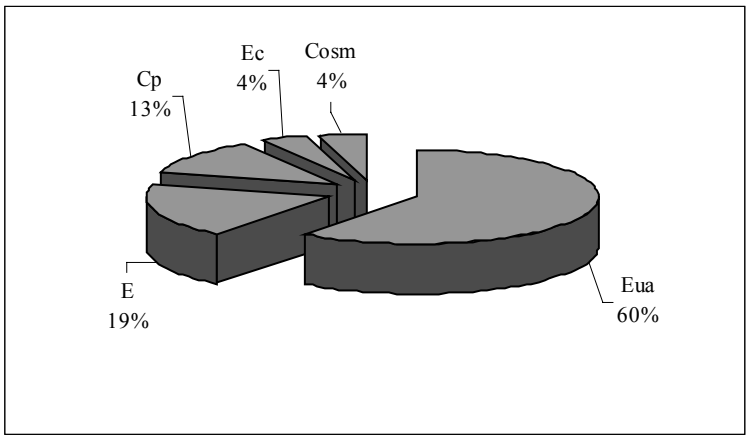
Relevé	*1*	*2*
Altitude (m):	430	430
Exposition:	S	S
Recouvrement(%):	70	80
Surface (m²):	25	25

Poa trivialis	3	4
Poa pratensis	+.1	1
Festuca pratensis	+.1	1
Cynosurus cristatus	+.1	1
Briza media	+	+.1
Holcus lanatus	1	+.1
Juncus effusus	+	1
Trifolium pratense	1.2	2
Trifolium hybridum	+.1	1
Trifolium repens	+	1
Medicago lupulina	+.1	1
Lotus corniculatus	+	+.1
Rumex crispus	+	+
Ranunculus acris	+	+
Ranunculus bulbosus	+	+
Carum carvi	+	1
Symphytum officinale	+	+
Mentha longifolia	+	+
Prunella vulgaris	+	+
Galium palustre	+	+
Achillea millefolium	+	+
Leucanthemum vulgare	+	+.1
Equisetum palustre	+	+

L'association *Festucetum pratensis* SOO 1938 sousassoc. *transsilvanicum* SOO 1938, 1947, 1959 a ete signalée à l'altitude de 519 m, à la lisière du bois, dans un pré mésophytique. Elle est constituée par *Festuca pratensis* et des autres Poaceae. L'humidité prononcée du terrain, surtout près de la source, détermine la présence de Carex sp. et *Equisetum palustre*. Le spectre des bioformes est caractérisé par la dominance des elements hémicryptophytes (60,41%) suivies par thérophytes (20,83%), halohydrophytes (8,33%), géophytes (6,25%) et chamaephytes (4,16%):



En examinant le spectre floristique on constate la dominance des éléments eurasiatiques (60,41%), suivis par les espèces européenes (18,75%), circumpolaires (12,5%), central-européenes (4,16%) et cosmopolites (4,16%):



En ce qui concerne l'humidité, les espèces mésophiles sont dominantes (43,75%) suivies par les xéromésophytes (25%). L'association est completée par la présence des espèces mésohygrophytes (14,58%), amphitolerantes (12,5%) et hygrophytes (4,16%). En ce qui concerne la température, les espèces micromésothermes forment 43,75% du total des espèces, suivies par les amphitolerantes (41,66%), les microthermes (10,41%) et les modéré-thermophiles (4,16%). Du point de vue de la réaction du sol, l'association est dominée par les espèces indifférentes (60,41%) tandis que les espèces faiblement acidifié-neutrophiles et acidifié-neutrophiles réalisent seulement 31,25% et respectivement 8,33%.

Relevé	*1*	*2*	*3*
Altitude (m):	519	519	500
Exposition:	SE	SE	SE
Recouvrement(%):	100	100	60
Surface (m²):	25	25	10

Festuca pratensis	4.5	4.5	3.5
Poa pratensis	1.1	+	+.1
Poa trivialis	+	1.3	1.4
Agrostis stolonifera	+	1.1	+
Anthoxanthum odoratum	1.3	+	1.4
Dactylis glomerata	+	-	+
Bromus hordaceus	+	1.5	-
Carex distans	+	1	+
Carex hirta	-	+	+
Carex muricata ssp. lamprocarpa	+	+	-
Carex vulpina	+	-	+
Juncus articulatus	+	+	-
Coronilla varia	1.3	+	-
Lotus corniculatus	+	+	-
Medicago lupulina	+	+	+
Trifolium pratense	2.4	+	1.4
Trifolium repens	+	+	-
Rumex acetosa	+	+	+
Rumex crispus	+	-	+
Stellaria graminea	+	-	+
Ranunculus acris	+	1.2	+
Ranunculus bulbosus	+	1.1	+
Rorippa austriaca	+	+	-
Lysimachia nummularia	1.3	+	-
Prunella vulgaris	1.3	+	+
Rhinanthus minor	1.5	2.5	-
Veronica chamaedrys	+	-	+
Plantago lanceolata	1.4	1.3	1.4
Plantago media	+	+	+
Galium verum	-	+	+
Geranium columbinum	+	+	-
Campanula patula	+	+	-
Crepis biennis	-	+	1.3
Leucanthemum vulgare	1.3	1.3	1.5

Equisetum arvense	+	1.3	-
Equisetum palustre	+	+	-
Bromus commutatus	+	-	+
Bromus sterilis	-	+	+
Festuca rubra	+	-	-
Lathyrus hirsutus	-	+	+
Ononis arvensis	+	+	+
Vicia cracca	+.1	+	+
Salvia pratensis	+	1	+
Convolvulus arvensis	1	+	+
Valerianella dentata	+	-	+
Achillea millefolium	+.1	+	1
Cichorium intybus	1	+	+
Sonchus arvensis	+	-	+

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BUTTERFLIES (ORD. LEPIDOPTERA, S. ORD. RHOPALOCERA) OF ZLAŞTI VALLEY (POIANA RUSCĂ MOUNTAINS, WESTERN CARPATHIANS, ROMANIA)

SILVIA BURNAZ

Rezumat

Fluturi diurni (Ord. Lepidoptera, S. ord. Rhopalocera) din Valea Zlaşti (Munţii Poiana Ruscă, Carpaţii Occidentali, România)

83 specii de fluturi diurni au fost identificate în habitate naturale ale Văii Zlaşti, una dintre cele mai spectaculoase zone ale Munţilor Poiana Ruscă. Afluent al Cernei, râul Zlaşti străbate atât o zonă calcaroasă cu aspect de defileu cât şi zona montană propriu-zisă reprezentată de munţi mici cu altitudini cuprinse între 700-850 m. Habitatele studiate sunt reprezentate de pajişti, stâncării cu substrat calcaros sau cristalin, liziera pădurilor de foioase, asociaţii arbustive şi arinişuri din lungul văii. Lista sistematică a speciilor este însoţită de date privind frecvenţa, exigenţele ecologice ale speciilor, sursa trofică a larvelor şi adulţilor. Temperaturile ridicate a lunilor iulie-august din anii 2005-2006 (peste 30^0C) au permis existenţa unor efective populaţionale ridicate ale majorităţii speciilor de lepidoptere diurne. Predomină speciile care au ca habitat preferenţial liziera pădurilor, arinişurile şi pajiştile situate de-a lungul râului. Între speciile cu o frecvenţă ridicată (peste 16 indivizi/zi) se numără: *Lycaena dispar rutila*, *Lycaena virgaureae*, *Scoliantides orion*, *Argynnis paphia*, *Argynnis aglaja*, *Issoria lathonia*, *Inachis io*, *Aglais urticae*, *Araschnia levana*, *Minois dryas*, *Hipparchia fagi*, etc. Frecvente, mai ales la liziera şi marginea drumurilor de pădure sunt: *Apatura iris*, *Apatura ilia*, *Vanessa atalanta*, *Vanessa cardui*, *Brinthesia circe pannnonica*. Pe stâncăriile calcaroase frecvente sunt: *Polyommatus daphnis*, *Polyommatus bellargus* şi *Polyommatus coridon*. Doar câteva specii sunt mai rare în zona cercetată: *Maculinea alcon*, *Satyrium w-album*, *Satyrium pruni*, *Neozephyrus quercus*, *Thecla betulae*, *Chazara briseis briseis*. Conform categoriilor de periclitare ale IUCN unele

specii identificate de noi în Valea Zlaşti ca: *Lycaena dispar rutila*, *Lycaena virgaureae*, *Lycaena thersamon*, *Thecla betulae*, *Neozephyrus quercus*, *Satyrium w-album*, *Satyrium pruni*, *Scoliantides orion lariana*, *Maculinea arion*, *Maculinea alcon*, *Brenthis daphne*, *Brenthis hecate*, *Apatura ilia ilia*, *Apatura iris*, *Chazara briseis* sunt considerate vulnerabile sau potențial amenințate.

Key words: Butterflies, Zlaşti Valley, Poiana Ruscă Mountains, checklist

INTRODUCTION

The purpose of this study is the knowledge of the butterflies of Zlaşti Valley, one of the most spectacular zones of the eastern part of Poiana Ruscă Mountains (Western Carpathians, Romania).

In 2003-2005 we have investigated the calcareous hills, that guarded downstream of the river, between the localities Boş and Groş. We published preliminary data in the periodical of the Romanian Lepidopterological Society. 83 species of Macrolepidoptera (S. ord. Rhopalocera) were recorded from these localities (BURNAZ SILVIA 2005).

In 2006 we studied the mountainous zone (700 m - 850 m altitude) situated between Ulm and Cerbăl localities.

Before our study, FOTESCU (1972) has published a small checklist of butterflies of Runcu, Govăjdie and Zlaşti rivers.

RELIEF AND GEOLOGY

The investigated area is situated in the north-eastern part of Poiana Ruscă Mountains (OANCEA & all. 1987), near Hunedoara town. Zlaşti River is one of the principal affluent of Cerna River, that crosses the mountainous and hillocky zone of Poiana Ruscă Mountains (KRAUTNER 1984).

The relief is represented by small mountains (700 m - 850 m altitude) and hills (400 - 500 m altitude) covered by forests of deciduous trees.

In the inferior and central sector of the valley, the calcareous rocks formed a small gorge. The geology of the mountainous zone is characterized by crystalline schists.

CLIMATE

The average of the temperature and precipitations: In the hillocky zone the average of temperature is 8-9^{0}C. In the mountainous zone the average of the temperature is 6-7^{0}C.

The average of precipitations is about 800 mm. In 2005 and 2006, the daily temperature was over 30^{0}C, in June-August.

FLORA AND VEGETATION

As. *Carpino-Fagetum* PAUCĂ 1941, which covered the northern, northeastern and western part of the hills and mountains, form the forests of Zlaşti Valley. The forests alternate with lawns and rocky zones. Shrubs are represented by *Coryletum avellanae* Soo 1927, *Pruno spinosae-Crataegetum monogynae* (SOÓ 1927) HUECK 1931 associations.

Mesophilous and mesoxerophilous associations (As. *Festuco rubrae-Agrostetum tenuis* CSÜROS-KAPTALAN 1964) and *Festuco rubrae-Cynosuretum* (Tx. 40), SOÓ 57-62) form lawns.

Thymo comosi-Festucetum rupicolae (CSÜROS & GERGELY 1959) POP & HODIŞAN 1985 is the principal association in the limestone area of Zlaşti Valley.

In the river meadow *Aegopodio – Alnetum glutinosae* KARPATI & JURKO 1961 and *Salici capreae - Sambucetum racemosae* SOÓ 1960 associations are identified.

MATERIAL AND METHODS

Samples were taken in different habitats (lawns, stones, the edge of the forests) using an entomological net.

5 types of habitats were studied:

1. Lawns situated across the valley, represented by mesophilous and mesoxerophilous associations;
2. Rocky area (crystalline stones) with xerothermophilous associations;
3. The edge of the deciduous forests;
4. Shrubs with *Prunus spinosa*, *Crataegus monogyna*, *Sambucus nigra*, *Sambucus racemosa*, *Sambucus ebulus*;
5. Zlaşti Valley with Alnus and Salix phytocoenoses.

Butterflies identification was made in the laboratory using the following books: SPULER (1909-1911), BERGMANN (1952), FORSTER & WOHLFAHRT (1955), NICULESCU (1961, 1963, 1965), HIGGINS & RILEY (1970, 1993), CHINERY (1996), STILL (1996), FELTWELL (2001), TOLMAN & LEWINGTON (2007). The checklist of the butterflies is according the actual classification of Macrolepidoptera species (SZÉKELY 1999; MIHUȚ 2000; RAKOSY 2002).

RESULTS AND DISCUSSIONS

The various habitats with different phytocoenoses and local climate offer favourable conditions for lepidoptera fauna, especially for butterflies. In 2005-2006 we identified 83 species of butterflies. The checklist of the species is accompanied by data about the flying period, ecological exigencies, the frequency of species, and larval and adult food plants (Tab. 2).

The frequency of the species is established according RÁKOSY & VIEHMANN (1991) classification.

The majority of the species identified in this area belongs to Nymphalidae (40 species) and Lycaenidae families (26 species) (Tab. 1).

Tab. 1 – The structure of Rhopalocera families in Zlaşti area
(Poiana Ruscă Mountains)

Family	Number of species
Hesperiidae	7
Papilionidae	2
Pieridae	8
Lycaenidae	26
Nymphalidae	40

The analysis of the ecological exigencies emphasizes that the majority of the species are mesophilous (55%), followed by mesothermophilous (12%), mesohygrophilous (10%) and mesoxerothermophilous species (7%) (Fig. 1). These species are characteristic for natural habitats represented by the deciduous forests and lawns. Xerothermophilous species (11%) are: *Polyommatus coridon*, *Polyommatus daphnis* (in the limestone area), *Scoliantides orion*, *Minois dryas*, *Chazara briseis*, *Neozephyrus quercus*, *Pyronia tithonus* and *Polyommatus bellargus*.

The analysis of the frequency of the species shows us that the majority of the species are relative frequent species (5-10 individuals/day). *Lycaena alciphron*, *Papilio machaon*, *Colias croceus*, *Gonepteryx rhamni*, *Callophrys rubi*, *Cupido minimus*, *Everes argiades*, *Celastrina argiolus*, *Plebejus argyrognomon*, *Polyommatus daphnis*, *Polyommatus bellargus*, *Brenthis hecate*, *Brenthis daphne*, *Pyronia tithonus* are species with a relative frequency. Very frequent species (over 16 individuals/day) are *Lycaena dispar rutila*, *Lycaena virgaureae*, *Scoliantides orion*, *Polyommatus icarus*, *Maniola jurtina*, *Aphantopus hyperanthus*, *Melitaea athalia*, *Melitaea cinxia*, *Melitaea didyma*, *Ochlodes venatus faunus*, *Hesperia comma*, *Pieris napi*, *Pieris rapae*, *Pyrgus malvae*, *Argynnis paphia*, *Argynnis aglaja*, *Argynnis adippe*, etc. Frequent species (6-15 individuals/day) are: *Pyrgus carthami*, *Thymelicus sylvestris*, *Carterocephalus palaemon*, *Iphiclides podalirius*, *Colias hyale*, *Plebejus argus*, *Aricia agestis*, *Apatura iris*, etc. Rare species (1-5 individuals/day) and very rare species (1-4 individuals/generation) are: *Maculinea alcon*, *Chazara briseis*, *Neozephyrus quercus*, *Satyrium w-album*, *Satyrium pruni*, *Thecla betulae*.

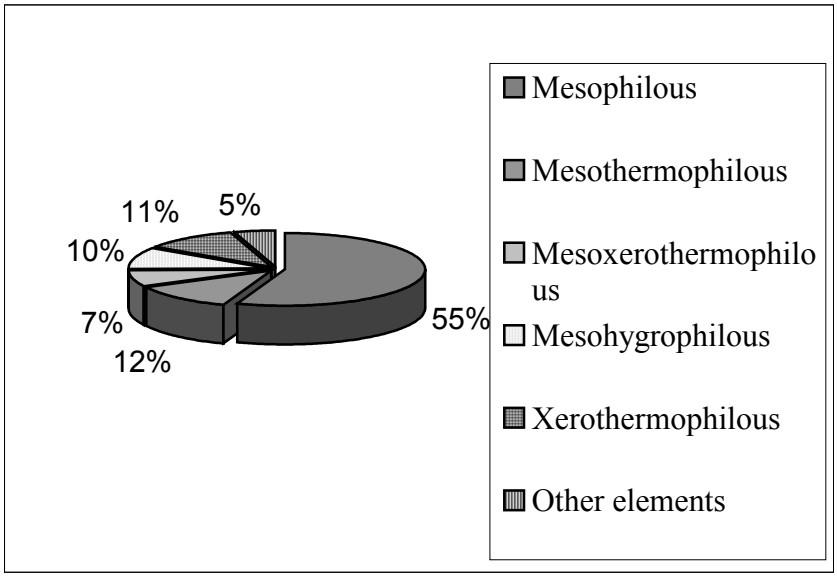

Fig. 1 – Ecological exigencies of species identified in Zlaşti Valley (Poiana Ruscă Mountains)

All butterflies identified in the area of Zlaşti Valley feed on plants in their larval stage. Most of them are oligophagous (58 species) and monophagous (14 species) but some species are polyphagous (11 species) (Fig. 2).

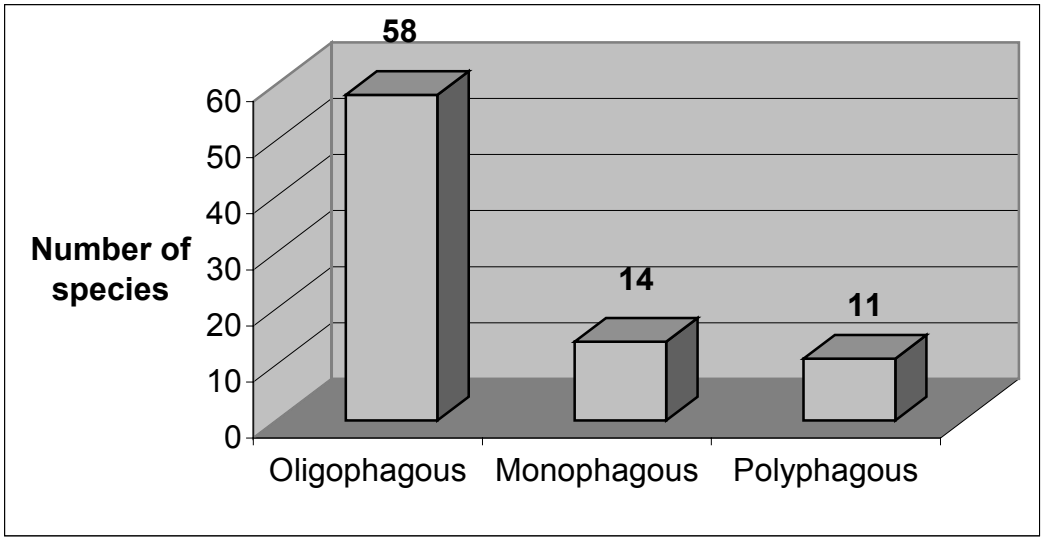

Fig. 2- The type of phagisme of butterflies larvae

Monophagous species like *Neozephyrus quercus*, *Thecla betulae*, *Scoliantides orion lariana*, *Polyommatus coridon*, *Satyrium pruni* are limited to particular habitats and form local colonies where their host plants occur.

Oligophagous species are especially Nymphalids but also Pierids and Lycaenids: *Apatura iris*, *Apatura ilia*, *Boloria euphrosyne*, *Boloria dia*, *Argynnis paphia*, *Argynnis adippe*, *Melitaea cinxia*, *Melitaea athalia*, *Erebia aethiops*, *Melanargia galathea*, *Aphantopus hyperanthus*, *Maniola jurtina*, *Minois dryas*, *Hipparchia semele*, *Coenonympha pamphilus*, *Coenonympha arcania*, *Coenonympha glycerion*, *Pieris brassicae*, *Pieris rapae*, *Pieris napi*, *Lycaena dispar rutila*, etc. So that, Poaceae are prefered by Satyrinae species and some Hesperiidae, e.g. *Hesperia comma*, *Ochlodes venatus faunus*, *Carterocephalus palaemon*, etc. Brassicaceae and Fabaceae are host plants for different Pierids and Lycaenids. Rhamnaceae are host plants for *Gonepteryx rhamni*. Violaceae, and especially Viola species are host plants for *Argynnis paphia*, *Argynnis aglaja*, *Argynnis adippe* and *Issoria lathonia*. Urtica species are host plants for *Vanessa atalanta*, *Vanessa cardui*, *Inachis io* and *Aglais urticae*. Plantago species are host plants for *Melitaea athalia* and *Malitaea cinxia*.

The local occurrence of most butterflies depends on the occurrence of their host plants, in particular plant communities. The presence of any butterfly species depends not only on climatic data and the presence of suitable caterpillar food but also on appropriate adult nectar source or other food, the presence of certain symbiotic species, notably ants (OPLER & KRIZEK 1984).

Adult butterflies feed especially on nectar of flowers but some species, like *Nymphalis antiopa*, *Vanessa atalanta*, *Apatura iris*, *Apatura ilia* feed on other substances like: carrion, dump, tree sap, rotting fruits. *Thecla betulae* prefers aphid “honeydew” secretions.

The most visited flowers are: *Leucanthemum vulgare*, *Thymus comosus*, *Thymus serpyllum*, *Sambucus nigra*, *Sambucus racemosa*, *Sambucus ebulus*, *Scabiosa ochroleuca*, *Origanum vulgare*, *Telekia speciosa*, *Carduus candicans*, *Cirsium arvense*, *Cirsium canum*, *Rosa canina*, *Centaurium umbellatum*, *Rubus caesius*, *Rubus idaeus*, *Rubus fruticosus*, *Aster amellus*, *Menthia longifolia*, *Epilobium angustifolium*, *Eupatorium cannabinum*, *Salvia nemorosa*, *Melilothus officinalis*, *Galium verum*, *Vicia faba*, *Tanacetum vulgare*, *Viola tricolor*, *Potentilla reptans*, *Trifolium campestre*, *Verbascum thapsus*, *Linum catharticum*, *Dianthus carthusianorum*, *Medicago lupulina*, *Genista sagitalis*.

An interesting behaviour is of Lycaenidae species. Larvae or chrysalides of many species are tended by ants in a presumed mutualistic association (OPLER & KRIZEK 1984).

Tab. 2- Checklist of butterflies (Ord. Lepidoptera, S. ord. Rhopalocera)
of Zlaşti Valley (Poiana Ruscă Mountains)

Taxa	P	E.E	LHP	Pf-Ns	F
HESPERIIDAE					
Erynnis tages tages (LINNAEUS, 1758)	VI-VIII	M	Fabaceae	Medicago lupulina, Melilothus officinalis, Trifolium campestre, Hypericum perforatum, Leucanthemum vulgare, Dianthus carthusianorum	VF
Pyrgus carthami (HÜBNER, 1813)	V-VIII	M	Potentilla sp., Alchemilla sp., Malva sp.	Potentilla reptans, Viola tricolor, Hypericum perforatum, Genista sagittaria, Lotus corniculatus	F
Pyrgus malvae malvae (LINNAEUS, 1758)	VII-VIII	M	Fragaria vesca, Potentilla recta, Agrimonia eupatoria, Rubus fruticosus	Hypericum perforatum, Linum catharticum, Potentilla reptans, Salvia nemorosa, Galium verum, Senecio vulgaris, Potentilla recta, Rubus caesius, R. fruticosus	VF
Carterocephalus palaemon (PALLAS, 1771)	VI-VII	M	Poaceae	Potentilla reptans, Galium verum	F
Thymelicus sylvestris (PODA, 1761)	VII-VIII	M	Poaceae	Geranium robertianum, Inula hirta, Senecio vulgaris, Leucanthemum vulgare, Salvia nemorosa, Galium verum, Vicia faba, Tanacetum vulgare, Hypericum perforatum, Aster amellus, Prunella vulgaris	F

Taxa	P	E.E	LHP	Pf-Ns	F
Hesperia comma (LINNAEUS, 1758)	VII-VIII	M	Poaceae: Festuca	Aster amellus, Leucanthemum vulgare, Viola tricolor, Mentha longifolia, Tanacetum vulgare, Lotus corniculatus, Vicia faba, Sedum hispanicum	VF
Ochlodes venatus faunus (TURATI, 1905)	VII-VIII	Mt	Poaceae	Hypericum perforatum, Aster amellus, Leucanthemum vulgare, Trifolium pratense, Trifolium repens, Genista sagitalis, Thymus sp	VF
PAPILIONIDAE					
Iphiclides podalirius (LINNAEUS, 1758)	VI-VIII	Mxt	Prunus sp.	Epilobium angustifolium, Eupatorium cannabinum, Mentha longifolia	F
Papilio machaon (LINNAEUS, 1758)	IV-VIII	M	Umbelliferae	Cirsium canum, Telekia speciosa, Verbascum thapsus, Dipsacus fullonum	RF
PIERIDAE					
Leptidea sinapis sinapis (LINNAEUS, 1758)	IV-IX	M	Fabaceae	Lotus corniculatus, Salvia pratensis, Trifolium pratense, Aster amellus, Scabiosa columbaria, Eupatorium cannabinum, Mentha longifolia, Leucanthemum vulgare, Sambucus racemosa, Sambucus nigra, Dianthus carthusianorum, Chamaespartium sagittale	VF
Pieris rapae (LINNAEUS, 1758)	IV-IX	M, Eu	Brassicaceae	Hypericum perforatum, Leucanthemum vulgare, Linum hirsutum, Inula hirta, Dianthus carthusianorum, Digitalis grandiflora, Trifolium pratense, Trifolium repens, Lotus corniculatus, Chamaespartium sagittale, Epilobium hirsutum, Thymus comosus, T. serpyllum, Cytisus nigricans	VF
Pieris napi napi (LINNAEUS, 1758)	IV-IX	M	Brasicaceae	Trifolium campestre, Lotus corniculatus, Dianthus carthusianorum, Epilobium hirsutum, Mentha arvensis, Mentha longifolia, Telekia speciosa	VF
Pontia edusa (Fabricius, 1777)	IV-IX	M	Brassicaceae	Trifolium campestre, Lotus corniculatus, Chamaespartium sagittale, Aster amellus	VF

Taxa	P	E.E	LHP	Pf-Ns	F
Colias croceus (FOURCROY, 1758)	IV-IX	Mxt	Fabaceae	Lotus corniculatus, Chamaespartium sagittale, Trifolium pratense, Trifolium repens, Coronilla varia, Hieracium pilosella, Leucanthemum vulgare, Tanacetum vulgare, Dianthus carthusianorum, Telekia speciosa, Digitalis grandiflora, Prunella vulgaris, Silene vulgaris, Genista tinctoria, Centaurea phrygia, Lotus corniculatus, Galium verum	RF
Colias hyale (LINNAEUS, 1758)	IV-IX	M	Fabaceae	Scabiosa columbaria, Telekia speciosa, Leucanthemum vulgare, Senecio arvensis, Dianthus carthusianorum, Trifolium pratense, Sanguisorba officinalis,	F
Gonepteryx rhamni (LINNAEUS, 1758)	IV-IX	M	Rhamnaceae	Carduus nutans, Origanum vulgare, Solidago virgaurea, Scabiosa columbaria, Centaurea cyanus, Sambucus nigra, Sambucus racemosa racemosa, Rosa canina, Rubus idaeus, Rubus caesius, Crataegus monogyna	RF
LYCAENIDAE					
Hamearis lucina (LINNAEUS, 1758)	V-VIII	M	Primula vulgaris, P. veris	Taraxacum officinale, Fragaria vesca, Salvia pratensis	VF
Lycaena phlaeas phlaeas (LINNAEUS, 1761)	VI-VIII	M	Polygonaceae: Rumex acetosella, R. acetosa	Salvia pratensis, Trifolium arvense, Trifolium repens, Leucanthemum vulgare	RF
Lycaena dispar rutila (WERNEBURG, 1864)	VI-VIII	Hg	Polygonaceae: Rumex sp.	Epilobium montanum, Epilobium angustifolium, Menta longifolia	VF
Lycaena virgaureae virgaureae (LINNAEUS, 1758)	VI-VIII	M	Rumex acetosa	Eupatorium cannabinum, Mentha longifolia, Mentha arvensis, Filipendula ulmaria, Thymus serpyllum, Galium verum, Epilobium angustifolium	VF
Lycaena alciphron (Rottemburg, 1775)	VI-VII	Mh	Rumex acetosa	Epilobium montanum, Epilobium angustifolium, Menta longifolia	RF

Taxa	P	E.E	LHP	Pf-Ns	F
Thecla betulae (LINNAEUS, 1758)	VI-VIII	Mt	Prunus spinosa; Chrysalides attended by Lasius niger	Sambucus nigra (fruits) ; Sweet and sticky honey-dew from aphids (STILL, 1996)	VR
Neozephyrus quercus quercus (LINNAEUS, 1758)	VI-VIII	Xt	Quercus robur	Rarely on Sambucus racemosa and Sambucus nigra	VR
Callophrys rubi (LINNAEUS, 1758)	VI-VIII	Mt	Genista tinctoria, Cytisus scoparius, Anthyllis vulneraria	Lotus corniculatus, Medicago sativa, Geranium robertianum, Trifolium arvense	RF
Satyrium w-album (KNOCH, 1782)	VI-VIII	M	Rhamnus catharticum	Rarely on Geranium robertianum, Sambucus nigra, Sambucus racemosa fruits, Rubus caesius, R. idaeus, R. fruticosus fruits.	R
Satyrium pruni (LINNAEUS, 1758)	V-VII	Mt	Prunus spinosa	Rarely on Rubus fruticosus, R. caesius	R
Cupido minimus minimus (FUESSLY, 1775)	VI-VIII	Mt	Anthyllis vulneraria; Larvae attended by Lasius niger, Formica fusca, Myrmica rubra	Geranium robertianum, Viola tricolor, Hypericum perforatum, Tanacetum vulgare, Trifolium pratense, Lotus corniculatus	RF
Everes argiades (PALLAS, 1771)	VI-VIII	M	Fabaceae	Tanacetum vulgare, Potentilla reptans, Trifolium campestre	RF
Celastrina argiolus (LINNAEUS, 1758)	V-VI; VII-VIII	M	Rubus fruticosus, R. idaeus, Filipendula ulmaria, Astragalus glycyphyllos, Medicago sativa	Tanacetum vulgare, Potentilla reptans, Trifolium campestre, Sambucus racemosa, Aster tripolium, Valeriana officinalis, Galium verum, Achillea millefolium, Prunella vulgaris, Potentilla reptans, Myosotis sp., Stellaria graminea, Potentilla erecta	RF
Scoliantides orion lariana FRUHSTORFER, 1910	VI-VII	Xt	Sedum album; Sedum hispanicum, Sedum telephium; Larvae attended by Camponotus vagus, C. aethiops	Hieracium pilosella, Sedum hispanicum, Lotus corniculatus, Prunella vulgaris, Teucrium chamaedrys, Polygala comosa, Potentilla recta	VF

Taxa	P	E.E	LHP	Pf-Ns	F
Glaucopsyche alexis (PODA, 1761)	V-VII	M	Fabaceae; Larvae attended by Lasius alienus, Formica pratensis, Camponotus aethiops, etc.	Lotus corniculatus, Medicago sativa, Potentilla reptans, Hypericum perforatum	RF
Maculinea arion (LINNAEUS, 1758)	VII-VIII	Mht	Thymus serpyllum; Larvae and chrysalids attended by Myrmica sabuleti	Filipendula ulmaria, Agrimonia eupatoria, Leucanthemum vulgare, Linum flavum, Thymus serpyllum, Potentilla reptans, Lotus corniculatus	R
Maculinea alcon (DENIS & SCHIFFERMÜLLER, 1775)	VII-VIII	Mh	Gentiana pneumonanthe, G. cruciata; Larvae attended by Myrmica rubra	Teucrium chamaedrys, Thymus comosus, Aster amellus, Centaurea scabiosa, Cardamine pratensis, Arabis hirsuta	VR
Plebeius argus argus (LINNAEUS, 1758)	VI-VIII	Mh	Fabaceae; Cistaceae; larvae attended by Lasius niger	Chamaespartium sagittale, Lotus corniculatus, Potentilla recta, Viola tricolor, Medicago lupulina, Mentha sp.	F
Plebeius argyrognomon (BERGSTRASSER, 1779)	V-VI; VI-VII	M	Astragalus glycyphyllos; Larvae attended by Lasius, Myrmica	Lotus corniculatus, Medicago sativa, Trifolium pratense, Mentha arvensis	RF
Aricia agestis agestis (DENIS & SCHIFFERMÜLLER, 1775)	VI-VIII	Mxt	Helianthemum nummularium, Erodium cicutarium, Geranium robertianum	Lotus corniculatus, Medicago sativa, Trifolium pratense, Mentha arvensis, M. longifolia, Genista sagittalis, Potentilla reptans	F
Polyommatus semiargus semiargus (ROTTEMBURG, 1775)	VI-VIII	M	Trifolium pratense; Larvae attended by Lasius niger	Medicago sativa, Hypericum perforatum, Lotus corniculatus, Potentilla reptans, Leucanthemum vulgare, Solidago virgaurea, Senecio vulgaris, Aster amellus	RF
Polyommatus icarus (ROTTEMBURG, 1775)	V-IX	M	Fabaceae; Larvae attended by Lasius alienus, L niger	Genista tinctoria, Aster amellus, Viola tricolor, Potentilla recta, Leucanthemum vulgare	VF

Taxa	P	E.E	LHP	Pf-Ns	F
Polyommatus daphnis (DENIS & SCHIFFERMÜLLER, 1775)	VI-VIII	Xt	Thymus sp., Astragalus sp.; Larvae attended by Lasius alienus, Formica pratensis	Hypericum hirsutum, Leucanthemum vulgare, Aster amellus, Genista tinctoria, Inula hirta	RF
Polyommatus bellargus (ROTTEMBURG, 1775)	V-VI; VII-VIII	Xt	Hippocrepis comosa; Larvae attended by Lasius niger, L. alienus, Myrmica sabuleti	Dianthus carthusianorum, Hypericum perforatum; Leucanthemum vulgare, Solidago virgaurea, Senecio vulgaris, Aster amellus	RF
Polyommatus coridon coridon (PODA, 1761)	VII-VIII	Xt	Hippocrepis comosa; Larvae attended by ants	Dianthus carthusianorum, Hypericum perforatum, Sedum hispanicum, Sedum album	F
NYMPHALIDAE					
Argynnis paphia paphia (LINNAEUS, 1758)	VII-VIII	M	Viola sp.	Carduus nutans, Cirsium arvense, Tanacetum vulgare, Leucanthemum vulgare, Centaurea cyanus, Cychorium intybus	VF
Argynnis aglaja (LINNAEUS, 1758)	VI-VII	M	Viola sp.	Leucanthemum vulgare, Aster amellus, Solidago virgaurea, Origanum vulgare, Scabiosa ochroleuca, Thymus comosus, Centaurea phrygia	VF
Argynnis adippe (DENIS & SCHIFFERMÜLLER, 1775)	VI-VIII	Mt	Viola sp.	Leucanthemum vulgare, Artemisia austriaca, Telekia speciosa, Aster amellus, Senecio nemorensis, Solidago virgaurea, Epilobium sp.	VF
Argynnis niobe niobe (LINNAEUS, 1758)	VI-VIII	M	Viola, Plantago	Leucanthemum vulgare, Artemisia austriaca, Telekia speciosa, Aster amellus, Senecio nemorensis, Solidago virgaurea, Mentha longifolia, Epilobium montanum	VF
Issoria lathonia (LINNAEUS, 1758)	V-VIII	M	Viola sp.	Leucanthemum vulgare, Telekia speciosa, Aster amellus, Senecio nemorensis, Senecio vulgare, Solidago virgaurea, Tanacetum vulgare, Dianthus carthusianorum	VF

Taxa	P	E.E	LHP	Pf-Ns	F
Brenthis daphne (DENIS & SCHIFFERMÜLLER, 1775)	VI-VIII	Xt	Rubus fruticosus, R. idaeus	Aster amellus Leucanthemum vulgare, Dianthus carthusianorum, Tanacetum vulgare, Linum tenuifolium,	RF
Brenthis hecate (DENIS & SCHIFFERMÜLLER, 1775)	VI-VII	M	Filipendula ulmaria	Leucanthemum vulgare, Telekia speciosa, Aster amellus, Senecio nemorensis, Senecio vulgare, Solidago virgaurea	RF
Boloria euphrosyne (LINNAEUS, 1758)	V-VIII	M	Viola sp.	Digitalis grandiflora, Lotus corniculatus, Medicago sativa, Dianthus carthusianorum, Mentha longifolia, Mentha aquatica, Hypericum perforatum, Leucanthemum vulgare, Galium odoratum, Galium verum, Achillea millefolium, Senecio vulgare, Aster amellus, Centaurea phrygia	VF
Boloria selene (DENIS & SCHIFFERMÜLLER, 1775)	V-VIII	M	Viola sp.	Leucanthemum vulgare, Senecio vernalis, Lamium purpureum, Hesperis tristis, Galium odoratum, Achillea millefolium, Solidago virgaurea, Vicia cracca, Silene vulgaris, Stellaria holostea, Cirsium arvense	VF
Boloria dia dia (LINNAEUS, 1767)	V-VIII	M	Viola, Rubus	Potentilla recta, Medicago lupulina, Trifolium pratense, Trifolium repens, Leucanthemum vulgare, Linaria vulgaris, Origanum vulgare, Senecio nemorensis	VF
Vanessa atalanta (LINNAEUS, 1758)	VI-IX	U, Mg	Urtica sp.	Carduus nutans, Cirsium arvense, Rotten fruits	F
Vanessa cardui (LINNAEUS, 1758)	VII-VIII	U, Mg	Carduus, Cirsium	Carduus nutans, Carduus candicans, Centaurea cyanus, Cirsium arvense, Telekia speciosa	VF
Inachis io (LINNAEUS, 1758)	VI-IX	M, Eu	Urtica sp.	Fermeting fruits, Telekia speciosa, Leucanthemum vulgare, Rubus caesius	VF
Aglais urticae (LINNAEUS, 1758)	VI-VIII	Eu, Mg	Urtica sp.	Carduus nutans, Cyrsium arvense, Hypericum perforatum, Urtica dioica, Sedum album, Salvia nemorosa, Centaurea phrygia	VF

Taxa	P	E.E	LHP	Pf-Ns	F
Polygonia c-album (LINNAEUS, 1758)	V-VIII	M	Ribes, Urtica, Salix, Corylus	Urtica dioica, Mentha longifolia, Leucanthemum vulgare, Telekia speciosa, Hieracium pilosella, Dipsacus fullonum, Succisa pratensis, Rubus caesius, Rubus idaeus	VF
Apatura ilia (DENIS & SCHIFFERMÜLLER, 1775)	VII-VIII	Mh	Salicaceae	Damp ground, tree-sap, carrion	F
Apatura iris (LINNAEUS, 1758)	VII	Mh	Salicaceae	Carrion, dung and tree-sap	F
Araschnia levana (LINNAEUS, 1758)	VI-VIII	Mh	Urtica	Telekia speciosa, Aster amellus, Urtica dioica, Hypericum peerforatum	VF
Nymphalis antiopa (LINNAEUS, 1758)	V-VIII	Mh	Salicaceae	Rarely on Sambucus nigra	R
Melitaea cinxia cinxia (LINNAEUS, 1758)	V-VIII	Mt	Plantago	Lotus corniculatus, Medicago sativa, Hypericum perforatum, Leucanthemum vulgare, Tanacetum vulgare	VF
Melitaea phoebe (DENIS & SCHIFFERMÜLLER, 1758)	VI-VIII	Mt	Scabiosa columbaria, Cirsium arvense	Lotus corniculatus, Medicago sativa, Hypericum perforatum, Leucanthemum vulgare, Genista tinctoria, Aster amellus, Galium verum, Salvia pratensis	VF
Melitaea didyma didyma (ESPER, 1778)	V-VIII	Mxt	Primula, Plantago	Lotus corniculatus, Medicago sativa, Hypericum perforatum, Leucanthemum vulgare, Salvia pratensis, Aster amellus, Centaurium umbellatum, Prunella vulgaris, Thymus commosus	VF
Melitaea athalia (ROTTEMBURG, 1775)	V-VIII	M	Plantago	Lotus corniculatus, Medicago sativa, Leucanthemum vulgare, Veronica jacquinii, Salvia pratensis	VF
Neptis hylas (LINNAEUS, 1758)	V-VIII	Mh	Lathyrus vernus, L. niger	Rarely on Cirsium arvense	VF
Pararge aegeria tircis BUTLER, 1867	V-IX	M	Poaceae	Telekia speciosa, Tanacetum vulgare, Inula conyza, Leucanthemum vulgare	VF
Lasiommata megera megera (LINNAEUS, 1767)	V-VIII	M	Poaceae	Rarely on Urtica dioica, Leucanthemum vulgare, Tanacetum vulgare, Lotus corniculatus, Sambucus racemosa	VF

Taxa	P	E.E	LHP	Pf-Ns	F
Lasiommata maera maera (LINNAEUS, 1758)	V-VIII	M	Poaceae	Urtica dioica, Leucanthemum vulgare, Tanacetum vulgare, Lotus corniculatus, Taraxacum officinale, Ranunculus repens	VF
Coenonympha arcania arcania (LINNAEUS, 1761)	V-VIII	M	Poaceae	Achillea millefolium, Trifolium pratense, Trifolium repens, Centaurea cyanus, Medicago lupulina, Lotus corniculatus, Veronica spicata, Digitalis grandiflora, Vicia faba	VF
Coenonympha glycerion glycerion (BORKHAUSEN, 1788)	VI-VIII	M	Poaceae	Trifolium repens, Centaurea cyanus, Medicago lupulina, Lotus corniculatus, Veronica spicata, Digitalis grandiflora	RF
Coenonympha pamphilus (LINNAEUS, 1758)	V-IX	M	Poaceae	Leucanthemum vulgare, Dianthus carthusianorum, Hypericum perforatum	VF
Pyronia tithonus (LINNAEUS, 1767)	VII-VIII	Xt	Poaceae	Dianthus carthusianorum Aster amellus, Filipendula hexapetala	RF
Aphantopus hyperantus (LINNAEUS, 1758)	V-IX	M	Poaceae	Leucanthemum vulgare, Dianthus carthusianorum, Aster amellus, Cirsium arvense, Carduus candicans, Lotus corniculatus, Rubus sp. Origanum vulgare, Hypericum perforatum Galium verum	VF
Maniola jurtina (LINNAEUS, 1758)	V-IX	M	Poaceae	Telekia speciosa, Carduus acanthoides, Centaurea cyanus, Lotus corniculatus, Cirsium arvense, Origanum vulgare, Filipendula hexapetala, Galium verum	VF
Erebia aethiops aethiops (ESPER, 1777)	VII-VIII	M	Poaceae	Geranium sanguineum, Senecio nemorensis, Aster amellus, Digitalis grandiflora, Chamaespartium sagittale	F
Melanargia galathea (LINNAEUS, 1758)	V-I	M	Poaceae	Leucanthemum vulgare, Aster amellus, Digitalis grandiflora, Galium verum, Dianthus carthusianorum, Salvia pratensis, Lotus corniculatus Origanum vulgare, Thymmus comosus, Filipendula hexapetala	VF
Minois dryas (SCOPOLI, 1763)	VII-VIII	Xt	Poaceae	Fruits of Sambucus nigra and Sambucus racemosa	VF

Taxa	P	E.E	LHP	Pf-Ns	F
Hipparchia fagi (SCOPOLI, 1763)	VII-VIII	Mt	Poaceae	Hypericum perforatum, Digitalis grandiflora, Verbascum phlomoides.	VF
Hipparchia semele semele (LINNAEUS, 1758)	VII-VIII	M	Poaceae	Rarely on Sambucus and Telekia speciosa	R
Brintesia circe pannonica FRUHSTORFER, 1911	VII-VIII	Xt	Poaceae	Rarely on Verbascum phlomoides, Hypericum Telekia speciosa	F
Chazara briseis briseis (LINNAEUS, 1764)	VII-VIII	Xt	Poaceae	Rarely on Telekia speciosa	R

Abreviations: EE= Ecological exigencies: M-Mezofilous species; Mt-Mezotermofilous species; Xt-Xerotermofilous species, U-Ubiquist; Eu- Euritope; Mg- Migratory Species; STL- Larval Food Plants; PF-NS-Plant flowers-Nectar Source; F = Frequency: VF = Very Frequent species (over 16 individuals/day); RF = Relativ frequent species (5-10 individuals/day); F = Frequent species (5-10 individuals/day); R = Rare species; VR = Very Rare species (1-4 individuals/generation)

Rare species in Zlaşti Valley

Maculinea alcon (DENIS & SCHIFFERMÜLLER, 1775) - 2♂♂ 14.07.2005. The butterflies prefer lawns, meadows. In its early stage larvae feed on Gentiana sp. In the next stages, ants attend them. Pupation takes place inside the nest of ants.

Maculinea arion (LINNAEUS, 1758) - 2♂♂ 1.07. 2006. Adults prefer rough grasslands wherever the food plant grows, in conjunction with suitable ant nests (STILL 1996).

Neozephyrus quercus (LINNAEUS, 1758)– 1♂ 20.07.2006. It is a woodland butterfly, found in oak forest. Larvae feed on *Quercus robur*. The adults feed on sticky „honey-dew" from aphids but also on *Sambucus racemosa* fruits.

Thecla betulae (LINNAEUS, 1758)- 1♂ 24.07.2005. Butterflies prefer the edge of the forest. Larvae feed on *Prunus spinosa*. STILL (1996) considers that the butterfly is not attracted to flowers but we found them on flowers of *Sambucus racemosa*.

Chazara briseis briseis (LINNAEUS, 1764): 1♂ 20.07.2006. The butterfly prefers dry lawns and the edge of the forests. Larvae feed on Poaceae. Adults rarely visit *Telekia speciosa*.

CONCLUSIONS

83 species belonging to S.ord. Rhopalocera were reported from Zlaşti Valley (Poiana Ruscă Mountains). The majority of the species are relative frequent or frequent in this area. The abundance of the populations of the majority of the species is due to the high temperature

of Juin-August (over 30^0C). According to different IUCN categories of endangement (RÁKOSY 2002), some of recorded species of Zlaşti Valley are near threatened, vulnerable or endangered. *Lycaena dispar rutila*, *Lycaena virgaureae*, *Lycaena thersamon*, *Thecla betulae*, *Neozephyrus quercus*, *Satyrium w-album*, *Satyrium pruni*, *Scoliantides orion lariana*, *Maculinea arion*, *Maculinea alcon*, *Brenthis daphne*, *Brenthis hecate*, *Apatura ilia*, *Apatura iris* and *Chazara briseis* are included in the Red List of Butterflies of Romania. Rare species recorded from Zlaşti Valley are: *Maculinea arion*, *Maculinea alcon*, *Neozephyrus quercus*, *Thecla betulae* and *Chazara briseis*. These species must be protected in their natural habitats.

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LEPIDOPTERA SPECIES (MACROLEPIDOPTERA) CAPTURED IN THE SURROUDING OF THE MUSEUM OF DEVA (HUNEDOARA COUNTY, ROMANIA)

SILVIA BURNAZ

Rezumat

Specii de lepidoptere (Macrolepidoptera) capturate în împrejurimile Muzeului din Deva (județul Hunedoara, România)

514 exemplare aparținând la 201 specii de Macrolepidoptere au fost capturate cu ajutorul unei instalații electrice exterioare aflată în fața clădirii Muzeului Civilizației Dacice şi Romane Deva (Secția ştiințele naturii). Instituția muzeală, cu cele două corpuri: Magna Curia şi clădirea secției de ştiințele naturii, se află situată în partea nordică a municipiului Deva, la poalele Dealului Cetății Deva şi în apropierea unui parc municipal, amenajat la începutul secolului XX. Dealul Cetății Deva, aparținător Masivului Poiana Ruscă, a primit statutul de rezervație naturală grație atât importanței geologice şi istorice cât şi florei şi faunei bogate în elemente de origine mediteraneană. Parcul situat în apropierea clădirii muzeului este alcătuit din diferite esențe lemnoase şi diferite specii de arbuşti ornamentali. Pe baza colectărilor efectuate în 2000-2006 a fost elaborată lista sistematică a speciilor. Alături de speciile comune au fost colectate şi unele rarități: *Dysgonia algira*, *Xylena exoleta*, *Valeria oleagina*, *Boarmia roboraria*,*Calamia tridens*, Dicranura ulmi, *Cryphia muralis*.

Key words: Macrolepidoptera species, Museum of Deva, Hunedoara County

INTRODUCTION

The Museum of Deva, named The Museum of Dacian and Roman Civilization is situated in the northern part of Deva town, the residence of Hunedoara County (Romania). Two buildings form it, one represented by the historical monument, Magna Curia, and the other, represented by the section of natural sciences. The both buildings are situated in a beautiful landscape, with a natural protected area - "The Hill of Deva City" (Poiana Ruscă Mts.) and a public park, representing a collection of native trees.

Forests of deciduous trees and shrubs (As. *Corno-Fraxinetum* orni POP & HODIȘAN 1964; As. *Carpino-Fagetum* PAUCĂ 1941) represent the vegetation of the Hill of Deva City. Small grasslands (As. *Cleistogeno-Festucetum rupicolae* (SOÓ 1930) ZÓLYOMI 1958) are situated in the southern and south-eastern part of the Hill of Deva City (NUȚU AGNIȘA et all., 1974). The natural parc situated near the building of the museum is formed by diferent deciuous and coniferous trees and shrubs.

Our purpose is to evidence the fauna of Macrolepidoptera identified in a small natural area of Deva town, the residence of the Hunedoara County.

Data about the Macrolepidoptera fauna of the hills of Deva City, including the natural reserve of *The Hill of Deva City* are published by us (BURNAZ SILVIA 1993).

MATERIAL AND METHODS

Samples were made in 2000-2004, every year in March-November, using a fluorescent tube placed in front of the building of Deva Museum.

Collected specimens were identified in the laboratory, using different literature: SPULER 1908-1910, KOCH (1964), RÁKOSY 1996, STILL 1996.

The specimens we captured are preserved in the lepidopterological collection of the Deva Museum.

RESULTS AND DISCUSSIONS

A checklist of Macrolepidoptera species captured in the surrounding of the building of Deva Museum is given.

514 specimens representing 201 Macrolepidoptera species were captured in the period of 2000-2006. Best-represented families, according to the number of captured species are Noctuidae (72 species) and Geometridae (61 species).

Ord. LEPIDOPTERA

S. ord. HETEROCERA

LASIOCAMPIDAE

1. *Malacosoma neustrium* (LINNAEUS, 1758): 1♂ 20. 07. 2003
2. *Trichiura crataegi* (LINNAEUS, 1758): 1♂ 28. 08. 2002
3. *Macrothylacia rubi* (LINNAEUS, 1758): 1♀ 29. 06. 2002
4. *Odonestis pruni* (LINNAEUS, 1758): 1♂ 20.07. 2003
5. *Gastropacha quercifolia* (LINNAEUS, 1758): 1♂ 29. 06. 2002

SPHINGIDAE

6. *Sphinx ligustri* (LINNAEUS, 1758): 1♂ 22. 07. 2001
7. *Macroglossum stellatarum* (LINNAEUS, 1758): 2♂♂ 11. 07; 24. 07. 2003; 1♂ 2.08. 2004
8. *Smerinthus ocellatus* (LINNAEUS, 1758): 1♂ 3. 07. 2000
9. *Hyles euphorbiae* (LINNAEUS, 1758): 2♂♂ 14. 06. 2001; 1♂ 20. 08. 2003
10. *Deilephila porcellus* (LINNAEUS, 1758): 1♂ 11. 07. 2002; 1♂ 20. 07. 2003
11. *Deilephila elpenor elpenor* (LINNAEUS, 1758): 1♂ 25. 05. 2002; 1♂ 20. 06. 2003; 1♂ 1. 07. 2004

DREPANIDAE

12. *Thyatira batis* (LINNAEUS, 1758): 1♂27. 06. 2000; 1♂ 14. 07. 2002
13. *Habrosyne pyritoides* (HUFNAGEL, 1766): 3♂♂ 27. 06. 2000; 1♂, 1♀ 14. 07. 2002; 2♂♂, 20. 07. 2002; 28. 07. 2003
14. *Polyploca ridens* (FABRICIUS, 1757): 1♂ 13. 04. 2002
15. *Drepana falcataria* (LINNAEUS, 1758): 3♂♂ 26. 06. 2002; 18. 07. 2002; 16. 07. 2003; 1♂ 18. 07. 2004
16. *Sabra harpagula* (ESPER, 1786): 1♂ 24. 07. 2002
17. *Cilix glaucata* (SCOPOLI, 1763): 1♂ 4. 07. 2001; 2♂♂, 1♀ 15-17. 08. 2002; 1♂ 4. 07. 2003

GEOMETRIDAE

18. *Abraxas grossulariata* (LINNAEUS, 1758): 1♂ 14. 07. 2001; 1♂ 29. 06. 2002
19. *Lomaspilis marginata* (LINNAEUS, 1758): 1♂ 14. 07. 2001
20. *Ligdia adustata* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 11. 08. 2003

21. *Heliomata glarearia* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 14. 06. 2002
22. *Tephrina arenacearia* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 2. 06. 2002
23. *Opistograptis luteolata* (LINNAEUS, 1758): 1♂ 15. 07. 2001; 1♂ 29. 06. 2002; 1♂ 4. 07. 2004
24. *Ennomos fuscantaria* (HAWORTH, 1809): 1♂ 16. 09. 2002
25. *Ennomos autumnarius* WERNEBURG, 1859: 1♂ 18. 09. 2003
26. *Ennomos erosaria* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 15. 07. 2001
27. *Selenia lunularia* (HÜBNER, 1788): 4♂♂ 27. 04. 2002; 3 ♂♂ 29. 04. 2004
28. *Selenia dentaria* (FABRICIUS, 1775): 4♂♂, 1♀ 3-16. 04. 2002
29. *Selenia tetralunaria* (HUFNAGEL, 1767): 3♂♂ 14. 04. 2001; 1♂ 20. 04. 2002; 1♂ 12. 04. 2004
30. *Crocallis elinguaria* (LINNAEUS, 1758): 1♂ 29. 06. 2002
31. *Ourapteryx sambucaria* (L. 1758): 29. 06. 2000
32. *Colotois pennaria* (LINNAEUS, 1761): 9♂♂ 11-17.11.2002
33. *Lycia hirtari*a (CLERCK, 1759): 1♂ 14. 04. 2000; 3♂♂ 14. 04. 2001
34. *Biston betularia* (LINNAEUS, 1758): 11♂ 21. 07. 2003; 30. 07. 2003 (with f. *carbonaria* and f. *insularia)*
35. *Agriopis marginaria* (FABRICIUS, 1776): 2♂♂ 31. 10. 2001; 3. 11. 2002
36. *Agriopis bajaria* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 4. 11. 2001
37. *Agriopis aurantiaria* (HÜBNER, 1799): 11♂♂ 29. 10 - 22. 11. 2002; 5♂♂ 14. 11. 2003; 8♂♂ 17. 11. 2004
38. *Erannis defoliaria* (CLERCK, 1759): 14♂♂ 3-10. 11. 2001; 18♂♂ 10-21. 11. 2003; 12♂♂ 12-27. 11. 2004
39. *Cleora cinctaria* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 14. 07. 2002; 4♂♂ 18-19. 07. 2003
40. *Alcis repandatus* (LINNAEUS, 1758): 7♂♂, 2♀♀ 11. 07. - 26. 08. 2002
41. *Boarmia roboraria* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 18.07.2003; Rare species in the fauna of Romania.
42. *Hypomecis punctinalis* (SCOPOLI, 1763): 1♂ 11.07.2002; 1♂ 14.07.2003; 2♂♂ 20.07.2005
43. *Ascotis selenaria* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 10.07.2002; 2♂♂ 14.07.2003
44. *Campaea margaritata* (LINNAEUS, 1767): 1♂ 14.07.2002 ; 1♂ 15.07.2003
45. *Alsophila quadripunctaria* (ESPER, 1800): 3♂♂ 14.10.2002; 1♂ 2.11. 2003
46. *Aplasta ononaria* (FUESSLY, 1783): 1♂ 18.07.2002

47. *Geometra papilionaria* (LINNAEUS, 1758): 1♂ 5.08.2001; 1♂ 18.06.2002; 1♂ 13.07.2002; 1♂ 21.06.2003
48. *Antonechloris smaragdaria* (FABRICIUS, 1787): 1♂ 12.06.2002
49. *Timandra griseata* W. PETERSEN, 1902: 1♂ 22.07.2002
50. *Hemistola chrysoprasaria* (ESPER, 1794): 1♂ 18.07.2002 ; 1♂ 15.07.2003; 1♂ 19.07.2005
51. *Cyclophora annulata* (SCHULZE, 1775): 1♂ 14.07.2002
52. *Cyclophora pendularia* (CLERCK, 1759): 1♂ 23.08.2003
53. *Cyclophora punctaria* (LINNAEUS, 1758): 1♂ 27.08.2003
54. *Cyclophora linnearia* (HÜBNER, 1799): 1♂ 14.09.2002; 1♂ 14.07. 2004; 1♂ 19.07. 2005;
55. *Scopula immorata* (LINNAEUS, 1758): 1♂ 12.07.2002
56. *Scopula nigropunctata* (HUFNAGEL, 1767): 2♂♂ 24. 07. 2001
57. *Scopula ornata* (SCOPOLI, 1763): 1♂ 24.07.2002
58. *Scopula rubiginata* (HUFNAGEL, 1767): 1♂ 15.07.2002; 1♂ 13.08.2004
59. *Scopula immutata* (LINNAEUS, 1758): 1♂ 27.08.2003
60. *Idaea ochrata* (SCOPOLI, 1763): 2♂♂ 25.08.; 27.08.2003
61. *Idaea aureolaria* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 14.07. 2002
62. *Idaea trigeminata* (HAWORTH, 1809): 1♂ 24.06.2003; 1♂ 26.06.2004
63. *Idaea aversata* (LINNAEUS, 1758): 1♂ 12.07.2001; 4♂♂ 28-30.06.2002
64. *Scotopteryx moeniata* (SCOPOLI, 1763): 1♂ 7.08.2001; 1♂ 3.08.2002; 1♂ 13.08.2004
65. *Scotopteryx chenopodiata* (LINNAEUS, 1758): 1♂ 7.08.2001
66. *Scotoperyx luridata* (HUFNAGEL, 1767): 1♂ 12.07.2002
67. *Xanthorhoe ferrugata* (CLERCK, 1759): 2♂♂ 12.06.2002; 20.06.2002; 1♂ 24.06.2003
68. *Xanthorhoe fluctuata* (LINNAEUS, 1758): 1♂ 14.06.2002; 2♂♂ 1-2.07.2003
69. *Catarhoe cuculata* (HUFNAGEL, 1767): 1♂ 14.06.2002
70. *Epirrhoe alternata* (MÜLLER, 1764): 1♂ 24.06.2002; 2♂♂ 1-2.07.2003
71. *Camptogramma bilineata* (LINNAEUS, 1758): 1♂ 19.07.2002; 1♂ 23.08.2003
72. *Cosmorhoe ocellata* (LINNAEUS, 1758): 1♂ 19. 07. 2002; 1♂ 10. 07. 2004
73. *Pelurga comitata* (LINNAEUS, 1758): 2♂♂ 9-10.08.2003
74. *Eulithis prunata* (LINNAEUS, 1758): 1♂ 28.08.2001
75. *Horisme vitalbata* (DENIS & SCHIFFERMÜLLER, 1775): 1♂, 1♀ 20.08.2003

76. *Horisme tersata* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 21.07.2002; 1♂ 18.07.2003
77. *Melanthia procellata* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 11.07.2002
78. *Pelurga comitata* (LINNAEUS, 1758): 1♂ 17.07.2001
79. *Operophtera brummata* (LINNAEUS, 1758): 8♂♂ 3-11.11.2001; 15♂♂ 4-11.11.2002; 17.11.2002; 11♂♂ 9-14.11.2003
80. *Perizoma alchemillata* (LINNAEUS, 1758): 1♂ 24.06.2003
81. *Eupithecia centaureata* (DENIS & SCHIFFERMÜLLER, 1775):1♂ 13.07.2003
82. *Eupithecia linariata* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 24.06.2003
83. *Aplocera plagiata* (LINNAEUS, 1758): 2♂♂ 18.06; 23.06.2002
84. *Asthena albulata* (HUFNAGEL, 1767): 1♂ 11.07.2002
85. *Hydrelia flammeolaria* (HUFNAGEL, 1767): 1♂ 27.06.2002
86. *Chiasmia clathrata* (LINNAEUS, 1758): 1♂ 7.07.2001; 1♂ 14.05.2003
87. *Semiothisa alternaria* (HÜBNER, 1809): 1♂ 14.05.2002

NOTODONTIDAE

88. *Stauropus fagi* (LINNAEUS, 1758): 1♂ 2.05.2000; 1♂ 12.05.2000; 1♂ 3.07.2003
89. *Drymonia ruficornis* (HUFNAGEL, 1766): 1♂ 25.04.2001
90. *Drymonia dodonaea* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 22. 05. 2003
91. *Pterostoma palpina* (CLERCK, 1759): 1♂ 28.06.2002; 2♂♂ 3.07; 10.08.2003
92. *Phalera bucephala* (LINNAEUS, 1819): 1♂ 18.07.2003
93. *Clostera curtula* (LINNAEUS, 1758): 1♂ 28.06.2002
94. *Notodonta torva* (HÜBNER, 1803): 1♂ 14.07.2001
95. *Dicranura ulmi* (DENIS & SCHIFFERMÜLLER, 1775): 2 ♂♂ 17.04.2001; 1♂ 20.04.2002; Rare species in the fauna of Romania.
96. *Spatalia argentina* (DENIS & SCHIFFERMÜLLER, 1775): 3♂♂ 24.05.2001;
97. *Eligmodonta ziczac ziczac* (LINNAEUS, 1758): 1♂ 3.06.2001; 1♂10.08.2003

NOCTUIDAE

98. *Acronicta rumicis* (LINNAEUS, 1758): 5♂♂ 14.05; 26.06; 3.07; 14.08.2002; 3♂♂ 27-28.08.2003
99. *Acronicta euphorbiae* (DENIS & SCHIFFERMÜLLER, 1775): 2♂♂ 17.09.2001; 1♂ 15.05.2002
100. *Craniophora ligustri* (DENIS & SCHIFFERMÜLLER, 1775): 3♂♂ 14.07.2003

101. *Idia calvaria* (DENIS & SCHIFFERMÜLLER, 1775): 3♂♂ 27. 06. 2002; 30. 06. 2002; 28. 08. 2002; 1♂ 1.09. 2004

102. *Cryphia muralis* (FORSTER, 1771): 1♂ 28.07.2002; Rare species in Romania, recorded only from Băile Herculane, Mehadia, Tecuci, Ardeoani-Bacău (RÁKOSY 1996) and from Laz (Alba County) (BURNAZ SILVIA 2002).

103. *Cryphia fraudatricula* (HÜBNER, 1802): 1♂ 10.07.2001

104. *Laspeyria flexula* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 20.07.2002

105. *Catocala nupta* (LINNAEUS, 1767): 1♂ 9.09.2003

106. *Catocala elocata* (ESPER, 1788): 1♂ 10.08.2001

107. *Ephesia fulminea* (SCOPOLI, 1763): 2♂♂ 17-18.07.2002

108. *Dysgonia algira* (LINNAEUS, 1767): 1♂ 12.08.2004; Rare species, recorded from the southern part of Romanian Carpathians, Banat, Dobrogea and Delta of Danube (RÁKOSY 1996)

109. *Scoliopteryx libatrix* (LINNAEUS, 1758): 1♂ 29.03.2002

110. *Hypena proboscidalis* (LINNAEUS, 1758): 3♂♂ 18-20.07.2002; 2♂♂ 26.07; 8.08.2003

111. *Hypena rostralis* (LINNAEUS, 1758): 3♂♂ 25.05; 27.07.2002; 1♂ 27.04.2004

112. *Rivula sericealis* (SCOPOLI, 1763): 1♂ 12.06.2001; 1♂ 14.07.2002; 1♂ 16.07.2003; 1♂ 27.08.2004

113. *Diachrysia chrysitis* (LINNAEUS, 1758): 1♂ 27.07.2002; 2♂♂ 14.07. 2003

114. *Autographa gamma* (LINNAEUS, 1758): 2♂♂ 16.07.2001; 4♂♂ 25.07. 20.07; 3.08.; 14.08; 2002; 3♂♂ 3.08; 23.08.2003 (2 ex.); 4♂♂ 11.06; 14.07; 18.07; 15.08.2004

115. *Abrostola asclepiadis* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 20.06.2002; 1♂ 26.06.2003; 1♂ 15.06.2004

116. *Cucullia umbratica* (LINNAEUS, 1758): 1♂ 17.07.2001

117. *Pyramidcampa pyramidea* (LINNAEUS, 1758): 1♂ 23.08.2003

118. *Amphipyra tragopoginis* (CLERCK, 1759): 1♂ 18.07.2001; 1♂ 27. 06. 2002; 1♂ 20.07.2003

119. *Diloba caerulaeocephala* (LINNAEUS, 1758): 3♂♂ 24-30.10.2002

120. *Heliothis armigera* (HÜBNER, 1808): 5♂♂, 1♀ 18-29.08.2002; 3♀♀ 4-5.09.2003

121. *Pyrrhia umbra* (HUFNAGEL, 1766): 1♀ 15.06.2003

122. *Caradrina morpheus* (HUFNAGEL, 1766): 1♂ 28.08.2002

123. *Platypterigea kadenii* FREYER, 1836: 1♂ 28.08.2003; 1♂ 26. 07. 2004

124. *Paradrina clavipalpis* (SCOPOLI, 1763): 2♂♂ 27. 06. 2002; 18.10.2002; 3♂♂ 23-24.08.2003.

125. *Hoplodrina octogenaria* (Goeze, 1781): 1♂ 2. 07. 2002

126. *Hoplodrina blanda* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 17.07. 2003; 1♂ 2.09.2004

127. *Hoplodrina respersa* (DENIS & SCHIFERMÜLLER, 1775): 1♂ 21.06.2001; 1♂ 2. 07. 2002

128. *Thalpophila matura* (HUFNAGEL, 1766): 1♂ 26.08.2003; 1♂ 13.09.2004

129. *Trachea atriplicis* (LINNAEUS, 1758): 1♂ 2.07. 2002; 2♂♂ 20.08; 13.09.2004

130. *Phlogophora meticulosa* (LINNAEUS, 1758): 1♂ 29. 06. 2002; 2♂♂ 15. 09. 2003; 24. 09. 2003; 1♂ 14. 09. 2004

131. *Tholera cespitis* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 4.10.2002

132. *Cosmia pyralina* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 21.07.2001

133. *Cosmia trapezina* (LINNAEUS, 1758): 1♂ 20.07.2001; 2♂♂ 3.09.2002; 1♂ 22.07. 2004

134. *Xanthia togata* (ESPER, 1788): 1♂ 11.10.2002; 4 ♂♂9-12. 10. 2004

135. *Xanthia sulphurago* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 10.09.2003

136. *Xanthia icteritia* (HUFNAGEL, 1766): 1♂ 14.09.2002

137. *Xanthia ocellaris* (BORKHAUSEN, 1792): 1♂ 3.10.2002

138. *Agrochola lychnidis* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 14.09.2002

139. *Agrochola circellaris* (HUFNAGEL, 1766): 2♂♂ 4.09.2001; 4♂♂ 14.09; 20.10. 2002; 1♂ 25. 10. 2003

140. *Agrochola litura* (LINNAEUS, 1761): 1♂ 12.09.2001

141. *Eupsilia transversa* (HUFNAGEL, 1766): 2♂♂ 13.04.2002; 11♂♂ 16-19.04 2003; 14.09.2003; 6♂♂ 22-24. 04. 2004.

142. *Conistra rubiginosa* (SCOPOLI, 1763): 1♂ 20.09. 2002; 1♂ 1.10.2003

143. *Conistra rubiginea* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 14. 04. 2000; 1♂ 20.09. 2002

144. *Lithophane ornitopus* (HUFNAGEL, 1766): 2♂♂ 14.05.2002; 1♂ 14.09. 2003; 1♂ 25. 05. 2004

145. *Allophyes oxyacanthae* (LINNAEUS, 1758): 1♂ 17.11.2002; 2♂♂ 28.09; 27.10.2003

146. *Blepharita satura* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 11. 10. 2003

147. *Apamea monoglypha* (HUFNAGEL, 1766): 1♂ 28. 06. 2000

148. *Apamea sordens* (HUFNAGEL, 1766): 1♂ 14. 07. 2001

149. *Oligia strigilis* (LINNAEUS, 1758): 1♂ 14. 07. 2000

150. *Mesapamea secalis* (LINNAEUS, 1758): 1♂ 14. 07. 2000

151. *Calamia tridens* (HUFNAGEL, 1766): 1♂ 27.07. 2003

152. *Hadula trifolii* (HUFNAGEL, 1766): 1♂ 23.08. 2003

153. *Lacanobia w-latinum* (HUFNAGEL, 1766): 1♂ 20.07.2002

154. *Lacanobia oleracea* (Linnaeus, 1758): 1♂ 14. 07. 2000

155. *Mamestra brassicae* (LINNAEUS, 1766): 1 ♂ 17.07.2003; 1 ♂ 12. 08. 2004; 1 ♂ 27.07.2005

156. *Mythimna vitellina* (HÜBNER, 1808): 1♂ 18.07.2002

157. *Mythimna albipuncta* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 14.08.2001; 1♂ 18.07.2002; 1♂ 13.09.2004

158. *Mythimna l-album* (LINNAEUS, 1767): 1♂ 10.07.2001; 2♂♂ 11.07.2002; 1♂ 27.07.2003

159. *Mythimna ferrago* (FABRICIUS, 1787): 1♂ 11.08.2002

160. *Hadena albimacula* (Borkhausen, 1792): 1♂ 20. 07. 2001

161. *Hadena rivularis* (Fabricius, 1775): 1♂ 27.06.2005

162. *Orthosia incerta* (HUFNAGEL, 1766): 3♂♂ 3-4.04.2002; 2♂♂, 1♀ 30.03.2003; 1♂ 10.04.2004

163. *Orthosia gothica* (LINNAEUS, 1758): 1♂ 31.03.2002; 3♂♂ 4.04.2003; 2♂♂ 14.04.2005

164. *Orthosia cruda* (DENIS & SCHIFFERMULLER, 1775): 3♂♂ 6.04.2004; 2♂♂ 14.04.2005; 1♂ 10.04.2006

165. *Orthosia miniosa* (DENIS & SCHIFFERMÜLLER, 1775): 1 ♂ 14.04.2003

166. *Perigrapha munda* (DENIS & SCHIFFERMÜLLER, 1775): 2♂♂ 3.04. 2004

167. *Cerapteryx gramminis* (LINNAEUS, 1758): 1♂ 18.08.2002

168. *Tholera decimalis* (PODA, 1761): 1♂ 11.09.2002

169. *Ochropleura plecta* (LINNAEUS, 1761): 1♀ 20.07.2002; 2♂♂ 28.06.2003

170. *Axylia putris* (LINNAEUS, 1761): 1♂ 28.07.2002

171. *Noctua pronuba* (LINNAEUS, 1758): 1♂ 3.10.2003

172. *Noctua orbona* (HUFNAGEL, 1766): 1♂ 20.07.2002

173. *Noctua fimbriata* (SCHREBER, 1759): 2♂♂ 14.07.2003; 1♂ 29.06.2004

174. *Xestia c-nigrum* (LINNAEUS, 1758): 6♂♂ 21-25.08.2002; 3♂♂ 28.07.2003; 2♂♂ 24.07.2004; 3♂♂ 30.07.2005; 6♂♂, 1♀ 18.08.2006

175. *Xestia triangulum* (HUFNAGEL, 1766): 1♂ 28.07.2002

176. *Xestia ditrapezium* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 14. 07. 2000; 2♂♂ 6.07.2005

177. *Cerastis rubricosa* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 3.04.2002; 2♂♂ 31.03.2004

178. *Euxoa tritici* (LINNAEUS, 1761): 1♂ 20.07.2002

179. *Agrotis ipsilon* (HUFNAGEL, 1766): 4♂♂ 27.07.2003; 2♂♂ 18.08.2003

180. *Agrotis exclamatiotis* (LINNAEUS, 1758): 2♂♂ 24. 07.2002 ; 4♂♂ 27.06.2004; 3♂♂ 30.06.2005; 1.07.2005; 7♂♂, 2♀♀ 6.07-10.07.2006

181. *Agrotis segetum* (DENIS & SCHIFFERMÜLLER, 1775): 3♂♂ 20-21.08.2002; 1♂, 1♀ 14.07.2003; 3♂♂ 13-15.08.2004 ; 2♂♂ 25.07.2005

PANTHEIDAE

182. *Colocasia coryli* (LINNAEUS, 1758): 2♂♂ 18.08.2002; 1♂ 24.05.2003; 3♂♂ 14-16.09.2003; 1♂ 20.09.2003

LYMANTRIIDAE

183. *Lymantria dispar* (LINNAEUS, 1758): 1♂ 25.08.2001; 1♂ 1.09.2003; 1♂ 27.08.2004

184. *Calliteara pudibunda* (Linnaeus, 1758): 1♂ 24.06.2004

185. *Euproctis chysorrhoea* (LINNAEUS, 1758): 2♂♂ 9.07.2002; 1♂ 6.08.2002; 1♂ 29.06.2003; 1♂ 27.06.2004

186. *Arctornis l-nigrum* (MÜLLER, 1764): 1♂ 4.07.2003; 2♂♂ 13.07.2003

NOLIDAE

187. *Meganola strigula* (DENIS & SCHIFFERMÜLLER, 1775): 1♂ 20.07.2001

188. *Nola cucullatella* (LINNAEUS, 1758): 1♂ 15.07.2002

189. *Nycteola revayana* (SCOPOLI, 1772): 1♂ 19.07.2004

190. *Pseudoips prasinanus* (LINNAEUS, 1758): 1♂ 14. 07. 2002

191. *Bena bicolorana* (FUESSLY, 1775): 1♂, 1♀ 24; 29. 07. 2002; 1♂ 14. 07. 2003

ARCTIIDAE

192. *Miltochrista miniata* (FORSTER, 1771): 2♂♂ 17.07.2000; 1♂ 20.07.2002

193. *Eilema lurideola* (ZINCKEN, 1817): 1♂ 27.08.2002; 2♂♂, 1♀ 25.08.2003

194. *Atolmis rubricollis* (LINNAEUS, 1758): 2♂♂ 1.07.2002; 1♂ 24.06.2004; 1♂ 29.06.2005

195. *Spilosoma lubricipeda* (LINNAEUS, 1758): 4♂♂ 12.06. 2001; 3♂♂ 14.06.2001; 1♀ 13.07.2001

196. *Spilosoma luteum* (HUFNAGEL, 1766): 2♂♂ 13.07.2001; 1♂ 20.07.2001

197. *Diaphora mendica* (CLERCK, 1759): 1♂ 27.05. 2000; 1♂ 1.06.2001; 1♂ 12.06.2001

198. *Phragmatobia fuliginosa* (LINNAEUS, 1758): 2♂♂ 8.08.2002; 3♂♂ 27.07.2003; 1♂ 25.07.2004

199. *Phragmatobia caesarea* (GOEZE, 1781): 1♂ 3.06.2002

200. *Callimorpha quadripunctaria* (PODA, 1761): 8♂♂ 14.08.2002 (2); 20.08.2003 (1); 24.08.2003 (1); 17.08.2004 (4)

201. *Arctia villica villica* (LINNAEUS, 1758): 1♂ 14.07.2003

CONCLUSIONS

The study of Lepidoptera species captured in the surrouding of the building of the Museum of Deva offered us the possibility to record 201 taxa. Some species rare in the fauna of Romania are recorded: *Dysgonia algira*, *Boarmia roboraria*, *Dicranura ulmi*, *Calamia tridens*, *Cryphia muralis*.

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DATA CONCERNING BUTTERFLIES (ORD. LEPIDOPTERA, S.ORD. RHOPALOCERA) OF NANDRU VALLEY (POIANA RUSCĂ MOUNTAINS, WESTERN CARPATHIANS, ROMANIA)

SILVIA BURNAZ

Rezumat

Date privind fluturii diurni (Ord. Lepidoptera, S.ord. Rhopalocera) din Valea Nandrului (Munții Poiana Ruscă, Carpații Occidentali, România)

Pe baza cercetărilor efectuate în anii 1988 şi 2007 în diferite habitate naturale situate în Valea Nandrului, una dintre cele mai spectaculoase zone carstice ale Munților Poiana Ruscă (Carpații Occidentali) au fost semnalate 82 specii de fluturi diurni. În condițiile unor temperaturi foarte ridicate față de media normală a lunilor mai-august şi a unei vegetații afectate de seceta prelungită, au fost colectate un număr relativ mare de specii, caracteristice mai ales pajiştilor din lungul văii, lizierei pădurilor de foioase, arinişurilor şi stâncăriilor. Specii frecvente şi foarte frecvente au fost: *Melitaea didyma*, *Melitaea cinxia*, *Argynnis paphia*, *Argynnis adippe*, *Aphantopus hyperanthus*, *Maniola jurtina*, *Coenonympha arcania*, *Coenonympha pamphilus*, *Melanargia galathea*, *Vanessa atalanta*, *Vanessa cardui*, *Pieris napi*, *Pieris rapae rapae*. Specii rare şi foarte rare în zona cercetată sunt *Branthis daphne*, *Brenthis hecate*, *Maculinea arion*, *Maculinea alcon*, *Thymelicus acteon* şi *Satyrium pruni*. Pentru toate speciile colectate sau observate în teren sunt prezentate date referitoare la frecvență, cerințele ecologice față de habitat, distribuția geografică actuală şi categoriile de periclitare conform criteriilor IUCN.

Key words: checklist, Macrolepidoptera species, S. ord. Rhopalocera, Nandru Valley, Poiana Ruscă Mountains

INTRODUCTION

A floristical and faunistical research was accomplished in Poiana Ruscă Mountains (Western Carpathians). The western part of these mountains is situated in Hunedoara County (Romania).

A moderate altitude characterizes the relief of these mountains: 500 m -1000 m. Crystalline schists, andesits and other magmatic rocks are prevailed. But, in some regions, especially on the basin of Cerna Valley, calcareous areas are predominates. Nandru Valley is situated in the area of the deciduous forests but at the entrance in this valley, calcareous rockies are present (Fig. 2, 3).

The aim of the study is to emphasize the diversity of entomofauna (especially Lepidoptera, Rhopalocera) of some natural habitats situated in the Valley of Cerna River and its affluents.

In the past years (2000-2006) we have studied the flora and butterflies of some habitats situated in Zlaşti Valley, Govăjdie Valley and Runc Valley (BURNAZ SILVIA 2000, 2002) and (BURNAZ SILVIA & BALAZS MARCELA 2001, 2002).

In 1988 and 2007, we have researched the Rhopalocera fauna of Nandru Valley, affluent of Cerna River, one of the most important calcareous areas of Poiana Ruscă Mountains.

MATERIAL AND METHODS

The study has been made on the basis of field surveys. The specimens have been collected or observed in the following habitats:

1. Rocky habitats with mezophilous and xerothermophilous vegetation As. *Asplenio-Cystopteridetum fragilis* OBERD. (1939) 1949; As. *Melico-Phleetum montani* BOŞCAIU et al. 1966;

2. Lawns and pastures: *Festucetum pratensis* Soó (1938), 1955, 1966; As. *Agrosteto-Festuceto valesiacae* ARDELEAN 1983; As. *Anthoxantho-Agrostietum capillaris* SILLINGER 1933; As. *Agrosti stoloniferae-Deschampsietum cespitosae* UJVÁROSI 1941; As. *Festuco rubrae-Agrostietum capillaris* HORV. (1951);

3. Forest edge and shrubs phytocoenoses: As. *Prunus spinosae-Crataegetum* (SOÓ 1927) HUECK. 1931; As. *Sambucetum racemosae* Oberd. 1973; As. *Sambucetum ebuli* (KAISER 1926) FELFÖLDY 1942; As. *Coryletum avellanae* SOÓ 1927;

4. As. *Aegopodio-Alnetum glutinosae* Karpati & Jurko 1961; As. *Salicetum albae-fragilis* Issler 1924 em Soó 1957; *Tussilaginetum farfarae* OBERD. 1949; *Senecioni silvatici-Epilobietum angustifolii* (HUECK 1931) Tx. 1950; As. *Petasitetum hybridi (*DOST. 1933) SOÓ 1940, along the Nandru river.

In June and July meadows and lawns are covered by *Galium verum*, *Centaurium umbellatum*, *Centaurea cyanus*, *Cychorium intybus*, *Dianthus carthusianorum*, *Galium verum* (Fig. 4, 5, 8, 9). At the edge of the forests and in Nandru Valley *Telekia speciosa* and *Epilobium angustifolium* are spread (Fig. 6,7).

The collecting and the observations were carried out in 1988 and 2007. The collecting and observations were made in May-August. The specimens were determined after SPULER (1909-1911), BERGMANN (1952), NICULESCU (1961, 1965, 1966), CHYNERY (1996), STILL (1996), FELTWELL (2001), TOLMAN & LEWINGTON (2007).

The frequency of species was established after RÁKOSY & VIEHMANN 1991: Frequent species – 6-15 specimens /day; Very Frequent species - over 16 specimens/day; Relative frequent species – 1-5 specimens/day; Rare species - 5-10 specimens /generation; Very rare species – 1-4 specimens/generation.

Ecological exigencies of species were established after RÁKOSY (1997) and MIHUȚ (2000) classification: M- Mesophilous species; Mh- Mesohygrophilous species; Mt- Mesothermophilous species; Xt- Xerothermophilous species; Mxt- Mesoxerothermophilous species; Hg- Hygrophilous species; Eu-Eurytope species.

We used the scientifical classification of Rhopalocera species after RÁKOSY (2002).

For all the identified taxons, the categories of endangerment according to IUCN criteria are presented (RÁKOSY 2002): EX- Extinct; CR- Critical endangered; EN- Endangered; VU- Vulnerable; NT- Near threatened; LC – Least concern.

RESULTS AND DISCUSSION

82 Macrolepidoptera species (S. ord. Rhopalocera) were recorded from the natural habitats of Nandru Valley (Poiana Ruscă Mountains). Species were collected or observed in different habitats of Nandru Valley.

A checklist of the butterflies and data about the fly period of the adults, the favourite habitats, larval and adult's host plants is given.

ORD. LEPIDOPTERA

S. ORD. RHOPALOCERA

HESPERIOIDEA

HESPERIIDAE

1. *Erynnis tages tages* (Linnaeus, 1758) – 11 ♂♂, 3 ♀♀ 15.05-16.07. VF; Mxt; Eua; LC. It is a species that prefers the hillsides and the edge of the forests. The adults fly in May-June. Larvae food plants are Fabaceae. The adults breed on *Potentilla erecta*, *Fragaria vesca*, *Medicago lupulina*, *Melilothus officinalis*, *Trifolium campestre*, *Hypericum perforatum*, *Leucanthemum vulgare*, *and Dianthus carthusianorum*.

2. *Pyrgus carthami* (HÜBNER, 1813) – 10 ♂♂, 3 ♀♀ 14.05-11.08. VF; Mt; Eua; LC. It is a very common species, spread especially in flowery lawns and the edge of the forests. The flight period of the adults is between May and August. Larvae breed on Carthamus, Malva and Potentilla species (STILL, 1996).

3. *Thymelicus acteon* (ROTTEMBURG, 1775) – VR; Mt; Vam; NT. This butterfly enjoys open forested areas, the edge of the forests and scrubby areas. It is a rare species in the area of Nandru Valley (2 ♂♂ 9.07.2007), at the edge of the forests). Larvae food plants are Poaceae (*Brachypodium pinnatum*, *B. sylvaticum*, *Elymus repens* and Calamagrostis sp.)

4. *Thymelicus sylvestris* (PODA, 1761) – 19♂♂, 4♀♀ 27.06-19.07. VF; M; Vam; LC. This is a very common species, recorded from all the studied areas of Poiana Ruscă Mountains. In Nandru Valley, the adults fly in June-August, in lawns and meadows. They visit the flowers of *Hypericum perforatum*, *Centaurium umbellatum*, *Geranium robertianum*, *Inula hirta*, *Senecio vulgaris*, *Leucanthemum vulgare*, *Salvia nemorosa*, *Melilothus officinalis*, *Galium verum*, *Vicia faba*, *Tanacetum vulgare*, *Viola tricolor*, *Potentilla reptans*. Larvae breed on different Poaceae (*Holcus lanatus*, *Phleum pratense*, *Brachypodium pinnatum*)

5. *Hesperia comma* (LINNAEUS, 1758) – 12♂♂, 5♀♀ 12.07-18.08. VF; M; Hol; LC. The butterfly is regulary found in lawns, edges of the forests and meadows (Fig. 21). The flight period is between July and August. As adult it frequents the flowers of *Aster amellus*, *Leucanthemum vulgare*, *Viola tricolor*, *Centaurium umbellatum*, *Mentha longifolia*, *Tanacetum vulgare*, *Lotus corniculatus*, *Vicia faba*, *Sedum hispanicum*.

6. *Ochlodes venatus faunus* (TURATI, 1905) – 9♂♂, 3♀♀ 19.06-27.08. VF; Mt; Eua; LC. It is a frequent species wich enjoys forest edges, shrub areas and lawns. Adults' fly is in June-August and visit nectar sources as *Hypericum perforatum*, *Aster amellus*, *Leucanthemum*

vulgare, *Trifolium pratense*, *Trifolium repens*, *Sambucus nigra*, *Centaurium umbellatum*, *Sambucus racemosa*, *Rosa canina*, *and Crataegus monogyna*. Larvae breed on Poaceae.

PAPILIONOIDEA

PAPILIONIDAE

7. *Parnassius mnemosyne transsylvanica* SCHMIDT, 1930 – 3♂♂ 21.06. VR; Mh; End; NT. These butterflies occur in mountainous zone of Nandru Valley, especially in meadows and forest edge. The adults fly in June and visit *Sambucus nigra*. The larvae breeds on Corydalis species.

8. *Iphiclides podalirius podalirius* (LINNAEUS, 1758) – 9♂♂ 21.06-23.07. RF; Mxt; Eua; NT. This is a common species wich prefers the forest edge and the areas of shrubs. The adults fly in June-July and often visit: *Epilobium angustifolium*, *Eupatorium cannabinum*, *Mentha longifolia*, *Aster amellus*, *Sambucus racemosa*. Larvae breed on Rosaceae (especially Prunus).

9. *Papilio machaon machaon* (LINNAEUS, 1758) – 3♂♂, 2♀♀ 9-21.07. RF; Mt; Eua; NT. The adults fly in April-August, in two generation and visit the flowers of *Cirsium canum*, *Crataegus monogyna*, *Telekia speciosa*, *Verbascum thapsus*, *Dipsacus fullonum*, *Rosa canina*, *Sambucus nigra*, *Sambucus racemosa*.

PIERIDAE

10. *Leptidea sinapis sinapis* (LINNAEUS, 1758) – 18♂♂, 11♀♀ 18.05-12.08. VF; M; Eua; LC. This very common species prefers forest edges and lawns. The adults fly in May-June and July-August and visit the following plants-nectar sources: *Lotus corniculatus*, *Salvia pratensis*, *Trifolium pratense*, *Aster amellus*, *Centaurium umbellatum*, *Scabiosa columbaria*, *Eupatorium cannabinum*, *Mentha longifolia*. Larvae breed on Fabaceae.

11. *Anthocharis cardamines* (LINNAEUS, 1758) - 8♂♂ 24.05. VF; M; Eua; LC. The adults fly in April and visit the preferred plants: *Viola tricolor*, *Ranunculus acer*, *Dentaria bulbifera*, *Hesperis tristis*, *Lathyrus vernus*, *Viola odorata*, *Vinca minor*.

12. *Aporia crataegi crataegi* (LINNAEUS, 1758) - 4 ♂♂ 26.06. RF; M; Eua; LC. This is a relative frequent species. The adults fly in April-June and visit the flowers of *Sambucus racemosa*, *Berberis vulgaris*, *Crataegus monogyna*, *Prunus spinosa*. Larvae breed on: Rosaceae (Prunus and Crataegus).

13. *Pieris brassicae brassicae* (LINNAEUS, 1758) - 5♂♂ 26.06-12.07. F; M; Eua; LC. It is a frequent species wich frequents forest edges and visits *Melittis melissophyllum*, *Sinapis arvensis*, *Sambucus racemosa*, *Alchemilla vulgaris*, *Centaurium umbellatum*, *Epilobium*

montanum, *Salvia glutinosa*, *Verbascum phlomoides* and *Lamium album*. Larvae breed on Brassicaceae.

14. *Pieris rapae* (LINNAEUS, 1758) - 24♂♂, 5♀♀ 27.05-1.10. VF; M; Hol; LC. It is a very frequent species wich occurs in all the habitats (lawns, forest edge, shrub areas, rocky habitats, etc.). The adults fly in May-October and visit the flowers of *Telekia speciosa*, *Lamium maculatum*, *Origanum vulgare*, *Cirsium vulgare*, *Lathyrus vernus*, *Campanula persicifolia*, *Aster amellus*, *Galium odoratum*, *Galium verum*, *Salvia pratensis*, *Leucanthemum vulgare*, *Hypericum perforatum*, *Anthyllis vulneraria*. Larvae breed on Brassicaceae.

15. *Pieris napi napi* (LINNAEUS, 1758) – 14♂♂, 4♀♀ 27.05-1.10. VF; M; Vam; LC. It is a very frequent species, found in all the studied habitats. The adults fly in May-October and visit the flowers of: *Sinapis arvensis*, *Alchemilla vulgaris*, *Lamium maculatum*, *Telekia speciosa*, *Hypochoeris maculata*, *Dianthus carthusianorum*, *Centaurium umbellatum*, *Cardamine pratensis*, *Trifolium pratense*, *Sanguisorba officinalis*, *Mentha longifolia*, *Succisa pratensis*, *Centaurea phrygia*, *Centaurea biebersteinii* (=micranthos), *Salvia nemorosa*, *Valeriana officinalis*, *Echium rubrum*.

16. *Pontia edusa* (FABRICIUS, 1777) - 9♂♂, 4♀♀ 29.04-14.09. VF; Mt; Eua; LC. This species is very common in the habitats of Nandru Valley. Adults' fly is in 2-3 broods, from April to September and prefers flowery lawns and hedgerows. They enjoy visiting *Viola tricolor*, *Viola canina*, *Lotus corniculatus*, *Medicago lupulina*, *Scabiosa ochroleuca*, *Dianthus carthusianorum*, *Teucrium chamaedrys*, *Centaurea micranthos*, *Viola hirta*, *Lathyrus vernus*, *Cirsium arvense*, *Melittis melisophyllum*, *Stachys sylvatica* and *Origanum vulgare*

17. *Colias croceus* (FOURCROY, 1785) - 19♂♂, 4♀♀ 29.04-14.09. F; Mt; E-Vam; LC. It is a very frequent species wich prefers flowery lawns and forest edges. The adults fly in April-September (in two generations) and visit the flowers of *Salvia pratensis*, *Leucanthemum vulgare*, *Dianthus carthusianorum*, *Sanguisorba officinalis*, *Coronilla varia*, *Onobrychis viciifolia*, *Symphytum officinale*, *Thymus comosus*, *Centaurea nigrescens*, *Knautia arvensis*. Larvae breed on Fabaceae.

18. *Colias hyale* (LINNAEUS, 1758) - 18♂♂, 5♀♀ 21.05-24.09. VF; M; Eua; LC. It is a very common species and regulary found in flowery meadows. The adults fly in two broods, in May-June and August-September. Nectar sources are: *Veronica teucrium*, *Cytisus nigricans*, *Medicago lupulina*, *Scabiosa ochroleuca*, *Dianthus carthusianorum*, *Teucrium chamaedrys*, *Centaurea micranthos*, *Viola hirta*, *Centaurium umbellatum*, ***Dipsacus silvester***, *Lathyrus vernus*, *Cirsium arvense*, *Melittis melisophyllum*, *Stachys sylvatica, Calamintha vulgaris* and *Origanum vulgare*.

19. *Gonepteryx rhamni rhamni* (LINNAEUS, 1758) - 18♂♂, 5♀♀ 29.04-4.09. RF; M; Vam; LC. The adults fly in April- September in forest edges. Sometimes they visit *Sambucus racemosa*, *Crataegus monogyna*, *and Prunus* spinosa. Larvae breed on: *Rhamnus catharticus*.

LYCAENIDAE

20. *Hamearis lucina* (LINNAEUS, 1758) - 16♂♂, 5♀♀ 29.05-4.09. VF; M; E; LC. It prefers forest edges and open woodlands. The adults fly in April-June and July-September and visit the flowers of Taraxacum officinale, Fragaria vesca, Salvia pratensis. Larvae feed on Primula species.

21. *Lycaena phlaeas phlaeas* (LINNAEUS, 1761) - 16♂♂, 5♀♀ 29.05-12.08. VF; M; Eua; LC. This is a very frequent species in the area of Nandru Valley. The adults fly in May-August, especially in forest edges and flowering lawns *Dianthus carthusianorum*, *Teucrium chamaedrys*, *Centaurea micranthos*, *Viola hirta*, *Centaurium umbellatum*, ***Dipsacus silvester***, *Lathyrus vernus*, *Cirsium arvense*, *Melittis melisophyllum*, *Stachys sylvatica, Calamintha vulgaris* and *Origanum vulgare*; Larvae feed on Polygonaceae.

22. *Lycaena dispar rutila* (WERNEBURG, 1864) - 16♂♂, 3♀♀ 9-19.07. VF; Hg; Eua; VU. It is a very common species, found especially in mesohygrophilous meadows. Adult plant resources are especially *Epilobium angustifolium*, *Menta longifolia*, *Eupatorium cannabinum*, *and Sambucus racemosa*.

23. *Lycaena virgaureae virgaureae* (LINNAEUS, 1758) - 18♂♂, 3♀♀ 19.07-3.08. VF; Mh: Eua; NT. It is a very common species, found especially in mesohygrophilous lawns situated in Nandru Valley. The adults prefer *Eupatorium cannabinum*, *Epilobium hirsutum*, *Geranium robertianum* and *Mentha longifolia* as nectar source. Larvae feed on Rumex species.

24. *Lycaena alciphron alciphron* (ROTTEMBURG, 1775) - 18♂♂, 3♀♀ 29.06-23.07. RF; Mh; Vam; VU. It is a relative common species. The adults fly in June-July and prefer mesohygrophilous lawns and search the nectar of *Epilobium hirsutum*, *Eupatorium cannabinum*, *and Menta longifolia*. The larvae feed on Rumex species.

25. *Thecla betulae* (LINNAEUS, 1758) - 6♂♂ 23.07. R; M; Eua; NT. It is a rare species in the area of Nandru Valley. The adults fly in July and August and prefer forest edge and shrub phytocoenoses. The host plant of larvae is *Prunus spinosa*. Ants attend chrysalides.

26. *Callophrys rubi* (LINNAEUS, 1758) - 6♂♂, 3♀♀ 26.06-23.07. F; Mt; Eua; LC. It is a very common species. Larvae breed on Calluna, Rubus. The adults fly in May-July, especially in clearings, open woodland and forest edges. They visit especially *Rosa canina*, *Sambucus nigra*, *and Sambucus racemosa*.

27. *Satyrium w-album* (KNOCH, 1782) - 6♂♂ 21.07. VR; Mxt; Eua; VU. It is found only in the clearings and forest edges. In June and July, the butterflies are attracted to bramble flowers. Larvae feed on elm flowers (*Ulmus glabra*) in the early stages, moving to leaves later. Ants attend the larvae of this species.

28. *Satyrium pruni* (LINNAEUS, 1758) - 4♂♂ 9.07. VR; Mt; Eua; NT. This species is rare in the area of Nandru Valley. The adult's fly in June-July, especially at the edge of the forests and anywhere is *Prunus spinosa*, the host plant of the larvae. The most visited plants are: *Ligustrum vulgare*, *Sambucus racemosa*, *Rubus fruticosus*. Larvae feed on *Prunus spinosa* and related trees.

29. *Cupido minimus minimus* (FUESSLY, 1775) - 6♂♂, 3♀♀ 26.06-23.07. F; M; Eua; NT. It is a very common species in Nandru Valley. The butterflies fly in June and July and frequent flowering lawns and visit a lot of plants for nectar. The most visited plants are: *Lotus corniculatus*, *Medicago sativa*, *Trifolium pratense*. Larvae host plant is *Anthyllis vulneraria*.

30. *Everes argiades (*PALLAS, 1771) - 11♂♂, 3♀♀ 26.05-23.06; 11.07-3.08. RF; M; Eua; LC. It is a bivoltine species (May-June and July-August), found in flowering meadows, lawns and forest edges. Adults enjoy visiting *Potentilla recta*, *Leucanthemum vulgare*, *Galium verum*, *Filipendula vulgaris*, *Polygala major*, *Medicago lupulina*, *Potentilla arenaria*, *Scabiosa ochroleuca*, *Agrimonia eupatoria*, *Linum tenuifolium*, *Prunella vulgaris.* Larvae feed on Fabaceae.

31. *Celastrina argiolus* (LINNAEUS, 1758) - 11♂♂, 2♀♀ 26.05; 11.07-3.08. RF; M; Eua; LC. The butterflies are regulary found in lawns and forest hedges. The adults fly in May and July-August and visit *Mercurialis perennis*, *Salvia pratensis*, *Stellaria holostea*, *Lysimachia nummularia, Ajuga reptans*, *Veronica chamaedrys*. Larvae are attended by *Lasius niger*, *L. alienus* and Myrmica species.

32. *Scoliantides orion lariana* FRUHSTORFER, 1910 - 8 ♂♂, 2♀♀ 26.06-11.08. RF; Xt; Eua; NT. The adults fly in May-August in rocky calcareous areas. Larvae breed on Sedum. They are attended by *Lasius alienus*, *Formica pratensis*, *Formica cinerea*, *Camponotus aethiops*.

33. *Glaucopsyche alexis* (PODA, 1761) - 9 ♂♂, 1♀ 26.06-21.07. RF; Mh; Eua; LC. The adults fly in June-July and prefer flowery lawns like *Prunella vulgaris*, Potentilla reptans, Veronica chamaedrys, *Thymus comosus*, *Origanum vulgare*, *Galium verum*. Larvae feed on Fabaceae.

34. *Maculinea arion* (LINNAEUS, 1758) - 4♂♂, 1♀ 11.21.07. VR; M; Eua; NT. The butterfly is rare in the calcareous area of Nandru Valley, especially in lawns and forest edges (Fig. 20). The adults fly in June-July and visit *Filipendula ulmaria*, *Agrimonia eupatoria*,

Leucanthemum vulgare, *Linum flavum*, *Thymus serpyllum*. In the early stages larvae feed on Thymus. Ants attend them in the following stages.

35. *Maculinea alcon* (DENIS & SCHIFFERMÜLLER, 1775) - 4♂♂ 21.07. VR; Mh; Eua; EN. It is a very rare species, which prefers meadows and grasslands. In the early stage, larvae feed on Gentiana. Ants (*Myrmica sabuleti*) attend them in the following stages. Pupation takes places in ant nests.

36. *Plebeius argus argus* (LINNAEUS, 1758) - 11♂♂, 3♀♀ 11.06-21.07. VF; M; Eua; LC. It is a very common species which prefers sunny areas, flowery meadows and forest edges. The adults fly in May- August and visit *Lotus corniculatus*, *Potentilla recta*, *Viola tricolor*, *Medicago lupulina*.

37. *Plebejus argyrognomon* (BERGSTRÄSSER, 1779) - 11♂♂, 3♀♀ 29.06-21.07. VF; M; Eua; LC. It prefers lawns and forest edges. Flight period is between May and August. Adults prefer *Lotus corniculatus*, *Viola tricolor*, *Viola canina*, *Fragaria vesca*, *Medicago lupulina*, *Genista tinctoria*. Larvae breed on Fabaceae.

38. *Aricia agestis agestis* (DENIS & SCHIFFERMÜLLER, 1775) - 7♂♂, 3♀♀ 29.05-27.08. VF; M; Eua; LC. The butterfly is most common in lawns, flowery meadows and forest edges. The fly period is from May to September. Favoured flowers include *Lotus corniculatus*, *Medicago sativa*, *Trifolium pratense*. Ants attend larvae but in the early stages they feed on Helianthemum and Geranium.

39. *Polyommatus semiargus semiargus* (ROTTEMBURG, 1775) - 7♂♂, 3♀♀ 29.05-7.09. F; M; Eua; LC. It is a very common species found in flowery lawns and forest edges. The fly period is May-June and August-September. Adults visit *Lotus corniculatus*, *Genista tinctoria*, *Viola tricolor*, *Taraxacum officinale*, *Agrimonia eupatoria*, *Viola canina*, *Leucanthemum vulgare*, *Medicago sativa*, *Trifolium pratense* Larvae feed on *Trifolium pratense*. Ants attended them, in the following stages.

40. *Polyommatus icarus* (ROTTEMBURG, 1775) - 18♂♂, 6♀♀ 29.05-17.09. VF; M; Eua; LC. It is a very common species wich prefers meadows, flowering hillsides, forest edges and scrubby phytocoenoses. The adults fly in April-September and visit the flowers of *Genista tinctoria*, *Aster amellus*, *Viola tricolor*, *Potentilla recta*, *Leucanthemum* ***vulgare*****,** ***Galium verum*****,** ***Filipendula vulgaris*****,** ***Polygala major*****,** ***Medicago lupulina*****,** ***Potentilla arenaria*****,** ***Scabiosa ochroleuca*****,** ***Agrimonia eupatoria*****,** ***Linum tenuifolium*****,** ***Prunella vulgaris*****.**

41. *Polyommatus daphnis* (DENIS & SCHIFFERMULLER, 1775) - 6♂♂, 1♀ 19.06-17.07. R; Xt; Eua; LC. The species is characteristic for calcareous areas of Nandru Valley. The adults fly in June-July and visit the flowers of *Hypericum hirsutum*, *Leucanthemum vulgare*,

Sedum hispanicum, *Aster amellus*, *Genista tinctoria*, *Inula hirta*. Host plants of larvae are *Thymus comosus* and Astragalus sp.

42. *Polyommatus bellargus* (ROTTEMBURG, 1775) - 5 ♂♂ 27.07.2007. VR; Mt; Eua; LC. It is a rare species in Nandru Valley and found only in flowery lawns. Adults visit the following plants: *Sedum hispanicum*, *Leucanthemum vulgare*, *Linum tenuifolium*, *Scabiosa ochroleuca*, *Onions spinosa*, *and Salvia pratensis*. Larvae feed on Fabaceae.

43. *Polyommatus coridon* (PODA, 1761) - 7♂♂, 1♀ 29.06-19.07. R; Xt; Eua; LC. The species is characteristic for calcareous areas of Nandru Valley. The adults fly in June-July and visit the flowers of *Dianthus carthusianorum*, *Prunella vulgaris*, *Scabiosa ochroleuca*, *Hypericum perforatum*, *Sedum hispanicum*. Host plant of larvae is *Hippocrepis comosa*. *Lasius niger*, *Lasius alienus*, *Formica rufa*, *Myrmica sabuleti* and other ants species attend caterpillars of this species.

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44. *Argynnis paphia paphia* (LINNAEUS, 1758) - 11♂♂, 4♀♀ 24.06-23.07. VF; M; Eua; LC. It is a very common species. The adults fly in June-August at the edge of the forest and visit especially *Cirsium arvense*, *Dipsacus fullonum*, *Telekia speciosa* and *Sambucus racemosa* flowers. Larvae breed on Viola.

45. *Argynnis aglaja* (LINNAEUS, 1758) - 10♂♂, 3♀♀ 24.06-27.07. VF; M; Eua; LC. The butterfly is found in meadows and clearings, in June-July. Larvae breed on Viola species. Adults prefer *Leucanthemum vulgare*, *Salvia pratensis*, *Hypericum perforatum*, *Agrimonia eupatoria*, *Origanum vulgare*, *Thymus comosus*, *Senecio nemorensis*, *Dianthus carthusianorum*, *Erigeron annuus*.

46. *Argynnis adippe* (DENIS & SCHIFFERMÜLLER, 1758) - 9♂♂, 5♀♀ 24.06-22.07. VF; M; Eua; LC. It is characteristic for meadows, lawns and forest edges. The adults fly in June-July and visit the following plants: *Leucanthemum vulgare*, *Cirsium arvense*, *Senecio vulgare*, *Dianthus carthusianorum*, *Sambucus racemosa*, *Eryngium planum*, *Galium verum*, *Agrimonia eupatoria*, *Salvia pratensis*, *Salvia nemorosa*, *Aster amellus*, *Telekia speciosa*.

47. *Argynnis niobe niobe* (LINNAEUS, 1758) - 9♂♂, 5♀♀ 19.06-25.07. VF; M; Eua; LC. It is a common species in the studied area. The adults fly in June-July and prefer clearings and meadows. They visit *Leucanthemum vulgare*, *Galium verum*, *Origanum vulgare*, *Prunella vulgaris*, *Filipendula hexapetala*, *Agrimonia eupatoria*, *Teucrium montanum*, *Eryngium campestre*, *Dianthus carthusianorum*, *Euphorbia cyparissias*, *Salvia pratensis*, *Hypericum perforatum*. Larvae breed on Viola species.

48. *Issoria lathonia* (LINNAEUS, 1758) - 15♂♂, 5♀♀ 19.06-15.08. VF; Mxt; Eua; LC. It is a very common species found especially in meadows, lawns and forest edges. The adults fly in June-August and visit *Leucanthemum vulgare*, *Telekia speciosa*, *Aster amellus*, *Senecio nemorensis*, *Senecio vulgare*, *Solidago virgaurea*, *Tanacetum vulgare*, *Dianthus carthusianorum*. Larvae breed on Viola species.

49. *Brenthis daphne* (DENIS & SCHIFFERMÜLLER, 1775) - 5♂♂, 2♀♀ 29.06-25.07. R; M; Eua; VU. The adults fly at the edge of the forests in June-July and visit *Aster amellus*, *Leucanthemum vulgare*, *Dianthus carthusianorum*, *Tanacetum vulgare*, *Linum tenuifolium* (Fig. 18). Larvae host plants are *Rubus fruticosus* and *Rubus idaeus*.

50. *Brenthis hecate* (DENIS & SCHIFFERMÜLLER, 1775) - 4♂♂, 1♀ 29.06-25.07; VR; M; Eua; VU. It is a very rare species found especially in meadows and forest edges. The adults fly in June-July and frequent *Leucanthemum vulgare*, *Telekia speciosa*, *Galium verum*, *Mentha longifolia*. Larvae host plant is *Filipendula ulmaria*.

51. *Clossiana euphrosyne* (LINNAEUS, 1758) - 16♂♂, 4♀♀ 25.05-25.07; VR; M; Eua; LC. It is very frequent in forest edges and meadows. The adults fly in May-July and visit *Trifolium pratense*, *Lathyrus pratensis*, *Rosa canina*, *Centaurea phrygia*, *Veronica chamaedrys*, *Lysimachia nummularia*, *Medicago sativa*, *Medicago lupulina*, *Silene dubia*, *Scabiosa ochroleuca*, *Genista tinctoria*, *Galium mollugo*, *Cichorium intybus*, *Galium verum*, *Salvia pratensis*, *Prunella vulgaris*, *Filipendula hexapetala*. Larvae breed on Viola species.

52. *Clossiana selene* (DENIS & SCHIFFERMÜLLER, 1775) - 19♂♂, 4♀♀ 25.05-15.09. VF; M; Eua; LC. It prefers forest edges, lawns and meadows. The adults fly in May-August and visit *Galium verum*, *Leucanthemum vulgare*, *Aster amellus*, *Lotus corniculatus*, *Medicago lupulina*, *Lathyrus pratensis*, *Linum catharticum*, *Myosotis palustris*, *Cychorium intybus*, *Ajuga reptans*, *Centaurea phrygia*, *Trifolium repens*, *Thymus comosus*, *Prunella vulgaris*, *Telekia speciosa*. Larvae breed on Viola species.

53. *Clossiana dia dia* (LINNAEUS, 1767) - 19♂♂, 4♀♀ 20.05-29.07. VF; M; Eua; LC. It is very frequent in May-July and it is found especially in lawns, meadows and clearings. The adults visit *Aster amellus*, *Galium verum*, *Ajuga reptans*, *Lysimachia nummularia*, *Fragaria vesca*, *Leucanthemum vulgare*, *Prunella vulgaris*, *Genista tinctoria*, *Ajuga reptans*, *Centaurea phrygia*, *Lotus corniculatus*, *Vicia cracca*, *Polygala vulgaris*, *Trifolium campestre*, *Galium verum*, *Potentilla reptans*, *Artemisia vulgaris*, *Hypericum perforatum*. Larvae breed on Viola.

54. *Vanessa atalanta* (LINNAEUS, 1758) - 11♂♂, 2♀♀ 20.06-29.07. VF; Cosm; Eu; Mg; LC. It is a very frequent species especially found in July and August in open habitats and

forest edges. It is rarely observed on flowers but prefers damp ground (fig. 21). Larvae host plants are Urtica species.

55. *Vanessa cardui* (LINNAEUS, 1758) - 10♂♂, 2♀♀ 20.06-2.08. VF; M; Eua; LC. The adults fly in June-August at the edge of the forest and visit especially *Cirsium arvense*, *Telekia speciosa*, and *Dipsacus fullonum*. Larvae breed on Carduus and Urtica.

56. *Inachis io* (LINNAEUS, 1758) - 8♂♂, 2♀♀ 29.05-2.08. F; M; Eua; LC. It prefers forest edges and clearings. The adults fly in May-August and visit *Leucanthemum vulgare*, *Rubus caesius*, Rosa canina, Berberis vulgaris, *Crataegus monogyna*, *Rubus fruticosus*, *Sambucus racemosa*, *Telekia speciosa*. Larvae breed on Urtica.

57. *Aglais urticae* (LINNAEUS, 1758) - 5♂♂, 2♀♀ 19.06-22.07. F; Eu; Mg; Eua; LC. It is a strong migrant and a frequent species in the studied area, found in all sorts of habitats from lawns to forest edges. The adults fly in June-July and visit *Cirsium arvense*, *Sambucus racemosa* and *Dypsacus fullonum*. Larvae breed on Urtica.

58. *Polygonia c-album* (LINNAEUS, 1758) - 5♂♂, 2♀♀ 19.06-2.08. VF; Eu; Eua; LC. It is a very common species wich prefers forest edges and shrubs phytocoenoses. The adults fly in June-August and visit *Sambucus nigra*, *Sambucus racemosa*, *Telekia speciosa*, *Rubus fruticosus*. Larvae breed on Urtica and Humulus.

59. *Araschnia levana* (LINNAEUS, 1758) - 15♂♂, 5♀♀ 29.05-2.08. F; Mh; Eua; LC. It is a common species, found in open woodland and forest edges (Fig. 10). The adults fly in May-August and rarely visit *Crataegus monogyna*, *Prunus spinosa*, *Telekia speciosa*, *Sambucus racemosa*, *Sambucus nigra*, *Urtica dioica*. Larvae breed on Urtica.

60. *Nymphalis antiopa* (LINNAEUS, 1758) - 3♂♂ 22.07. R; Mh; Eua; LC. It is a rare species in the studied area. The adults fly in May-July and rarely visit flowers, feeding on tree-sap and rotten fruits. Larvae breed on Salix.

61. *Melitaea cinxia cinxia* (LINNAEUS, 1758) - 25♂♂, 5♀♀ 29.05-22.08. VF; M; Eua; LC. This species frequents open flowery places, meadows, lawns and the edge of the forests. The adults fly in May-August and visit many flowers like: *Leucanthemum vulgare*, *Galium verum*, *Thymus comosus*, *Lotus corniculatus*, *Medicago sativa*, *Medicago lupulina*, *Trifolium pratense, Melilotus officinalis*, *Linaria vulgaris*, *Lysimachia vulgaris*, *Vicia cracca*, *Polygala vulgaris*, *Taraxacum officinale*, *Hypericum perforatum*, *Tanacetum vulgare*.

62. *Melitaea phoebe* (DENIS & SCHIFFERMULLER, 1775) - 21♂♂, 9♀♀ 24.05-2.09. VF; Mt; Eua; LC. The adults fly in May-September in the clearings of the forests, lawns, meadows and frequent many flowers for searching nectar: *Lotus corniculatus*, *Trifolium pratense*, *Lysimachia vulgaris*, *Salvia pratensis*, *Galium verum*, *Mentha longifolia*, *Taraxacum officinale*, *Linaria vulgaris*, *Genista tinctoria*, *Ajuga reptans*, *Centaurea phrygia*,

Galium uliginosum, *Medicago sativa*, *Hypericum perforatum*, *Leucanthemum vulgare*, *Tanacetum vulgare*.

63. *Melitaea didyma* (ESPER, 1778) - 18♂♂, 8♀♀ 29.05-2.09. VF; M; Eua; LC. This species is very common in flowery meadows, lawns and forest edges. The adults fly in May-September and visit *Coronilla varia*, *Lysimachia nummularia*, *Sanguisorba officinalis*, *Galium verum*, *Genista tinctoria*, *Taraxacum officinale*, *Ajuga reptans*, *Veronica chamaedrys*, *Centaurea phrygia*, *Medicago lupulina*, *Filipendula vulgaris*, *Trifolium repens*, *Hypericum perforatum*. Larvae breed especially on Plantago.

64. *Melitaea athalia athalia* (ROTTEMBURG, 1775) - 19♂♂, 6♀♀ 26.05-5.09. VF; M; Eua; LC. It is a very common species. Butterflies frequent open flowery places, forest edges and meadows. The most preferred flowers are: *Galium odoratum*, *Salvia pratensis*. Larvae breed on Plantago and Melampyrum.

65. *Neptis hylas* (LINNAEUS, 1758) - 9♂♂, 3♀♀ 26.05-5.08. F; Mt; Eua; VU. Bivoltine species. The adults fly in May-June and July-August. They prefer damp habitats situated in the valley of the river and rarely visit the flowers of *Sambucus racemosa* (Fig. 16). Larvae breed on Fabaceae

66. *Neptis rivularis* (SCOPOLI, 1763) - 8♂♂, 2♀♀ at 19-27.07. RF; M; Eua; LC. It is a relative common species. The most species we collected in July. The adults fly at the edges of the deciduous forests and rarely visit the flowers of *Sambucus racemosa* and *Eupatorium cannabinum*. Larvae host plants are *Spiraea chamaedryfolia* and *Filipendula ulmaria*.

67. *Apatura ilia ilia* (DENIS & SCHIFFERMÜLLER, 1775) - 8♂♂, 2♀♀ 11-27.07. F; Mh; Eua; VU. It is a frequent species, characteristic for willows phytocoenoses. Adults feed especially tree sap and carrion. Larvae breed on Salix and Populus.

68. *Apatura iris* (LINNAEUS, 1758) - 11♂♂, 2♀♀ 11-27.07. VF; Mh; Eua; VU. This species, very common, was collected especially in the area of willow trees – the host plants of the larvae. The adults fly in July-August and search dung, tree sap and carrion (Fig.11)

69. *Pararge aegeria tircis* BUTLER, 1867 - 18♂♂, 7♀♀ 11.06. -27.08. VF; M; E-Vam; LC. It is a very common species, found at the edge of the forests and clearings. The adults fly in May-September and visit some plants like *Telekia speciosa*, *Eupatorium cannabinum*, *Epilobium angustifolium*. Larvae host plants are Poaceae.

70. *Lasiommata megera megera* (LINNAEUS, 1767) - 9♂♂, 2♀♀ 11.06. -27.07. RF; M; E-Vam; LC. It is relative frequent species in June-July and rarely visits *Telekia speciosa*. Larvae host plants are Poaceae.

71. *Lasiommata maera maera* (LINNAEUS, 1758) - 8♂♂, 2♀♀ 21.06. -27.07. RF; M; Eua; LC. The adults fly in June-July and frequent the edge of the forests and clearings. Larvae host plants are Poaceae.

72. *Coenonympha arcania arcania* (LINNAEUS, 1761) - 18♂♂, 6♀♀ 21.05. -27.08. VF; Mh; Eua; LC. It is a very frequent species that prefers lawns and the edge of the forests. The adults fly in May-September and visit *Leucanthemum vulgare*, *Prunella vulgaris*, *Aster amellus*, *Ajuga reptans*, *Lathyrus pratensis*, *Lysimachia nummularia*, *Galium verum*, *Ajuga reptans*, *Centaurea phrygia*. Larvae host plants are Poaceae.

73. *Coenonympha glycerion glycerion* (BORKHAUSEN, 1788) - 7♂♂, 2♀♀ 21.07. - 7.08. RF; M; Eua; LC. The adults fly in open flowery places, forest edges and clearings in July-August. They enjoy visiting *Mentha longifolia*, *Leucanthemum vulgare*, *Aster amellus*, *Thymus comosus*, and *Galium verum*. Larvae breed on Poaceae.

74. *Coenonympha pamphilus* (LINNAEUS, 1758) - 17♂♂, 7♀♀ 21.05. -7.08. VF; M; Eua; LC. It is a very frequent species in all the habitats of Nandru Valley. The adults fly in May-August and visit *Leucanthemum vulgare*, *Viola tricolor*, *Taraxacum officinale*, *Aster amellus*, *Lysimachia nummularia*, *Lathyrus vernus*, *Galium verum*, *Mentha longifolia*, *Urtica dioica*, *Trifolium pratense*, *Inula hirta*, *Melampyrum arvense*, *Linum hirsutum*, *Artemisia austriaca*, *Coronilla varia*, *Teucrium chamaedrys*, *Filipendula vulgaris*.

75. *Pyronia tithonus tithonus* (LINNAEUS, 1767)- RF; Xt; Eua; EN. It is a relative frequent species that prefers the edge of the forests and clearings. Larvae breed on Poaceae.

76. *Aphantopus hyperanthus* (LINNAEUS, 1758) - 10♂♂, 4♀♀ 23.05. -27.07. VF; M; Eua; LC. It is a very frequent species collected in forest edges and shrub associations. The adults fly in May-September. They enjoy visiting *Rosa canina*, *Crataegus monogyna*, *Sambucus nigra*, *Sambucus racemosa*, *Galium verum*, *Telekia speciosa*, *Urtica dioica*, *Taraxacum officinale*, *Centaurea phrygia*, *Cichorium intybus*, *Medicago lupulina*, *Trifolium pratense*, *Trifolium campestre, Salvia pratensis*, *Galium mollugo*, *Melilotus officinalis*, *Artemisia austriaca*, *Linaria vulgaris*. Larvae breed on Poaceae.

77. *Maniola jurtina jurtina* (LINNAEUS, 1758) - 11♂♂, 2♀♀ 21.05. -7.09. VF; M; E-Vam; LC. It is a very frequent species, specific to the edge of the forests and clearings. The adults fly in May-September and visit *Telekia speciosa*, *Sambucus racemosa*, *Leucanthemum vulgare*, *Epilobium angustifolium*, *Taraxacum officinale*, *Galium verum*, *Linaria vulgaris*, *Salvia pratensis, Geranium robertianum*, *Melica uniflora*, *Urtica dioica*, *Geranium phaeum*, *Origanum vulgare*, *Mentha longifolia*, *Myosotis palustris*, *Eupatorium cannabinum*, *Melilotus officinalis*, *Urtica dioica*, *Senecio nemorensis*. Larvae host plants are Poaceae.

78. *Erebia aethiops* (ESPER, 1777) - 11♂♂, 2♀♀ 21.07. -7.08. VF; M; Eua; LC. It is a mountainous species, very frequent in the area of Nandru Valley. The adults visit nectar sources in forest edges and scrubby phytocoenoses. The most visited plants are: *Telekia speciosa*, *Sambucus racemosa*, *Leucanthemum vulgare*, *Epilobium angustifolium*, *Eupatorium cannabinum* (Fig. 12-13). Larvae host plants are Poaceae.

79. *Melanargia galathea* (LINNAEUS, 1758) - 11♂♂, 2♀♀ 21.06. -27.07. VF; M; Eua; LC. It prefers meadows, lawns and the edge of the forests (Fig. 14). The adults fly in June-July and visit *Leucanthemum vulgare*, *Aster amellus*, *Salvia pratensis*, *Origanum vulgare*, *Senecio nemorensis*, *Scabiosa ochroleuca*, *Inula hirta*, *Centaurea phrygia*, *Cichorium intybus*, *Centaurium umbellatum*, *Galium verum*, *Cirsium arvense*, *Carduus nutans*, *Dianthus carthusianorum*. Larvae host plants are Poaceae.

80. *Minois dryas* (SCOPOLI, 1763) - 7♂♂, 2♀♀ 9.07. -7.08. RF; Mt; Eua; LC. It prefers forest edges. The adults fly in July-August and rarely visit *Sambucus racemosa*. Larvae host plants are Poaceae.

81. *Hipparchia fagi* (SCOPOLI, 1763) - 8♂♂, 1♀ 9.07. -27.07. RF; M; Eua; LC. This is a relative frequent species that prefers the edge of the forests. The adults fly in June-July. We never see this species on the flowers. The adults prefer to rest on the leaves and trunks of the trees. Larvae host plants are Poaceae.

82. *Brinthesia circe pannonica* FRUHSTORFER, 1911 - 6♂♂, 1♀ 9.07. -25.07. F; Mt; Eua; NT. It is a common species characteristic for the edge of the forest. The adults fly in July and rarely visit the flowers of *Sambucus racemosa*. Larvae host plants are Poaceae.

The analyse of the lepidopterological material show us that the majority of the species belongs to Nymphalidae (38 species) and Lycaenidae (24 species) (Tab. 1).

Tab. 1- Number of species in comparison with the families of Lepidoptera (S.ord. Rhopalocera)

Families	Number of species
Hesperiidae	6
Papilionidae	3
Pieridae	10
Lycaenidae	24
Nymphalidae	38

The analyse of the ecological exigencies points out that most of species are mesophilous (57%), mesothermophilous (17%) and mesohygrophilous (11%). Xerothermophilous species (5% from all the species) are *Scoliantides orion*, *Polyommatus coridon*, *Polyommatus daphnis* and *Pyronia tithonus* (Fig. 1).

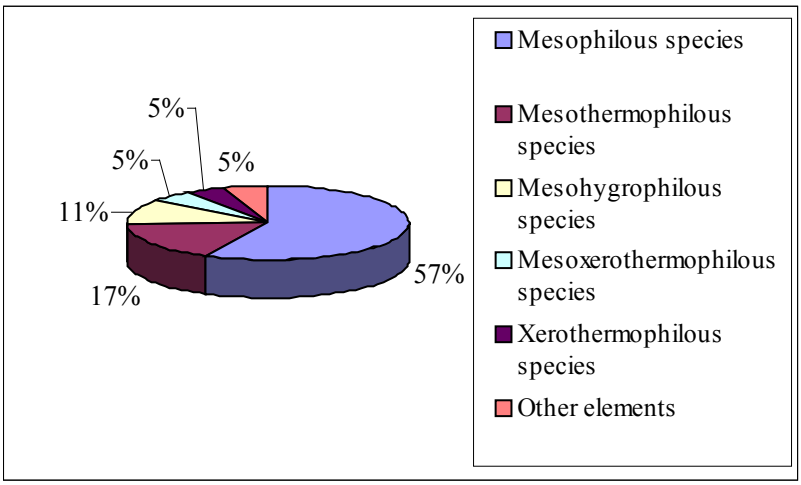

Fig. 1- The analysis of the ecological exigencies of the Macrolepidoptera species (S. ord. Rhopalocera) of Nandru Valley

The analysis of the geographical distribution points out that the majority of the species has an euroasiatic spreading. Westasiatic-mediterranean species are *Thymelicus sylvestris*, *Thymelicus acteon*, *Gonepteryx rhamni*, etc. Endemic taxon is *Parnassius mnemosyne transsylvanica*.

The analysis of the categories of endangerment according to IUCN criteria points out that *Satyrium pruni*, *Scoliantides orion lariana*, *Maculinea arion*, *Thecla betulae*, *Lycaena virgaureae*, *Parnassius mnemosyne transsylvanica*, *Papilio machaon*, and *Brinthesia circe* are classed as near threatened. *Lycaena dispar rutila*, *Satyrium w-album*, *Brenthis daphne*, *Brenthis hecate*, *Neptis hylas*, *Apatura ilia ilia* and *Apatura iris* are classed as vulnerable species. Endangered species are *Maculinea alcon* and *Pyronia tithonus*.

CONCLUSIONS

The habitats of Nandru Valley are rich in Lepidoptera species. This is due to the microclimate conditions and a rich flora and vegetation. Some vulnerable and endangered species in the fauna of Lepidoptera of Romania were recorded: *Maculinea alcon*, *Lycaena dispar rutila*, *Satyrium w-album*, *Brenthis daphne*, *Brenthis hecate*, *Apatura ilia ilia* and *Apatura iris*. Adults enjoy visiting a lot of plant species as nectar source. The most visited plants are *Leucanthemum vulgare*, *Telekia speciosa*, *Sambucus racemosa*, *Thymus comosus*,

Salvia pratensis, *Galium verum*, *Origanum vulgare*, *Rosa canina*, *Rubus caesius*, *Rubus fruticosus*, *Medicago lupulina*, *Genista tinctoria*, *Eupatorium cannabinum*, *Epilobium angustifolium*, *Dianthus carthusianorum*, Trifolium pratense, *Cirsium arvense*, *Centaurea phrygia*, *Veronica chamaedrys*, *Lysimachia nummularia*, *Silene dubia*, *Scabiosa ochroleuca*, and *Cichorium intybus*.

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Fig. 2. Deciduous forests in Nandru Valley

Fig. 3. Rocky Hills and pastures in Nandru Valley

Fig. 4. Lawns with Centaurea cyanus

Fig. 5. Lawns with Centaurium umbellatum

Fig. 6. Epilobium angustifolium at the forest road

Fig. 7. Telekia speciosa in Nandru Valley

Fig. 8. Lawns with Dianthus carthusianorum

Fig. 9. Lawns with Galium verum

Fig. 10. Araschnia levana

Fig. 11. Apatura iris

Fig. 12, 13. Erebia aethiops

Fig. 14. Melanargia galathea

Fig. 15. Polygonia c-album

Fig. 16. Neptis hylas

Fig. 17. Lycaena virgaureae

Fig. 18. Brenthis daphne

Fig. 19. Hesperia comma

Fig. 20. Maculinea arion

Fig. 21. Vanessa atalanta

Foto: Marcela Balazs, Dorin Cărăbeț, Silvia Burnaz

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NEW RECORDS OF THE SPECIES OF THE GENUS *VELIA* LATREILLE 1804, TAMANINI 1947 (GERROMORPHA: VELIIDAE) IN ROMANIA

DANIELA MINODORA ILIE
ANA DAVIDEANU

Rezumat

Noi semnalări ale speciilor genului *Velia* Latreille 1804, Tamanini 1947 (Gerromorpha: Veliidae) în România

În această lucrare prezentăm noi date referitoare la răspândirea speciilor din genul *Velia* în România, considerate rare în fauna țării noastre. În probele prelevate din pârâul Sărata am identificat 15 exemplare mascule aparținând speciei *Velia rivulorum* şi 7 exemplare femele din specia *Velia (Plesiovelia) caprai*. Este prima semnalare a speciilor din genul *Velia* în bazinul Oltului.

Lucrarea conține şi o scurtă descriere a genului şi caractere de identificare a celor două specii colectate de noi.

Key words : Velia Genus, new records, Romania

The species of the family Veliidae live on the water surface. They have their body covered with a thick pubescence, especially on the ventral side and on the legs. The head is shorter than the thorax including the scutellum. Both the antennae and the rostrum are made up of four segments. The intermediary legs are placed at an approximately equal length from both the fore and hinder legs. The hemi elytra present a short clavus and the corium and the membrane are not clearly separated.

The family Veliidae is represented on the territory of our country by two genera: *Microvelia* (with two species) and *Velia* (with six species).

The species of genus *Velia* are longer than those from genus *Microvelia*, having the length between 6-9 cm. They have two sensorial organs pseudocellar having the shape of a comb like the letter Y. These insects use, in their fast shifting on the water, only the intermediary legs. The fore legs are used for catching the prey. The tarsi have three segments.

At the males, the fore tibias have brushes for toilet and combs; the hinder thighbones are thicker and have two or three strong and sharp teeth (generally two), associated with other teeth on the ventral edge. These teeth are distributed on two rows, the strongest ones being in the external row. The hinder tibias are long and curved to the inside part otherwise the intermediary ones. As well as the hinder thighbone, the hinder tibias of the males have a row of sharp asperities situated on the inner edge. Mesonotum is almost all covered by pronotum at the wingless specimens. There are macropterous, brachypterous and wingless individuals.

The morphology of the 8th and 9th tergites, of the male's parameres and the sclerites of the aedeagus are among the best characters for identification (Fig. 1 and Fig. 2).

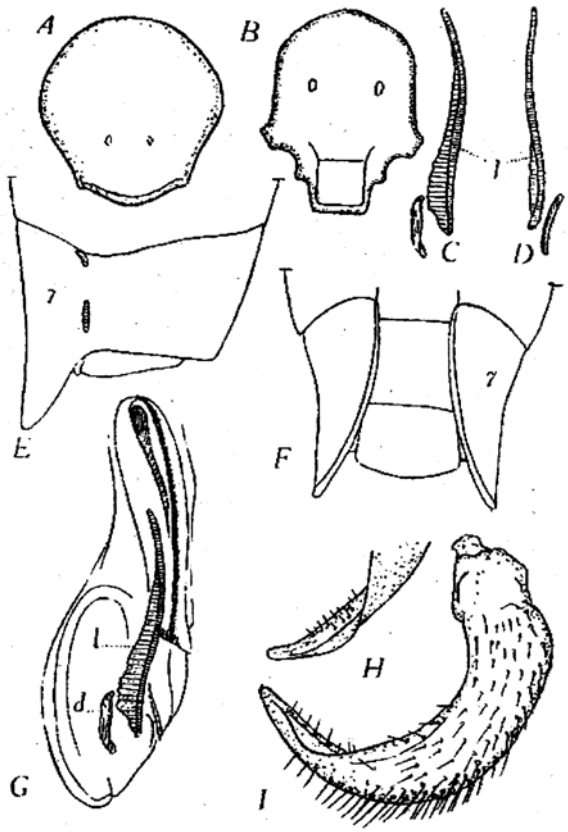


Fig. 1: *Velia caprai*
A: the 9th abdominal tergite at female;
B: the 9th abdominal tergite at male;
C–D: sclerites of the aedeagus;
E: the 7th abdominal segment of female – on a side;
F: female abdomen extremity - dorsal;
G: the aedeagus fitting of a male - profile; H: paramere extremity;
I: paramere (after Poisson R., 1957).

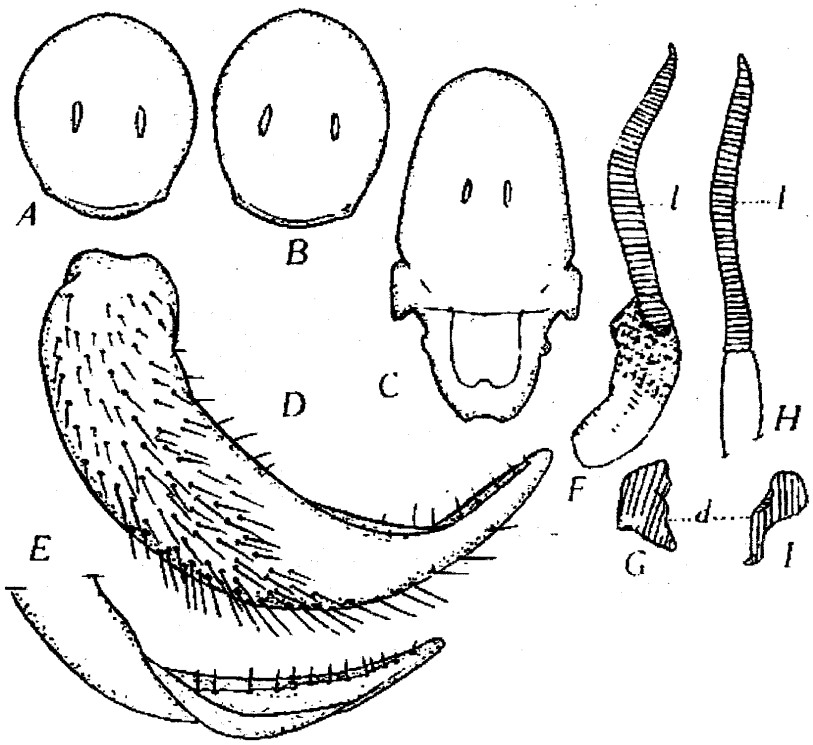


Fig. 2: *Velia rivulorum*
A–B: two aspects of 9th abdominal tergite at female;
C : the 9th abdominal tergite at male;
D–E: parameres;
F–G: sclerites of the aedeagus – profile;
H –I: sclerites of the aedeagus – front side;
(after Poisson R., 1957).

Ecology: the species of genus *Velia* are to be found on still waters of lakes and pounds or along the shady rivers. They are gregarious and predatory insects.

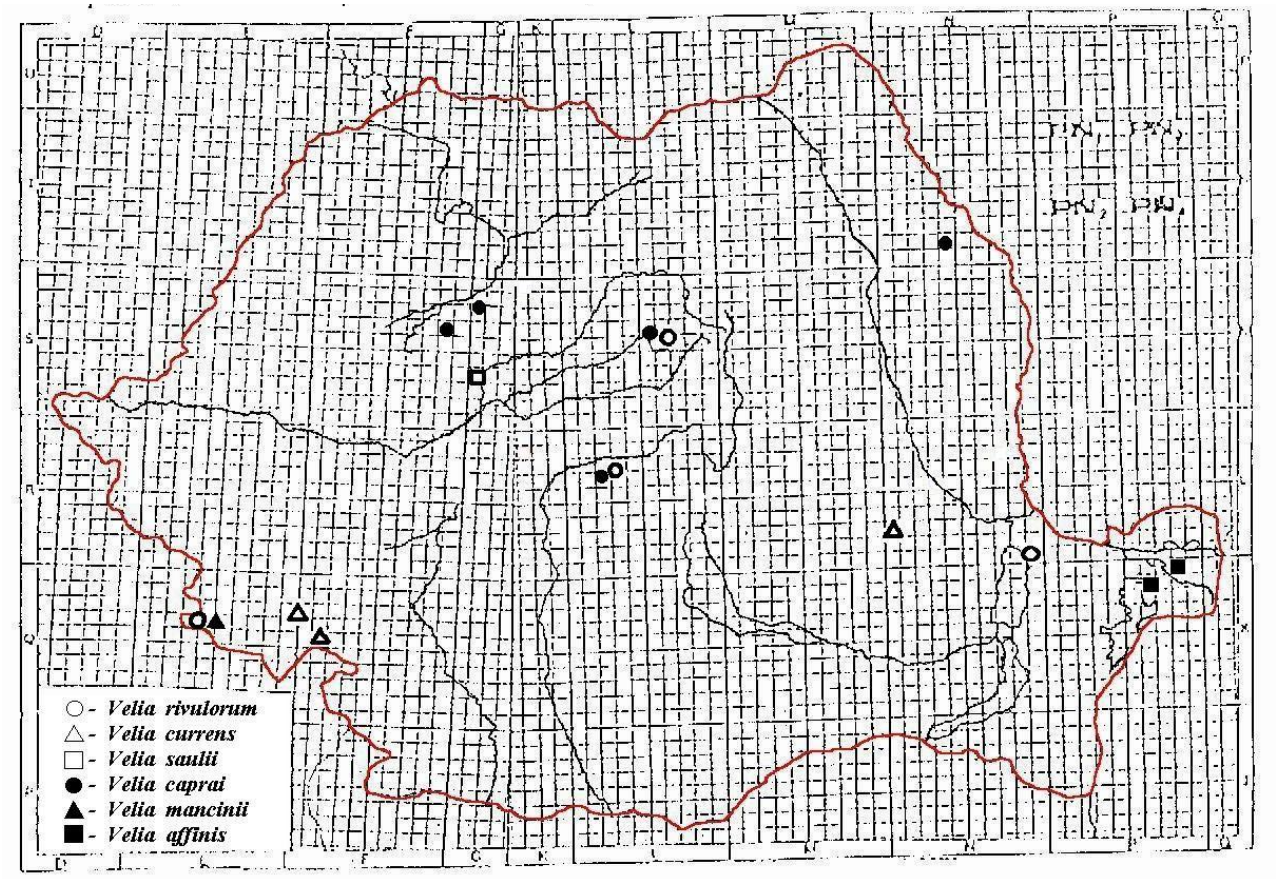
Spreading: the species of genus *Velia* are considered to be rare in Romania (the records are very few). They have been recorded in the following places in Romania (Map 1):

- *Velia rivulorum*: Caraş-Severin county: Baziaş 1873 (Horváth G.), Sfânta Elena (Horváth G.); Harghita county: Praid 10.09.2001 (Ilie Daniela); Sibiu county: Sărata 4.05.2002 (Ilie Daniela); Tulcea county: Măcin (Sienkiewicy I.).
- *Velia currens*: Buzău county: Râmnicu Sărat (Montandon A.); Caraş-Severin county: Mehadia (Lörincy A.); Mehedinţi county: Orşova (Horváth G.); Sălaj county: Ungurului Valley (Horváth G.); Cernei Valley (Botoşăneanu L.); Arieşurilor basin 1950-1952 (Botoşăneanu L.); Dobrogea (Horváth G.), Plopişului Mountains (Horváth G.).
- *Velia saulii*: Alba county: Aiud IV !970 (Kis B., Davideanu Ana).

- *Velia caprai*: Cluj county: Cluj IV 1976, Băişoara VII 1978; Iaşi county: Bârnova VI 1997; Zarandului Mountains VIII 1968 (all the records belong to the authors Kis B., Davideanu Ana); Harghita county: Praid 10.09.2001 (Ilie Daniela); Sibiu county: Sărata 4.05.2002 (Ilie Daniela).
- *Velia mancinii*: Caraş-Severin county: Baziaş 1873 (Benedek P.).
- *Velia affinis*: Tulcea county: Murighiol VIII 1972 (Kis B., Davideanu Ana), Caraorman VIII 1995 (idem).

We collected individuals from species *Velia rivulorum* and *Velia (Plesiovelia) caprai* from Sărata rivulet, a tributary of the Olt River from Făgăraş Mountains. The sampling stations are situated on the superior course of the rivulet upstream the locality, in the forest zone. The individuals are to be found on the banks of the rivulet, in quiet and shady places. On the 4th of May 2002 we collected 15 male individuals from *Velia rivulorum* species and 7 female individuals from *Velia (Plesiovelia) caprai* species, all being wingless.

Having the chance of the first record of these two species in the Olt basin, we believe that the further investigations that we intend to make on the other tributary of Olt River from Făgăraş Mountains will get to positive results.



Map 1: The spreading of the species of genus *Velia* in Romania.

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CONTRIBUTIONS IN GETTING TO KNOW THE DIVERSITY OF THE CERAMBICIDE FAUNA (INSECTA: COLEOPTERA: CERAMBYCIDAE) FROM THE „NORDUL GORJULUI" POTENTIAL NATURAL PARK, COUNTY GORJ, ROMANIA

CORNELIA CHIMISLIU

Rezumat

Contributii la cunoasterea diversității faunei de cerambicide (Insecta: Coleoptera: Cerambycidae) din potentialul parc natural „Nordul Gorjului" - judetul Gorj, Romania

Lucrarea sintetizează speciile de cerambicide menționate în literatura de specialitate consultată, publicată în perioada anilor 1928-2006, din perimetrul potanțialului Parc Natural „Nordul Gorjului". Au fost identificate 57 de speciiincluse în 41 de genuri, colectate în 20 de situri. În cadrul acestora, 3 sunt specii protejate de interes comunitar: *Cerambyx cerdo* LINNAEUS 1758, *Morimus asper funereus* Mulsant 1862, **Rosalia alpina* (LINNAEUS 1758). Ultima este specie prioritară în Directiva Habitate, Convenția de la Berna şi Legea 345/2006. Majoritatea speciilor au fost semnalate o singură dată. Cauzele posibile ale semnalărilor puține sunt: cercetarea insuficientă a zonei, micşorarea efectivului indivizilor speciilor sau chiar posibila dispariție a speciilor din zonă.

Key words: diversity, cerambicide, "Nordul Gorjului", Natural Park, Gorj, Romania

INTRODUCTION

One of the most important objective of the study dr. eng. Cristian D. Stoiculescu (I.C.A.S., Bucharest) set forth was a better understanding of the coleoptera fauna from the "Nordul Gorjului" Potential Natural Park area. Cristian D. Stoiculescu began this study in

2005, and he started working out the necessary papers so that the National Park "Nordul Gorjului" be legal. Within this study, we have worked out a list comprising the local Coleopteras, which I intended to publish. I wanted to do that as I noticed a great variety in point of the entomofauna, and despite that, the area has not been studied thoroughly. In a previous paper I succeeded in introducing the scarabaeoidea coleopteras in the international scientific papers, so that they become widely known. (CORNELIA CHIMISLIU 2006 b).

The present paper contains a synthesis of all the data from the scientific literature, data about the most common cerambycidae in this area.

The first data about this group of coleopteras are registered in documents published by O. Marcu in 1928 and 1929. Further information, very little though, are to be found beginning with 1962, in scientific documents belonging to professors at Entomology, Faculty of Agriculture, University of Craiova. The respective datahave been consolidated by Bobîrnac et al. (1999). Other species of Cerambicydae within the Natural Park, are to be found in the paper published by SERAFIM RODICA & all. 2004.

The species are protected (community interest), and they were noticed up to 2006 in the area of the "Nordul Gorjului" Potential Natural Park. The author has made this known by publishing important data (CORNELIA CHIMISLIU 2006a)

MATERIAL AND RESEARCHING METHODS

In previous papers, we have stated the park's site and also the importance of declaring this area as a Natural Park (CHIMISLIU 2006 a, 2006 b).

The base material consists in several data published in scientific papers between 1928 and 2006. The mentions made by S. Panin and N. Savulescu (1961) are also included, although the exact places were not stated, only generally mentioned as "species all over the country" or "all over the climate areas".

The species' taxonomy and list of terms have been updated according to the specific systems in Europea Fauna (www.faunaeur.org.). As some species underwent changes in name, the old name was also mentioned.

Each species had the collecting site mentioned, and also the authors in whose papers they were referred to.

There are still a lot of bibliographical data about this subject to come, however, the present paper is a synthesis of the specific data we know so far about the cerambycidae.

Abbreviations

Ber – 2 - species included in Annex nr. 2 (Fauna species under high protection), the Berne Convention (Law 13/1993)

HD-2- Species included in Annex nr. 2, the Biotope Standard 92/43/CEE

* - priority species in the Biotope Standard, the Berne Convention and Law 345/2006

Danger levels: VU – vulnerable taxons = Vulnerable; according to IUCN 2006

4^A – species included in Annex 4A (Animals and plants that need a high protection and the community interest), Law 345/2006.

RESULTS AND DISCUSSIONS

After having gathering all data, 57 cerambycidae species were identified, species included in 41 genera, caught in 20 sites. As the vegetation is very rich, we suppose the real number of the species living in this area is higher.

Within the species we have identified, 3 of them are protected and have the community interest: *Cerambyx cerdo* Linnaeus 1758, *Morimus asper funereus* Mulsant 1862, * *Rosalia* alpina (Linnaeus 1758). The latter is considered a priority species in the Biotope Standard, the Berne Convention and the Law 345/2006 (CHIMISLIU CORNELIA 2006a). The fact they live in this biotope is of utmost importance for the area's rich entomofauna, and also should be a step forward in its protection and maintenance.

The 3 species under protection by the community legislation are vulnerable species (Vulnerable), according to IUCN.

The present paper is an important contribution in getting to know the rich cerambicide species in the area and may be a starting point for those interested in a better cerambicide study in particular, but also the rich coleopteras fauna in general.

List of collecting sites

Baia de Fier

Bumbeşti

Cheile Bistriței

Cheile Galbenului

Ch. Oltețului

Cheile Sohodol

Cloşani

Lainici

Munții Parâng

Novaci

Oslea

Păpuşa (top)

Piatra Cloşani

Pietrele Albe

Rânca

Straja

Tismana

Valea Gilortului

Valea Sohodol

Next, the identified species in alphabetical order:

Familia Cerambycidae

Aegomorphus clavipes (SCHRANK, 1781) - Ch. Sohodol (BOBÎRNAC & all. 1999).

Aegosoma scabricorne (SCOPOLI, 1763) = *Megopis (Aegosoma) scabricornis* (SCOPOLI, 1763) - Ch. Sohodol, Bumbeşti (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Agapanthia dahli (RICHTER, 1821) – all over the country (PANIN & SĂVULESCU 1961), Ch. Sohodol, Tismana (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Agapanthia villosoviridescens (DE GEER, 1775) - Ch. Sohodol, Tismana (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Agapanthia violacea (FABRICIUS, 1775) - Cloşani (MARCU 1928).

Anastrangalia dubia (SCOPOLI, 1763) = *Leptura dubia* (SCOPOLI 1763) - Pietrele Albe (SERAFIM RODICA & all. 2004).

Anastrangalia sanguinolenta (LINNAEUS, 1761) = *Leptura sanguinolenta* (LINNAEUS, 1761) – Rânca (SERAFIM RODICA & all. 2004).

Anisorus quercus (GOEZE, 1783) – Pietrele Albe (SERAFIM RODICA & all. 2004).

Arhopalus rusticus (LINNAEUS, 1758) – *Xylotrechus rusticus* (LINNAEUS 1758) – Straja (SERAFIM RODICA & all. 2004).

Aromia moschata (LINNAEUS, 1758) – all over the country (PANIN & SĂVULESCU 1961), Piatra Cloşani (MARCU 1928), Novaci, Ch. Sohodol (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Callidium violaceum (LINNAEUS, 1758) - Rânca, Straja (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Cerambyx cerdo (LINNAEUS, 1758) – all over the country (PANIN & SĂVULESCU 1961), (HD-2, Ber–2, VU, 3^A) – Bumbeşti (BOBÎRNAC & all. 1999), Novaci, 1967, (SERAFIM RODICA & all. 2004), Cheile Bistriţei (CHIMIŞLIU CORNELIA 2006a).

Cerambyx miles BONELLI, 1812 – Piatra Cloşani (MARCU 1928).

Cerambyx scopolii FUESSLY, 1775 – all over the country (Panin S. & Săvulescu N. 1961) - Piatra Cloşani (MARCU 1928), Parâng Mountains, Păpuşa Top, Parâng Mountains, Ch. Sohodol (SERAFIM RODICA & all. 2004).

Cerambyx welensii (KSTER, 1846) = *C. velutinus* Brullé 1832 – Novaci (BOBÎRNAC & all. 1999).

Chlorophorus figuratus (SCOPOLI, 1763) – probably all over the country (PANIN & SĂVULESCU 1961), Piatra Cloşani (MARCU 1928), Ch. Sohodol (SERAFIM RODICA & all. 2004).

Chlorophorus herbsti (BRAHM, 1790) –Straja (SERAFIM RODICA & all. 2004).

Chlorophorus varius (MÜLLER, 1766) – all the climate areas (PANIN & SĂVULESCU 1961), Baia de Fier, Bumbeşti (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Clytus tropicus PANZER, 1795 – Novaci (BOBÎRNAC & all. 1999).

Dinoptera collaris (LINNAEUS, 1758) – Pietrele Albe (SERAFIM RODICA & all. 2004).

Gaurotes (Carilia) virginea (LINNAEUS, 1758) = *Carilia virginea* (LINNAEUS, 1758) – Oslea (MARCU 1928), Tismana (SERAFIM RODICA & all. 2004).

Hylotrupes bajulus (LINNAEUS, 1758) – all over the country (Panin S. & Săvulescu N. 1961), Tismana (MARCU 1928).

Isotomus speciosus (SCHNEIDER, 1787) = *Caloclytus speciosus* Schneid. – Piatra Cloşani (MARCU 1928).

Lamia textor (LINNAEUS, 1758) - Bumbeşti, Ch. Sohodol (BOBÎRNAC & all. 1999).

Leptura erratica (LINNAEUS, 1758) – Cloşani (MARCU 1928).

L. quadrifasciata LINNAEUS, 1758 - Novaci, Straja, Vulcan, Ch. Olteţului, Parâng Mountains, Ch. Sohodol (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Lepturobosca virens (LINNAEUS, 1758) - Oslea (MARCU 1928), Rânca, Bumbeşti (SERAFIM RODICA & all. 2004).

Monochamus sartor (FABRICIUS, 1787) – all over the country (PANIN & SĂVULESCU 1961), Novaci, Rânca (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Morimus asper funereus MULSANT, 1862 = *Morimus funereus* (MULSANT, 1863) (HD–2, VU, 3^A) - Piatra Cloşani (MARCU 1928) – V. Sohodol (BOBÎRNAC & all. 1999), Bumbeşti, Lainici, Ch. Sohodol, Rânca, Novaci (SERAFIM RODICA & all. 2004), Ch. Sohodol (CHIMIŞLIU CORNELIA 2006a).

Oplosia cinerea (MULSANT, 1839) = *Oplosia cinerea fennica* PAYKULL, 1800) – Pietrele Albe (SERAFIM RODICA & all. 2004).

Oxymirus cursor LINNAEUS, 1758 Linnaeus 1758 = *Toxotus cursor* (LINNAEUS, 1758) - Novaci (BOBÎRNAC & all. 1999), Novaci, Parâng Mtns (SERAFIM RODICA & all. 2004).

Pedestredorcadion murrayi (KÜSTER, 1847) = *Dorcadion (Pedestredorcadion) murrayi* KÜSTER, 1847 - Baia de Fier (SERAFIM RODICA & all. 2004).

P. pedestre (PODA, 1761) = *Dorcadion (Pedestredorcadion) pedestre* (Poda, 1761) – spread in all the country (PANIN & SĂVULESCU 1961), Păpuşa Top, Parâng Mts, Lainici, Ch.. Sohodol (SERAFIM RODICA & all. 2004).

Pachytodes cerambyciformis (SCHRANK, 1781)- Cloşani, Ch. Sohodol, Pietrele Albe (MARCU 1928), Ch. Sohodol, Pietrele Albe (BOBÎRNAC & all. 1999), (SERAFIM RODICA & all. 2004).

Paracorymbia (Melanoleptura) scutellata (FABRICIUS, 1781) – all the climate areas (PANIN & SĂVULESCU 1961), Oslea, Piatra Cloşani (MARCU 1928), Ch. Sohodol, Pietrele Albe (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Phytoecia pustulata (SCHRANK, 1776) – all over the country (PANIN & SĂVULESCU 1961), Piatra Cloşani (MARCU 1928).

Pidonia lurida (FABRICIUS, 1792)- Novaci, Valea Gilortului, Pietrele Albe (SERAFIM RODICA & all. 2004).

Plagionotus arcuatus (LINNAEUS, 1758) – all over the country (PANIN & SĂVULESCU 1961), Cloşani (MARCU 1928), Baia de Fier (SERAFIM RODICA & all. 2004).

Prionus (Prionus) coriarius (LINNAEUS, 1758) - Bumbeşti, Novaci, Straja, Ch. Sohodol, Valea de Peşti (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Pseudovadonia livida (FABRICIUS, 1776) = *Vadonia livida* (FABRICIUS 1776) - Cloşani (Marcu O., 1928), Sohodol, Rânca (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Purpuricenus budensis (GOEZE, 1783) - Novaci, Pietrele Albe (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Rhagium (Megarhagium) mordax (DE GEER, 1775) – Ch. Sohodol, Novaci, Pietrele Albe (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Rhagium (Megarhagium) sycophanta (SCHRANK, 1781) - Oslea (MARCU 1928), Novaci, (SERAFIM RODICA & all. 2004).

Ropalopus clavipes (FABRICIUS, 1775) - Cloşani (MARCU 1928).

Ropalopus insubricus (GERMAR, 1824) - Piatra Cloşani (MARCU 1928).

****Rosalia alpina*** (LINNAEUS, 1758) (HD*- 2, Ber – 2*, VU, 3^{A}) – all over the country (PANIN & SĂVULESCU 1961), Piatra Cloşani (MARCU 1928), V. Sohodol (BOBÎRNAC & all.

1999a), Bumbeşti, Pietrele Albe, Ch. Sohodol (SERAFIM RODICA & all. 2004, Cheile Bistriței, Cheile Galbenului, Cheile Sohodol (CHIMIŞLIU CORNELIA 2006a).

Rutpela maculata (PODA, 1761) - Piatra Cloşani, Oslea (MARCU 1928), V. Sohodol (BOBÎRNAC & all. 1999), Munții Parâng Rânca, Ch. Sohodol, Pietrele Albe (BOBÎRNAC & all. 1999, SERAFIM RODICA & all. 2004).

Saperda carcharias (LINNAEUS, 1758) - Tismana (MARCU 1928).

Saphanus piceus (LAICHARTING, 1784) - Cloşani (MARCU 1928).

Stenopterus flavicornis KÜSTER, 1846 - Cloşani (MARCU 1928).

Stenurella melanura (LINNAEUS, 1758)= *Strangalia melanura (*LINNAEUS *1758)* – all over the country (PANIN & SĂVULESCU 1961), Cloşani, (MARCU 1928), Ch. Sohodol (BOBÎRNAC & all. 1999; SERAFIM RODICA & all. 2004).

Stenurella nigra (LINNAEUS, 1758) = *Strangalia nigra* (LINNAEUS 1758) – all over the country (PANIN & SĂVULESCU 1961),- Pietrele Albe (SERAFIM RODICA & all. 2004).

Stenurella septempunctata (FABRICIUS, 1792) = *Strangalia septempunctata* (FABRICIUS, 1792) the oak and the beech tree climate area, but also in the mtns (PANIN & SĂVULESCU 1961), - Cloşani, Piatra Cloşani (MARCU 1928), V. Sohodol (BOBÎRNAC & all. 1999), Ch. Sohodol, Pietrele Albe (SERAFIM RODICA et al., 2004).

Stictoleptura rubra (LINNAEUS, 1758) = *Leptura rubra* (LINNAEUS, 1758) - Ch. Sohodol, Ch. Olteţului (BOBÎRNAC & all. 1999), Rânca, Baia de Fier, Ch. Sohodol, Ch. Olteţului, Parâng mtns (SERAFIM RODICA & all. 2004).

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CONCLUSIONS

Given the brief data about the presence of the Cerambycidae in "Nordul Gorjului" Potential Natural Park, it is very important to perform systematic research in order to get a better understanding of this rich group of insects.

As these protected insect species, of community interest, along with other similar vertebrate and invertebrate species were identified, can be a well-grounded reason for those who began the necessary study to make "Nordul Gorjului" National Park legal.

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ON THE ZOOGEOGRAPHY OF (*LYNX LYNX* L.) IN 1969, IN ROMANIA

SORIN GEACU

Rezumat

Asupra zoogeografiei râsului (Lynx lynx L.) din România în 1969

Autorul prezintă date privind distribuţia geografică a râsului (Lynx lynx L.) în România. Analiza este bazată pe datele centralizate ale efectivelor de râs din Carpaţii României obţinute prin evaluarea cinegetică a speciei per district de vânătoare, existentă la nivelul anului 1969, considerat moment important în cunoaşterea zoogeografiei speciei. După câteva consideraţii generale bio-ecologice, este prezentată distribuţia şi densitatea speciei în Carpaţii Orientali, Meridionali şi Occidentali.

Key words : Lynx lynx, zoogeography, Romania

INTRODUCTION

The lynx is a medium-sized feline, with the males of the species weighing 20-27 kg and its females 16-20 kg. The largest continuous area of this species in Europe is found in the Russian Federation and the Scandinavian Peninsula, while elsewhere on the Continent distributions are fragmentary, within various massifs, and not very big populations.

The species started shrinking numerically as man began tampering with its habitat, the lynx being known as very sensitive to such interventions. According to some authors (PROMBERGER-FÜRPAß & IONESCU 2000), the human impact on the geographical landscape is responsible for the extinction of this species, the first among the vertebrates to undergo it.

The lynx is at home in the vast mountain forests mainly the resinous forests full of thickets and rocks situated, as a rule, in hardly accessible places. It is seldom found at heights below 800 m.

An unrivalled predator, the lynx feeds exclusively on animals. It has no other foes but man.

Since the size of its populations had shrank dramatically before 1930, sustained efforts succeeded in having it declared a "monument of nature" (a rare animal in Romania, numbering only 100 specimens in 1933), a status sanctioned in the Journal of the Romanian Kingdom Council of Ministers No. 734/1933. In this way, catching or selling the lynx was banned.

These measures contributed to the species numerical increase up to 500 specimens in 1950 and around 600 in 1954.

Given that the lynx populations of certain mountainous sectors kept multiplying considerably, it started being listed under the game category and by Order No. 637/March 14, 1953 of the Ministry of Forest Economy, hunting it was permitted the year round by special shooting licence from the Bucharest-based Game Economy Direction. However, small numbers were shot down: 38 in 1954, 42 in 1955, 20 in 1956, 30 in 1957 and 28 in 1958 (EMIL, 1976).

In time, as the damage caused to non-predatory game (the deer in particular) was significant, it was decided (1959) to control the lynx populations by annual shootings, the quotas being set for each Regional Forestry Direction apart. And yet, despite drastic measures being taken, very few individuals could be shot because the species is very shrewed and always on the alert. For exemple, of the 50 specimens planned to be hunted in 1959 in the former Baia Mare Region (currently the counties of Maramureş and Satu Mare), no more than 8 were brought down. Beginning with 1962, lynx hunting was permitted only 8 months/year, provided one had a shooting licence.

In 1969 the species numbered 931 members.

MATERIAL AND METHOD

The analysis is based on county level centralised data of lynx effectives obtained by evaluating cynegetic species per hunting district existing in 1969.

The next step was to elaborate a distribution map (fig. 1) and make some regional analyses.

Althrough the lynx is a very active species, controlling large areas, and difficult to observe, yet the data released in the walke of game evaluations, offer a quantitative groundwork, even if not in absolute terms, relevant for our purpose.

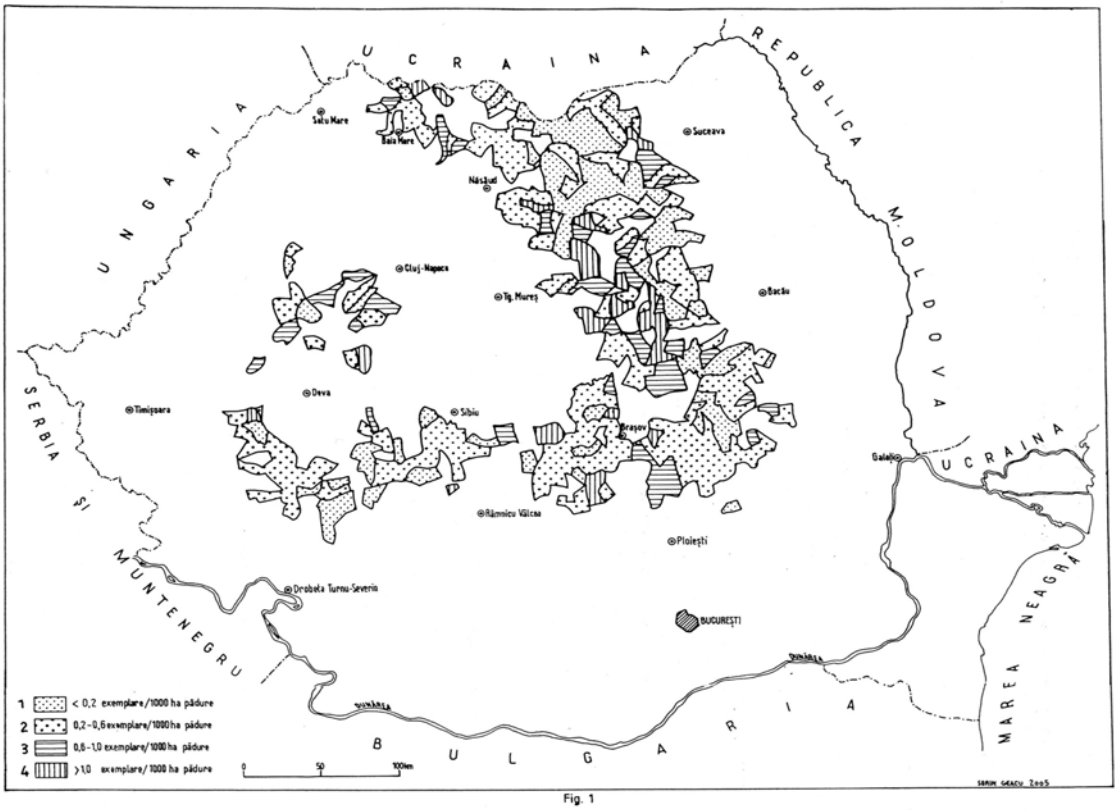

Fig. 1

Fig. 1 - The geographical distribution of the Lynx lynx L. in 1969 Romania. **1**. under 0.2 specimens/1,000 forest ha; **2.** 0.2-0.6 specimens/1,000 forest ha; **3.** 0.6-1.0 specimens/1,000 forest ha; **4.** over 1.0 specimens/1,000 forest ha.

THE LYNX IN ROMANIA (1969). GENERAL CONSIDERATIONS

Official records indicate the presence of 931 specimens, most of them in the forests of the Harghita and Suceava counties (132 and 109 specimens, respectively).

The species was found in 25 counties (66% of the total counties in Romania at the time).

A classification of counties, by number of identified specimens (in decreasing order), indicates the following:

- over 100 specimens in 2 counties (Harghita and Suceava);
- 50-99 specimens in 4 counties (Braşov, Covasna, Vrancea and Maramureş);
- 25-49 specimens in 11 counties (Bacău, Bistriţa-Năsăud, Neamţ, Buzău, Prahova, Sibiu, Vâlcea, Caraş-Severin, Mureş, Hunedoara and Alba);
- 10-24 specimens in 4 counties (Timiş, Argeş, Cluj and Dâmboviţa);
- 6-9 specimens in 4 counties (Arad, Bihor, Gorj and Satu Mare).

A classification by *historical provinces* shows that the mountains of Transylvania, Moldova and Bucovina shelterted the largest lynx population (438, 128 and 109 specimens, respectively). Fewer individuals were registered in the forested mountains of Muntenia (95), Maramureş (59), Banat (49) and Oltenia (35), and a symbolic presence (18) in the east of Crişana.

A classification of lynx-populated hunting districts by *physico-geographical regions* reveals that the Eastern Carpathians rank first (659 specimens, i.e. 70.8% of the national stock), far behind standing the Southern Carpathians (188, 20.2%) and the Western Carpathians (84,9%).

The distribution of the 308 lynx-populated *hunting districts* of Romania looked as follows: 208 (67.5%) in the Eastern Carpathians, 76 (24%) in the Southern Carpathians and 26 (8.5%) in the Western Carpathians. In 1969, the year of this analysis, lynx populated hunting districts covered 38,114 km^2 (16% of the country's area), which means that one lynx roamed over 22.5 km^2 in Prahova County and over 193,6 km^2 in Sibiu County (Table 1).

The forested area of lynx-related hunting districts, included 27,650 km^2 of forests (43.8% of the then forest area in Romania), each specimen benefiting by 9.9 km^2 of forested area in Harghita County and 99.8 km^2 in Sibiu County (Table 1).

Table 1. Surface-area / lynx specimen per county in 1969 (total area and forested area)

County	Harghita	Suceava	Braşov	Covasna	Vrancea	Maramureş	Bacău	Bistriţa-Năsăud	Neamţ
Specimen/km^2 total area	24.6	50.0	32.6	45.4	27.9	44.3	49.9	42.9	65.0
Specimen/ km^2 forest	9.9	34.0	16.9	25.9	19.5	27.5	37.2	24.1	47.7

County	Buzău	Prahova	Vâlcea	Caraş-Severin	Mureş	Hunedoara	Alba	Timiş	Argeş
Specimen/km^2 total area	47.7	22.5	47.1	39.1	46.3	55.1	49.3	22.9	76.4
Specimen/ km^2 forest	34.8	14.2	34.3	26.8	33.2	31.9	33.1	17.9	49.5

County	Cluj	Dâmbovița	Arad	Bihor	Gorj	Sibiu	Satu Mare
Specimen/km^2 total area	33.9	28.2	33.1	62.2	81.7	173.0	29.3
Specimen/ km^2 forest	20.6	15.6	19.1	37.6	64.0	99.8	11.8

Optimal lynx densities were put at 0.2 specimens/1000 forest hectares (ALMĂŞAN & POPESCU 1964; TEORAN 1981).

1. **The lynx in the Eastern Carpathians**

The Eastern Carpathians cover the largest forested area in Romania, stretching out from the northern border with Ukraine to the Prahova Valley in the south. The lynx prefers the resinous mesophilous forests (the richest in Romania), but also the foliated ones (a mixture of oak and beech), mixed forests being more numerous in the Gutâi, Ţibleş, Maramureş, Obcinele Bucovinei, Vrancea Mountains and in the Curvature Carpathians. The species was identified in 208 cynegetic districts grouped by county as follows: 38 in Suceava, 26 in Harghita, 22 in Maramureş, 21 in Covasna, 17 in Neamţ, 16 in Braşov, 15 in Bacău, 14 in Vrancea, 12 in Buzău, 11 in Bistriţa-Năsăud, 9 in Mureş, 5 in Prahova and 2 in Satu Mare.

In 1969, most specimens (7-17) lived in 12 (5.8%) hunting districts: Colibiţa in the Bârgău Mountains, Bistriţa-Năsăud County (17 specimens), Ţibleş, Maramureş County (10 specimens), Budila in the Întorsurii Mountains, Braşov County (10 specimens), Neculele, Vrancea County (10 specimens), Măgheruş, Harghita County (10 specimens), Mânăstirea Humor in the Obcinele Bucovinei, Suceava County (9 specimens), Teleajen, Prahova County (8 specimens), Valea Nărujei, Vrancea County (8 specimens), Voroneţ, Suceava County (7 specimens), Chiojdeni, Buzău County (7 specimens), Telejenel in the Siriu Mountains, Prahova County (7 specimens) and Gârcin, Braşov County (7 specimens).

A number of 4-6 specimens were identified in 61 hunting districts (29.3% of the total), most of them (24) in the counties of Harghita; 10 in Suceava, 7 in Vrancea, 6 in Covasna, 3 in Mureş, 2 in Bistriţa-Năsăud, 2 in Prahova, 2 in Neamţ, 2 in Buzău, 1 in Maramureş, 1 in Bistriţa-Năsăud and 1 in Satu Mare.

Out of these 61 districts we would mention Păltineţ (Prahova County), Tărlung (Braşov County), Bodoc and Petriceni (Covasna County), Condratu (Vrancea County), Ciobănuş and Asău (Bacău County), Bistra and Răstoliţa (Mureş County), Bălan, Vlăhiţa and Căliman (Harghita County), Breazău and Bâsca Mare (Buzău County), Galu (Neamţ County), Tihuţa (Bistriţa-Năsăud County), Strâmbu-Băiuţ (Maramureş County) and the following

districts in the Suceava County: Drăgoiasa, Iacobeni, Suha Mare, Suha Mică, Brodina, Brodinoara etc.

Most hunting districts (135, 64.9 %) held no more than 1-3 lynx specimens.

Highest densities (specimens / 1,000 forest ha) were recorded in 17 districts: 3.6 in Câmpulung la Tisa (Maramureş County), 3.3 in Crizbav (Braşov County), 2 in Zetea (Harghita County), 2.2 in Tuşnad (Harghita County), 1.6 in Budila (Braşov County), 1.6 in Bixad (Satu Mare County), 1.3 in Sencsed (Harghita County), 1.3 in Valea Rea (Harghita County), 1.2 in Țibleş (Maramureş County), 1.1 in Păuleni (the Ciuc Mountains, Harghita County), 1.1 in Mânăstirea Humor (Suceava County), 1.1 in Voivodeasa (Suceava County), 1 in Voşlăbeni (the Gurghiu Mountains, Harghita County), 1 in Colibița (Bistrița-Năsăud County), 1 in Năneşti (Maramureş County), 1 in Mădăraş (Harghita County) and 1 in Negreşti (the Oaş Mountains, Satu Mare County).

Densities of 0.6-1.0 specimens/1,000 forest hectares, had 31 hunting districts: 10 in Harghita County (e.g. Lacu Roşu, Rezu Mare, Uzul, Pilicske, Praid), 4 in Prahova County (e.g. Telejenel, Păltineț, Crasna), 3 in Covasna County (e.g. Cormoş, Bodoc), 3 in Vrancea County (e.g. Coza, Neculele), 3 in Suceava County (Suha Mică, Voroneț, Bogdăneşti), 2 in Braşov County (e.g. Gârcin), 2 in Maramureş County (Budeşti and Strâmbu-Băiuț in the Țibleş Mountains) and each in Buzău (Breazău), Bacău (Slănic), Mureş (Răstolița) and Neamț (Dreptu) counties.

Densities of 0.2-0.6 specimens/1,000 forest hectares were found in 99 hunting districts: 15 in Suceava County (e.g. Negrişoara, Drăgoiaşu, Valea Putnei, Rarău, Suha Mare, Dragoşa, Argel, Brodina, Solca, Baia), 14 in Maramureş County (e.g. Făina, Repedea, Câşla, Pietrosu, Huta, Cavnic, Băița), 10 in Braşov County (e.g. Valea Bogății, Teliu, Timiş, Tărlung, Poiana Mărului, Veneția), 9 in Vrancea County (e.g. Valea Nărujei, Lepşa, Macradău, Condratu), 8 in Bistrița-Năsăud County (e.g. Romuli, Tihuța, Rodna, Anieş), 8 in Buzău County (e.g. Gura Teghii, Bâsca Mare, Siriu, Vintilă Vodă), 8 in Covasna County (e.g. Vârghiş, Miko, Barcani, Zagon), 7 in Neamț County (e.g. Secu, Fundu Tarcău, Gura Tarcău, Borca, Galu), 7 in Bacău County (e.g. Caşin, Dofteana, Pralea), 6 in Harghita County (e.g. Homorod, Mihăileni), 5 in Mureş County (e.g. Niraj, Bistra, Bradu), 1 in Prahova County (Starchiojd) and 1 in Maramureş County (Racşa).

The lowest densities (under 0.2 specimens/1000 forest ha), had such hunting districts as: Dornişoara, Coşna, Putna in Suceava County, Săpânța in Maramureş County, Lunca Ilvei in Bistrița-Năsăud County, Bisericani and Magazia in Neamț County, Căldări in Vrancea County, Camenca in Bacău County, Sebeş in Mureş County, Valea Nehoiului in Buzău County, Oituz and Ghelința in Covasna County (the Vrancea Mountains), etc.

2. **The lynx in the Southern Carpathians**

The Southern Carpathians, the most imposing range in the Romanian Carpathian Chain, extend between the Prahova Valley in the east and the Timiş-Cerna-Bistra Corridor in the west. Compared to the Eastern Carpathians, forests occupy smaller surfaces, which explain why the lynx was seen only in 74 hunting districts: 14 in Hunedoara County, 11 in Argeş County, 10 in Vâlcea County, 9 in Sibiu County, 8 in Braşov County, 8 in Caraş Severin County, 6 in Gorj County, 4 in Dâmbovița County, 3 in Alba County and 1 in Prahova County.

Most numerous specimens (5-10) had 11 (14.9% of total) districts: Valea Radului, Braşov County (10), Sebeş, Braşov County (10), Runcu-Brăteiu, Dâmbovița County (7), Poiana Mărului, Caraş Severin County (6), Boia, Vâlcea County (6), Valea Ialomiței, Dâmbovița County (6), Cârțișoara, Sibiu County (5), Răşinari, Sibiu County (5), Gura Râului, Sibiu County (5), Râul Mic, Alba County (5) and Breaza, Braşov County (5).

Only 2-4 specimens in each of the 41 (55.4%) districts: 8 in Hunedoara County (e.g. Retezat, Măgureni, Câmpu lui Neag, Parâng, Petroşani, Uricani), 8 in Vâlcea County (e.g. Cheia, Brezoi, Câineni, Obârşia Lotrului, Latoriţa, Voineşiţa), 8 in Argeş County (e.g. Braha, Râul Târgului, Cetăţeni, Izvoru Dâmboviței, Rucăr), 5 in Caraş Severin County (e.g. Mărul, Fundu Cernei, Râu Lung, Râu Alb), 5 in Sibiu County (e.g. Tălmaciu, Lotrioara, Râu Vadului, Sălişte), 3 in Braşov County (e.g. Bârsa, Moeciu), 2 in Gorj County (Bistriţa, Sohodol în Munții Vâlcan), 1 in Alba County (Canciu) and 1 in Prahova County (Valea Cerbului).

And no more than one in each of the 22 (29.7%) hunting districts: 6 in Hunedoara County (e.g. Zănoaga, Râu Şes, Valea Streiului, Bilugu), 4 in Gorj County (e.g. Bumbeşti, Sadu), 3 in Argeş County (e.g. Dâmbovicioara), 2 in Dâmbovița County (e.g. Gemenea în Munții Leaota), 2 in Braşov County (e.g. Zărneşti), 2 in Caraş Severin County (e.g. Obârşia Bistrei in the Țarcu Mountains), 1 in Alba County (Prigoana), 1 in Sibiu County (Suru in the Cindrel Mountains) and 1 in Vâlcea County (Ştevia).

There were 4 hunting districts with top lynx densities: Valea Radului, Braşov County (2.2 specimens / 1,000 forest ha), Runcu-Brăteiu, Dâmbovița County (1.8), Breaza, Braşov County (1.8) and Sebeş, Braşov County (1.4).

In 3 hunting districts: Râul Mic (Alba County), Cetăţeni (Argeş County) and Cârțișoara (Sibiu County), densities ranged between 0.6 and 1.0 specimens.

In 51 districts valued registered 0.2-0.6 specimens / 1,000 forests hectares: 11 in Hunedoara Couny (e.g. Retezat, Râul Şes, Marginea, Măgureni, Câmpu lui Neag, Parâng,

Petroşani, Uricani), 8 in Caraş-Severin County (e.g. Poiana Mărului, Fundu Cernei, Obârşia Bistrei, Mărul), 8 in Argeş County (e.g. Lereşti, Râul Târgului, Rucăr, Izvoru Dâmboviţei), 8 in Vâlcea County (e.g. Cheia, Brezoi, Câineni, Voineasa), 7 in Sibiu County (e.g. Răşinari, Tălmaciu, Lotrioara, Râul Vadului, Sălişte, Gura Râului), 4 in Braşov County (e.g. Moeciu, Râul Mic, Bârsa), 3 in Dâmbovița County (e.g. Valea Ialomiței, Gemenea), 1 in Alba County (Canciu) and 1 in Prahova County (Valea Cerbului).

Lowest densities (under 0.2 specimens) were recorded only in 16 districts, e.g.: 6 in Gorj County (e.g. Bistrița, Sohodol, Bumbeşti, Sadu), 3 in Hunedoara County (Zănoaga, Valea Streiului, Voievodul), 2 in Vâlcea County (e.g. Latorița in the Parâng Mountains), 2 in Argeş County (e.g. Dâmbovicioara) and one each in Alba (Prigoana), Sibiu (Suru) and Braşov (Zărneşti) Counties.

3. The Lynx in the Western Carpathians

This range, which comprises the Banat Mountains and the Apuseni Mountains, was more intensely populated with human settlements than the provious two Carpathian sectors. The last lynx individual was signalled in the Apuseni Mountains in 1932; subsequently it seemingly immergrated from the Țarcu Mountains (Southern Carpathians), the first specimen being captured in the Bihor Mountains in 1954/1955. The following year it was seen in the Gilău Mountains. In March 1956, traces of lynx were found around the Valea Largă hunting park in the north of Hunedoara County. At the end of April 1956 and in February 1957 a female and a male lynx, respectively were caught here. In November 1957 the first traces of lynx were discovered in the Iara Valley (Cluj County). In February 1958 they trapped a 28 kg lynx in the Huda Valley, a tributary of the Iara. In 1960, lynx were for the first time detected in the Pădurea Craiului Mountains, their number steadily increasing up to 1965.

In 1969, the area registered the lowest number of individuals in Romania, they occurring only in 26 hunting districts (rich in mixtures of leafy and resinous forests): 6 in Alba County, 5 in Cluj County, 4 in Timiş County, 4 in Bihor County, 3 in Arad County, 3 in Caraş-Severin County and 1 in Alba County.

Most specimens were seen in 3 districts (11.5% of the total): Luncani in the Poiana Ruscă Mountains, Timiş County (10), Valea Belişului, Cluj County (6) and Vulturi-Feneş, Alba County (6).

A number of 2-5 individuals were recorded in each of the 19 (73.1%) hunting districts: 4 in Alba County (Poşaga, Lupşa, Ocoliş, Arieş superior), 4 in Cluj County (Someşu Cald, Someşu Rece, Băişoara, Valea Ierii), 3 in Bihor County (Drăgan, Pietroasa, Biharia), 3 in

Timiş County (Nădrag, Surduc-Tomeşti, Poieni), 3 in Caraş Severin County (Oţelu Roşu, Ruşchiţa, Stârna) and 2 in Arad County (Lunca, Luncşoara).

And only one specimen in each of the 4 (15.4%) districts existing in the counties of Arad (Treaşi in the Zarand Mountain), Bihor (Valea Iadului), Alba (Roşioara) and Hunedoara (Bulzeşti in the Bihor Mountains).

Highest *densities* registered the hunting districts of Vulturi-Feneş, Alba County (1.1 specimens/1,000 forest ha) and Luncani, Timiş County (1 specimen).

Another 8 districts: 3 in Arad County (Treasi, Lunca, Luncşoara), 3 in Cluj County (Someşu Cald, Băişoara, Valea Belişului) and 2 in Alba County (Lupşa, Ocoliş) hosted between 0.6 and 1 specimen per 1,000 forest hectares.

Between 0.2 and 0.6 individuals were found in 12 districts: 3 in Bihor County (Drăgan, Pietroasa, Biharia), 3 in Timiş County (Nădrag, Poieni, Surduc-Tomeşti), 2 in Alba County (Poşaga, Roşioara), 2 in Caraş-Severin County (Oţelu Roşu, Stârna), 1 in Cluj County (Someşu Rece) and 1 in Hunedoara County (Bulzeşti).

Lowest densities (under 0.2 specimens) were recorded in the following hunting districts: Valea Iadului (Bihor County), Valea Ierii (Cluj County), Arieş superior (Alba County) and Ruşchiţa, Poiana Ruscă Mountains (Caraş Severin County).

CONCLUSIONS

A carnivorous animal "par excellence", the lynx is a valuable trophy of the Romanian Carpathians and of the country's fauna, generally, part of the ecosystems' balance. With the growth of its effectives over the 1930s – 1960s, it began spreading also to lower-altitude forests, as seen in the year analysed herein (1969), such as Tisău (the Buzău Subcarpathians), Pralea and Jariştea (the Vrancea Subcarpathians), Baia (the Moldavian Subcarpathians), Săpânţa (close to Sighetu Marmaţiei town), Vlădeni (the Perşani Mountains) and Treaşi (the Zarand Mountains).

In our view, data on the 1969 distribution of the lynx in Romania represent an important moment in the zoogeographical knowledge of this species, moreover so as Romania is ranking now second in Europe (after the Russian Federation) as regards the size of the lynx population.

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EDUCATIONAL TOURISM IN THE NATURAL SCIENCES MUSEUMS OF SIBIU

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Rezumat

Turism educaţional în muzeele de ştiinţele naturii sibiene

În condiţiile creşterii gradului de informare al tinerilor misiunea muzeelor de atragere a publicului tânăr de informare acestuia este tot mai dificilă. Posibilitatea de a călători şi de a vedea „in situu" diversele minunăţii ale naturii sunt din ce în ce mai multe şi accesibile unui public aparţinător la diverse categorii sociale. Şi pentru că turismul adresat tinerilor nu trebuie să fie doar de relaxare ci şi educaţional a apărut o formă nouă de turism, care se dezvoltă cu repeziciune şi la noi în ţară, **turismul educaţional** sau **şcolar**. În această lucrarea, în contextul tematicii simpozionului, cultura sub diversele ei aspecte dorim să prezentăm un model de traseu turistic educaţional prin muzeele de ştiinţele naturi din Sibiu, deţinătoare de valori culturale. Traseul turistic include ca puncte de oprire următoarele muzee: *Muzeul de Istoria Farmaciei, Muzeul de Ştiinţele Naturii* şi *Muzeul de Arme şi Trofee de Vânătoare „August von Spiess"*. Pentru ca traseul educaţional să aibă continuitate vom prezenta şi clădirile care au semnificaţii istorice şi culturale pentru Sibiu.

Key words: The Natural Science Museums, educational tourism, Sibiu.

Due to its approachability, tourism has become a complex phenomenon in a process of continuous development and diversification, including new dimensions and forms, all this under the circumstances of tourism becoming ever more present in different branches of activity towards the inner country side, through its political, economic, social and cultural components. Most of the dictionaries define the concept of *tourism* (derived from the English word "tour") as the activity of travelling, wandering, moving in open space. The concept came up in 18th century Great Britain and referred to the action of „voyaging" (a term

borrowed from French), of travelling. The etymology of the French word is far more complex – the experts have even found its roots in antic Hebrew.

Starting with 1880, tourism specialists have pointed out the fact that the activity of travelling tends to become a phenomenon of major social and economic implications. Thus, from isolated displays, with a strict individual character and available only for the higher class, tourism has transformed throughout time in a mass phenomenon.

Cultural tourism, which mainly encompasses cultural tours (such as visiting museums, attending various cultural events, international festivals), stands out ever more lately. It is regarded as the tourism of the future, since due to the increase of the living standard, of the level of civilization and culture, man's thirst after knowledge is also increasing on a yearly basis. While travelling from one place to another, the tourist gains a significant volume of knowledge in various fields, which enables him to develop a personal perception of reality; further, coming to know and to appreciate mankind's treasures leads to emotions, facilitates and stimulates creative activities. Contemporary evolutions in different areas of human activity, alongside with the progress registered in scientific, technological, educational and sociological fields represent interesting topics from a cultural point of view for many tourists.

Given the increasing level of information of the young people, the mission of museums to attract and inform the young public is ever more difficult nowadays. The possibility of travelling and witnessing „in situu" various wonders of nature become ever more accessible to a public belonging to various social categories. And since the tourism aiming at young people should be not only a relaxation, but also an educational one, a new form of tourism is rapidly growing even in our country – the **educational** or **school** tourism. A simple navigation on internet points our various such initiatives aimed especially towards ecological education – of the mountain areas. This seems only natural since the mountain has always attracted and keeps on attracting tourists far more easier, since most of the population is from urban areas, and furthermore, this form of tourism implies not only both relaxation and education, but also health.

In this paper, we wish to present a model of educational touristic tour through the natural science museums of Sibiu, which host remarkable cultural values. We would use the generic concept of natural history museums, referring to the old sense of term which encompasses everything related to man, nature and health.

The touristic tour includes the following landmarks: *The Pharmacy History Museum, The Natural History Museum* and *The „August von Spiess" Guns and Hunting Trophies Museum* (table 1). In order for our educational tour to present continuity, we will also include

the buildings which have a historical and cultural meaning for Sibiu, as well as the minimum duration to complete the tour.

Educational tour: The Pharmacy History Museum - The Natural History Museum - The „August von Spiess" Guns and Hunting Trophies Museum

Tour duration: 5 hours

Target group: lower and upper secondary school and high school students

THE PHARMACY HISTORY MUSEUM

Overview

The museum was opened in 1972 and through its profile and location, it represents a truly rare item on the landscape of Romanian museums. The building – which is itself a historic monument – is located in the historic center of the city of Sibiu, which was declared historic reservation. A historic and architectural monument, the building displays gothic and renaissance elements and was built in 1568. It hosted the headquarters of one of the oldest drug stores in Sibiu – „The Black Bear's". Why would one build a museum on such a topic in Sibiu? Here are some of the many reasons:

- it was in Sibiu that the first ever documentary certified drug store for the territory of Transylvania, in the year 1494, was located;
- the tradition of the very diverse and creative pharmaceutical activity, compared to other areas of the country (pharmaceutical activity in the sense of preparing remedies by one's own recipes);
- the presence in Sibiu, as doctor of the governor of Transylvania - Samuel von Brukenthal, of the forerunner of homeopathy, Samuel Hahnemann.

The museum collection, either exhibited or kept in storage rooms for future display in temporary exhibitions, include 6,600 items, which re enact the evolution of the pharmaceutical science and technique. The museum is organized by respecting the pattern of a classical pharmacy: with rooms dedicated to products display, remedies sales – the office and the laboratory where the drugs were made. The office furniture, made in Vienna in 1902, belonged to another pharmacy from Sibiu – „ The Black Eagle's ", located in the building of the present Brukenthal National Museum. The cupboards display wooden, china, glass and crystal jars, bronze, cast iron grinding mortars (the oldest one dating from 16th century), pharmaceutical scales and weights, etc. The entire inventory process the evolution of the pharmaceutical technique and instruments. The decorations of the recipients, of all the

instruments in general, point towards the interest of those who created them in beauty, in combining utility with esthetics. All these were meant to please its visitors, who would usually be scared by disease, by the multitude of remedies and by not knowing what hides behind the medicines. On some of the jars, made of wood, one can still decipher alchemical signs which the pharmacists used to write down chemical elements, certain facts about the recipe, which were not meant to be understood by the general public.

Fig. 1. The Pharmacy History Museum
(26, Piața Mică)

The office – laboratory passage is done through a small exhibition which displays technical – medical tools used throughout the ages, such as surgery kits, microscopes, etc. The laboratory may easily impress one, due to the richness and diversity of the instruments used to obtain the basic substances which had been used to prepare the medicines.

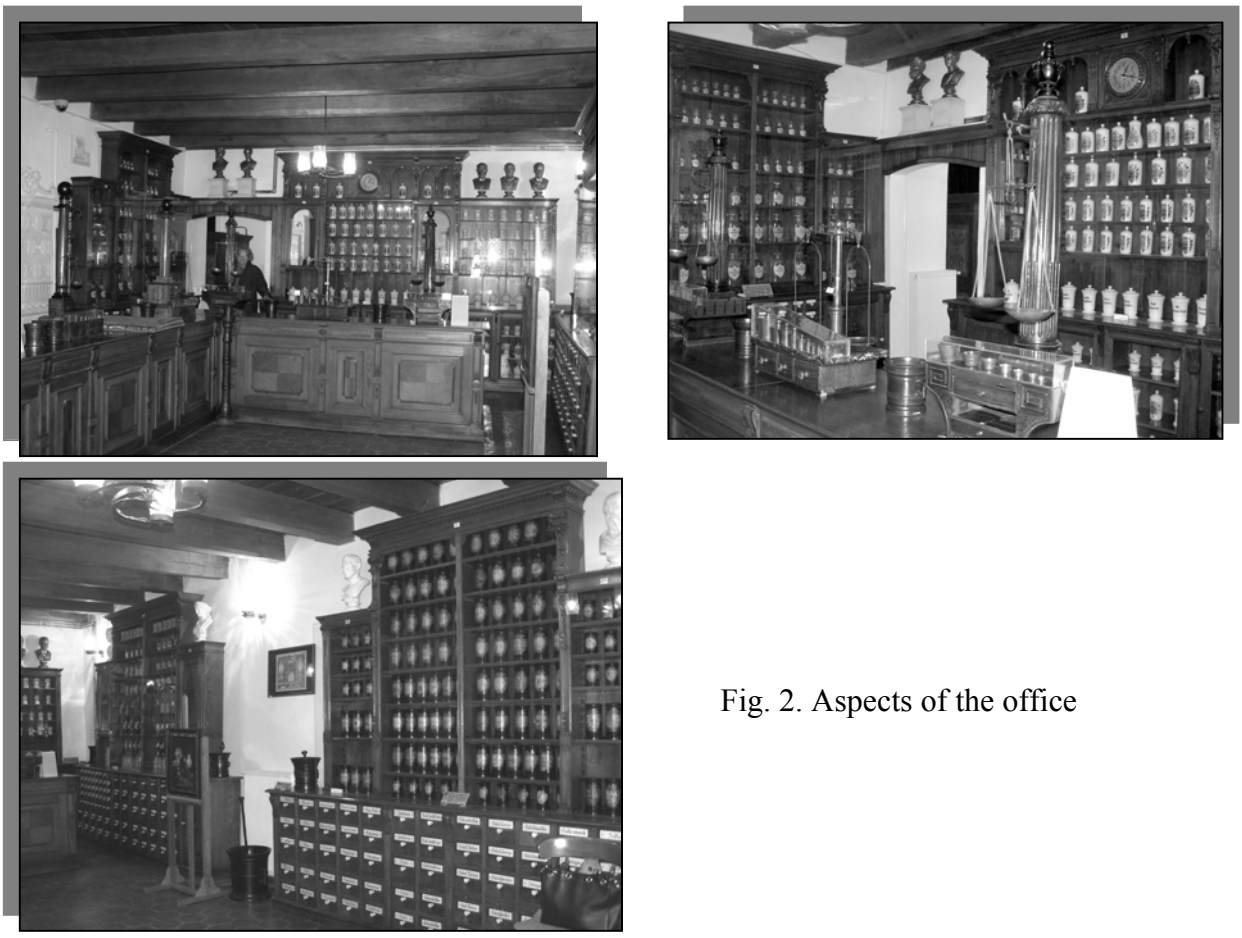


Fig. 2. Aspects of the office

The various scales of different types of scales, grinding mortars, machines used for crushing, grinding and spraying staple, distiller etc. which are exhibited in the laboratory, represent the starting point for the present day sophisticated machinery. The doctors who visit the museum may recognize among the exhibits the surgery instruments which resembles, with slight changes, the ones used currently.

Since it was in Sibiu that the father of homeopathy (who was chosen by the baron Samuel von Brukenthal, the governor of Transylvania, as personal physician), Samuel Hanemann, practiced medicine for one year, a room of the museum is dedicated to homeopathy and it displays the homeopathic collection of the „Angel's" pharmacy. Homeopathy, a science why was considered to be the subject of science history, owns a leading place in the public interest nowadays, perhaps as a return of mankind to the natural, fundamental elements, which make up not only himself but also the natural environment surrounding him.

Educational purpose:

- the only place in Sibiu and perhaps in southern Transylvania, too, where own can see how classical pharmacies were organized starting with the 17th century,

- getting to know the stages of producing a medicine and a thorough awareness of the necessity of respecting an specialist's advice on using them,
- the necessity of collecting information about the complementary sciences without which medicines could not be produces: chemistry, botanic, anatomy, etc.,
- the importance for one's own health of knowing the various types of remedies: allopathic, homeopathic
- the high degree of development of the pharmaceutical "industry" in Sibiu.

Educational activities:

- practical lessons of chemistry, the obtaining of various homeopathic and allopathic remedies through specific combinations

The starting point of the tour is represented by The Museum of Pharmacy History, described above. Before or after visiting the Museum, one can take a tour of Piata Mica (The Small Square), which was declared architectural reservation because it conserves the architecture of medieval buildings, since it is placed between the 1st and the 2nd row of fortified walls of the city. Besides the old buildings, which are interesting from an architectural perspective, one can also admire **Podul Minciunilor (1859** (the Liar's Bridge) – a pedestrian bridge built in order to connect the two sectors of the city center: The Lower Town and the Upper Town, in the location of a gate tower of the 2nd enclosure.

Fig. 3. The Liar's Bridge (1859)

The two sectors of the old town are different from an altimetryc point of view (they are situated on different terraces of the Cibin), but also from an architectural point of view. The building from the Upper Town, located closer to the Evangelic Church – which used to

be the center of the community, were inhabited by the nobility of the city, a fact proven also by the richness of the buildings in comparison to the ones in the Lower Town, inhabited by people with a much lower standard of living (a fact proven by the architecture and poorness of the buildings from this sector). The bridge represents a premiere in achieving a balance between the **resistance structure** and the decoration made through **trafonare**. On the side facing the city center, one can even notice the city coats of arms.

Turnul Sfatului, erected as gate tower for the 2nd enclosure of the fortress, marks the passage between the two squares, towards the 3rd enclosure. Built starting with the 13th century, it currently displays eight levels (the last one was completed in 1824) and one can notice on the side towards Piața Mare a Turkish cannonball in the wall, while from its top level one can admire the entire panorama of the city center.

Fig. 4. Turnul Sfatului

Piața Mare – a vital center of the medieval and current Sibiu, was designed in the 14th century and still hosts the old buildings built and inhabited by the nobility of Sibiu. Among these one can notice, besides the building of various architectural styles, the allegorical decorations of the ones located on the side towards the street leading down to the Ursulinelor Church. Among the important buildings for the political, cultural and religious life of medieval and present – day Sibiu, one may notice: the Brukenthal Palace (in the background), the City Hall, the Roman – Catholic Church with the former Jesuit seminar. Piața Mare, the cultural, political and social center (in the Middle Ages it also used to represent the location of the Sunday Fair of products) hosted special events for the history of the city: from the beheading of the Johann Sachs von Horteneck **comite** in 1889, the presence of the madmen' cage where those who had disturbed the public order in the previous night were kept, until the anti communist revolution of December 1989 and presently to significant cultural manifestations connected to the "Sibiu – cultural capital of Europe in 2007 " celebrations.

Fig. 5. Piața Mare
(the Brukenthal Palace in the background)

Piața Mare is also the starting point for several streets towards all the neighborhoods of Sibiu, therefore the access towards the other landmark can be made either through the Gh.Lazăr street, where the Archbishop Palace of the Evangelic Church AC and the Gh.Lazăr High School are the main cultural landmarks, or through Arhivelor street.

If one would choose the other tour option through Arhivelor street, one may notice the architectural solutions between buildings different as height and morphology. For example the connection between the houses from Piața Mare, the General's House with the passing tunnel and the National Saxon Archives Building, on whose front side one can see the Sibiu and Transylvanian coats of arms. Just like in all the cities from Transylvania, which still house the old medieval architectural structures, in Sibiu, too the streets converge towards a meeting point called square. Such a square can be noticed on the way towards the second landmark of the tour, the Friedrich Schiller Square, where the bronze bust of the poet (sculpted by Th. Khuen, 1905) can be noticed in a niche of the square.

THE NATURAL HISTORY MUSEUM

General overview

The intellectuals of the city of Sibiu and not only them, had also preoccupations related to the preservations of the surroundings of Sibiu, of the sites significant for natural sciences. The 18th and 19th centuries marked the period when various associations were set up, most of which had as main goal the study of the nature from southern Transylvania. The most active ones in this direction were the members of the Transylvanian Society for Natural Sciences from Sibiu ("Siebenbürgischen Vereins für Naturwissenschaften zu Hermannstadt"), who also founded the natural History Museum – as public institution and storage of the

collections gathered mainly by the Society members. Thus, on May 4th 1895, 46 years later after the Society was created, the Museum was opened to the public. One of the goals meant to be accomplished by opening it was that of educating the young generation into knowing and protecting the nature. They collected and bought museum exhibits which today add up to a patrimony of over one million items: mineralogy – petrography (19,000), paleontology (57,000), botanic (168,000), entomology (266,000), malacologie (510,000), vertebrates (8, 386). The museum items illustrate not only the natural environment around Sibiu, southern Transylvania but also areas from abroad.

Fig.6 .The Natural History Museum building
(1, Cetății street)

The Natural History Museum has been renovated and reorganized three times through its existence of over one century and now presents itself to its 21st century visitors in a new conception. The display topic of the museum pieces stays the same: the evolution and system of the living world, but not in a strictly systematic presentation, just like the old exhibition used to be, but in the context of the natural environment in which that specific biologic entity lives. In this sense, the vertebrates are included, among the dioramas, in their natural environment. In order to encompass almost all the major living types, dioramas were set up for the deltaic, continental (at a different altitude), arid – Australian, arctic and tropical environments. The moment when the current paper was published, the Museum undergoes a process of renovation and the permanent exhibition has not been opened yet, and therefore not being homologates, one was not allowed to take or present pictures of it.

In its new organization, the Museum will own at the first floor, a room for temporary exhibitions, conferences, lessons etc.

Educational purpose:

- the diversity of the museum items enables the presentation of a great variety of issues related to: the biology of various organisms, ecology, evolution etc.
- the paleontological and mineralogical – petrographical material enables the exemplification of the main types of mineral and rocks form the surroundings of Sibiu and not only; while the paleontological items represent starting points in palaeo – geographical and chrono –stratigraphical re –enactments, etc.

Educational activities

- the technical equipment (microscopes with display transmission), beamers, museum items will allow the set up of a temporary exhibition, open lessons which may assist store, sedimentation and enrichment of the knowledge the students and pupils acquired, according to their syllabus
- through the topic they deal with, the activities will include information from biology, ecology, botanic and geography etc.

x x x

Further, our tour takes us up Cetății street, another historical monument, where the ”Thalia” Hall is located, in the **Thick Tower** (**Turnul Gros**), which has been recently renovated as headquarters of the State Philharmonic Orchestra of Sibiu. The Thick Tower, which was initially meant to house cannons, was arranged as city theatre for the first time by the typographer Martin Hochmeister.

Fig.7. The ”Thalia” Hall
(current headquarters of the State Philarmonic Orchestra of Sibiu)

While heading toward the last landmark of the tour suggest in the current paper, one needs to include the area of the defence towers situated on the same street. The towers (The Harquebusiers' Tower/ **Turnul Archebuzierilor**, The Potters' Tower/ **Turnul Olarilor** and The Carpenters' Tower/ **Turnul Dulgherilor**) alongside the defence walls – the third enclosure – of the medieval fortress built in the 14th century represent examples of a medieval fortress, defence mechanisms/ types, describing everyday life in a medieval fortress (the concern of the guilds for protecting the towers, preserving the food when the city was under attack etc.)

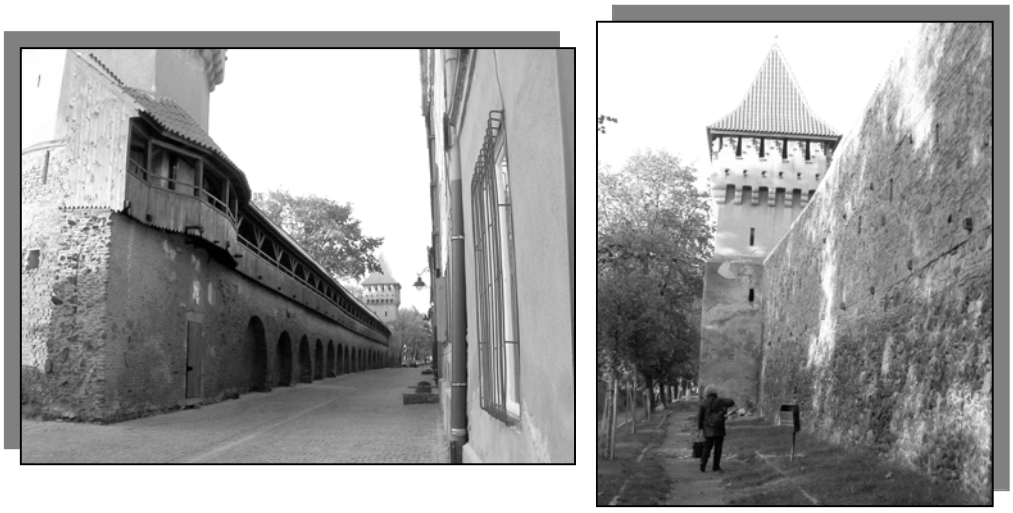
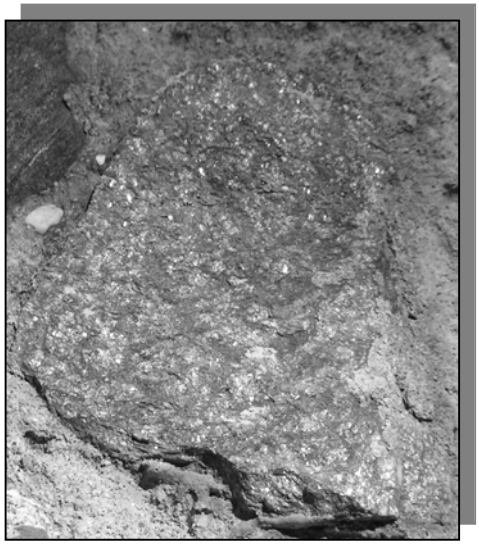


Fig.8. The defence towers and the walls of the third row of the city

Besides the historic and architectural importance of the wall, we must point out its utility in studying the geology of the local horizon. The wall was built with materials (rocks) from the areas surrounding Sibiu. One can carefully notice rocks belonging to three major categories: sedimentary, metamorphic and igneous.



a

b

Fig. 9. Details of the defence wall
a.crystalline schists with granates, modified
b. sericitos schist

The tour leading to the last landmark crossed an area which represents from an architectural point of view the present day or the recent times. The buildings were wither built in the second half of the 20th century or in the last year and unfortunately no longer have anything from the medieval architecture, but they are part of the new architecture of the main Romanian cities.

THE ”AUGUST VON SPIESS” GUNS AND HUNTING TROPHIES MUSEUM

Overview

The museum is organized in the old residence of colonel August von Spiess (born in Przemysl – Galiția, in 1884 and deceased in Sibiu in 1953) which was in 1922-1939 huntsman of the Royal house of Romania. The Museum has been renovated and re organized on several occasions, according to various requests related to museum organization but as well as due to the evolution of the knowledge of the general public; it was opened in the spring of this year in a new conception which, we hope, would attract and satisfy the tastes and requirements of as many visitors as possible.

In its temporary exhibition, it displays the richness and diversity of Romanian and African hunting. The exhibits belong to three collections which are: *The August von Spiess*

Collection, The Transylvanian Society for Natural Sciences Collection (the same society who founded the Natural History Museum), and *The Emil Witting Collection* (Society member).

From a thematic point of view, the museum is structured in four sectors. Thus, being first and foremost a museum of guns and hunting trophies, one can admire guns which re enact the evolution of fire guns, of the types of decoration and techniques used to manufacture various accessories related to fire guns.

Fig. 10. The „August von Spiess" Guns and Hunting Trophies Museum (4, Şcoala de Înot – the building was doanted with the purpose of housing a museum)

In the room which connects the sector dedicated to the collectors the feather hunting is exhibited **(of water and of plane)** and the fury hunting. Awarded trophies from various global exhibitions are displayed for each type of hunting (Vienna-1910, Budapest-1911, Leipzig-1930 etc.). An important sector of the museum is dedicated to August von Spiess. According to the original images, the trophy showroom organized by Spiess was re enacted.

Throughout the exhibition tour one can admire items made by those who contributed through donations to the setting up of the collections of the museum. The works, done by A. Von Spiess and E. Witting represent pioneering works for the cynegetic literature of Sibiu.

Fig.11. Aspects of the Museums

August Roland von Spiess knew the mountains bordering the south of Transylvania and the fauna populating these mountains very well. His writings, alongside Witting's, can contribute to the re-enactment of the fauna which lived in these mountains and as to study to which degree its quality and quantity has reduced ever since. In his paper "From Transylvania to Kilimandjaro Hunters in Africa" A.von Spiess wrote down in 1942 that "faith has lead me to Transylvania, where I was welcomed by its hospitable inhabitants and where I found among its many hunters, close and friendly advisors. I have been especially interested by the Romanian inhabitants and nationality, beings for which the mountains had no secrets and who...welcomed me among them and took me along in their expeditions...To these old hunters from the mountains I owe many hours of hunting in their thick, endless forests and in their tall mountains where the hunting is very rich".

There is a particularly spectacular sector in this exhibition, dedicated to the hunting activity of A.von Spiess in Africa, in the expeditions from 1936 and 1939, where next to trophies (gazelles, antelopes, rhinoceros, zebras etc.) brought from African countries –Kenya, Tanganyca – aspect from the life of the **massai**, the ones who joined Spiess in his hunting, are presented in a diorama.

Fig. 12. A.von Spiess with the massai

Educational purpose

While visiting this exhibition one may answer several questions: is hunting a criminal act? What is the role of the hunter in the natural environment? The museum, the exhibits, their arrangements according to museum – wise, esthetic but also educational criteria points out the role of the hunter in selecting the wild animals when disequilibrium occur, whose solutions would imply a lot of time and not always positive results (ex: excessive breeding of carnivores can lead to the destruction of the animals they feed on and therefore produce huge damage for the humans). Another typical example in this direction is the excessive breeding of rabbits in Australia which destroyed the sheep pastures. By hunting gun selection one understands the elimination of the weak individuals, of those in unstable condition, which display visible defects, or are underdeveloped, regardless if this refers to the size, shape or dimension of the horns, since the basic idea is preventing these individuals which display inferior characteristics from breeding, and from passing on these defects to their offspring. That is why it is preferred that hunting expeditions are organized by those who know the biology of the wild animals and the most suitable period for selection.

From this perspective, the museum promotes the idea of organized hunting, in periods when it does not disturb the mating, the development of the cubs, of those animals which have brought their contribution to reproducing the species and in order to give a chance to the young ones to develop (ex: the bucks). The presence of traps and snares in the exhibition points out the lack of fair play of such a ”hunting army” when the animals are crippled, in pain etc. and selection is out of the question. The exhibits and the items in the storage rooms can represents starting points for fauna reconstitution (quantitative – number of species, individuals and qualitative – degree of health, etc.).

* * *

The suggested tour is meant to be an invitation to knowledge, made also to the teachers to use the tridimensional material in the subjects they teach, since it is well known that the image associated to the information contributes to a more efficient learning process. The Natural History Museums owe their existence to the kind collectors, passionate for nature but also caring for the contemporaries and willing to share what they gathered and collected with those around them.

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Instructions for authors

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