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MARISIA

Studii şi materiale

XXXVIII-XXXIX

Ştiinţele Naturii

2019

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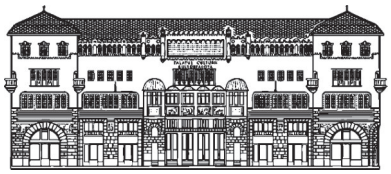

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XXXVIII-XXXIX

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SPECIES OF ORCHIDS IDENTIFIED IN GRĂDIŞTEA MUNCELULUI CIOCLOVINA NATURAL PARK

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Abstract: Grădiştea Muncelului Cioclovina Natural Park includes among its limits six of the most spectacular natural reserves of Hunedoara County: Ponorici-Cioclovina karst complex, Tecuri Cave, Şura Mare Cave, Crivadia Gorge, Ohaba-Ponor Fossil Point, Bolii Hill, Bolii Cave. The paper describes the species of orchids identified so far in the Grădiştea Muncelului Cioclovina Natural Park and their biological and ecological peculiarities. This park is home for 30 orchid species, with different ecological requirements, being spreaded in many natural habitats (shady forests, meadows, shrubs, screes, peatlands, marshland), that have some common features related to the calcareous substrate, its acidity, humidity, light regime and local microclimate. The long-term viability of the orchids from Grădiştea Muncelului Cioclovina Natural Park is affected by deforestation, overcollection, overgrazing, drainage of the marshes, habitat fragmentation etc.

Keywords: orchids species, flora analysis, Grădiştea Muncelului Cioclovina Natural Park

Introduction

Orchids are considered to be a group that has appeared quite recently in the history of the plant world. There are about 26,000 species of orchids and 749 genera around the world, and *Orchidaceae* family is one of the two largest families of flowering plants [2].

Orchids are one of the most endangered groups of plants worldwide. The greatest danger for orchids is the drastic diminution of habitats suitable for their survival. Among plants, orchids are particularly sensitive to habitat changes produced by ecological succession or disturbances [14]. They do not tolerate grazing intensities, deserts etc. In fact, this group can be considered a true "barometer" of the "health" of a habitat or otherwise called pressure on that habitat. Few species can withstand the continuous pressure that man exerts on natural habitats: e.g. *Epipactis heleborine* and *Lister* (*Neottia*) *ovata* (found in the Grădiştea Muncelului Cioclovina Natural Park) that can populate forests and plantations can be affected by intensive human activity. Old methods of land use, property of people (traditional and rational use of land) have been beneficial for spreading orchids *(www. Species of wild orchids from Romanian*.). The decline recently recorded by spontaneous orchid species in Europe is due to their harvesting of elegant and fragrant flowers, but also to their use in empirical medicine for aphrodisiac properties [9].

In the spontaneous flora of Romania, the Orchidaceae family is well represented, out of 35 genera in Europe, 34 of which are also found in our country (97%), and of about 116 species,

almost half (46.5%) are common to our country (69 species and subspecies). If we mention the 37 varieties, 67 forms and 7 hybrids, we can appreciate that lovers of orchids have something to admire in Romania [7].

In almost all European countries they are protected by law. In Romania, only *Cypripedium calceolus* and *Nigritella rubra* have this privilege due to some laws issued in 1938–1939. Most of the orchids on Romania's territory were included in the *Red List of Superior Plants in Romania* by Oltean et al. [6]. Dihoru & Negrean [5] mentioned 12 species of orchid that belongs to different sozological categories: critically endangered (*Epipactis danubialis, Hammarbia paludosa, Liparis loeselii, Ophrys apifera, O. fuciflora, O. insectifera, O. scolopax* ssp. *cornuta, O. sphegodes, Orchis pallens, Pseudorchis frivaldii*), endangered (*Orchis simia*) and low risk (*Orchis papilionacea*).

Liparis loeselii, Himantoglosssum caprinum and *Cypripedium calceolus*, also, are listed in Habitats Directive (Annex IIb) [15].

Among the most beautiful miracles of nature founded in the Grădiştea Muncelului Cioclovina Natural Park (PNGMC) are orchids, splendors of the plant world, with varied shapes and colors and highly fragrant. There are 30 species of orchids that are identified in Grădiştea Muncelului Cioclovina Natural Park, in different habitats (Fig. 1), with large population in some cases.

Fig. 1: Natural habitat from Grădiştea Muncelului Cioclovina with orchids

Materials and methods

The species of orchids from Grădiştea Muncelului Cioclovina Natural Park were identified during field surveys from 2017–2018. The orchids characterization has been achieved both on the basis of personal observations in the field and of information from literature.

There were made observations on taxonomy, biology and ecology of orchids from this area as well as some remarks on pressures and conservation measures that are necessary to maintain the viability of these species. Some scientific papers were usefull in this regards: Sanda et al. [10]; Ciocârlan [3]; Sârbu et al. [11].

Results and discussions

The floristic investigations carried out in the Grădiştea Muncelului Cioclovina Natural Park has materialized with the identification of 30 species of orchids belonging to 11 genera, as

follows: *Anacamptis pyramidalis* (L.) Rich. (Fig. 2 A); *A. coriophora* (L.) R. M. Bateman, Pridgeon & M. W. Chase (Fig. 2 B); *A. morio* (L.) R. M. Bateman, Pridgeon & M. W. Chase (Fig. 2 C); *A. palustris* ssp. *elegans* (Heuff.) R. M. Bateman, Pridgeon & M. W. Chase; *Cephalanthera damasonium* (Mill.) Druce (Fig. 3 B); *C. longifolia* (L.) R. M. Fritsch (Fig. 3 C); *C. rubra* (L.) Rich. (Fig. 3 A); *Dactylorhiza cordigera* (Fr.)Soó (Fig. 4 B); *D. incarnata* (L.)Soó; *D. maculata* (L.) Soó (Fig. 4 A); *D. majalis* (Rchb.) P. F. Hunt & Summerh.; *D. saccifera* (Brongn.) Soó; *D. sambucina* (L.) Soó (Fig. 5 A); *D. fuchsii* (Druce) Soó (Fig. 4 C); *Epipactis atrorubens* (Hoffm.) Besser (Fig. 5 C); *E. helleborine* (L.) Crantz (Fig. 5 B); *E. palustris* (L.) Crantz; *Gymnadenia conopsea* (L.) R. Br.; *G. odoratissima* (L.) Rich.; *Herminium monorchis* (L.) R. Br. (Fig. 6 A); *Neottia ovata* (L.) Bluff & Fingerh. (Fig. 6 C); *N. nidus-avis* (L.) Rich. (Fig. 6 B); *Neotinea tridentata* (Scop.) R. M. Bateman, Pridgeon & M. W. Chase (Fig. 7 A); *N. ustulata* (L.) R. M. Bateman, Pridgeon & M. W. Chase (Fig. 7 B); *Orchis mascula* (L.) L.; *Orchis militaris* L. (Fig. 7 C); *Orchis purpurea* Huds.; *Platanthera bifolia* (L.) Rich. (Fig. 8 A); *P. clorantha* (Custer) Rchb.; *Spiranthes spiralis* (L.) Chevall. (Fig. 8 B).

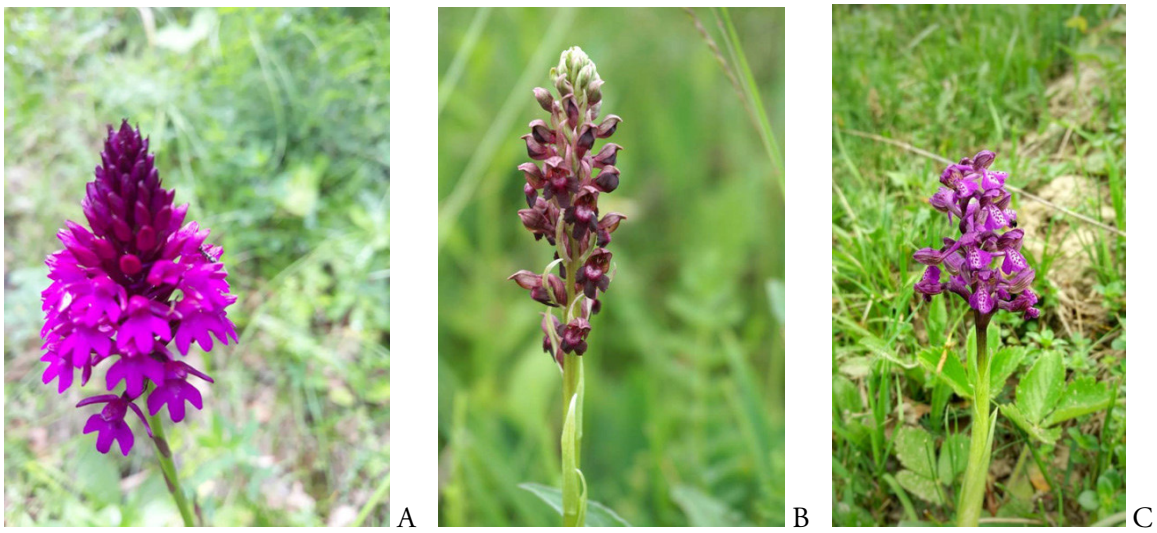

Fig. 2: A – *Anacamptis pyramidalis* (L.) Rich.; B – *Anacamptis coriophora* (L.) R. M. Bateman, Pridgeon & M. W. Chase; C – *Anacamptis morio* (L.) R. M. Bateman, Pridgeon & M. W. Chase

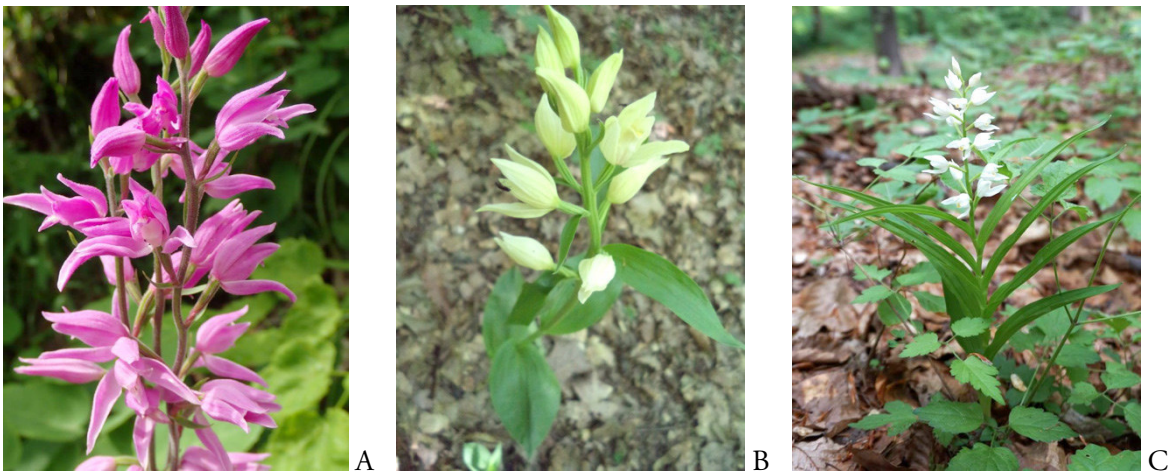

Fig. 3: A – *Cephalanthera rubra* (L.) Rich.; B – *Cephalanthera damasonium* (Mill.) Druce; C – *Cephalanthera longifolia* (L.) R. M. Fritsch

Fig. 4: A – *Dactylorhiza maculata* (L.) Soó; B – *Dactylorhiza cordigera* (Fr.) Soó; C – *Dactylorhiza fuchsii* (Druce) Soó

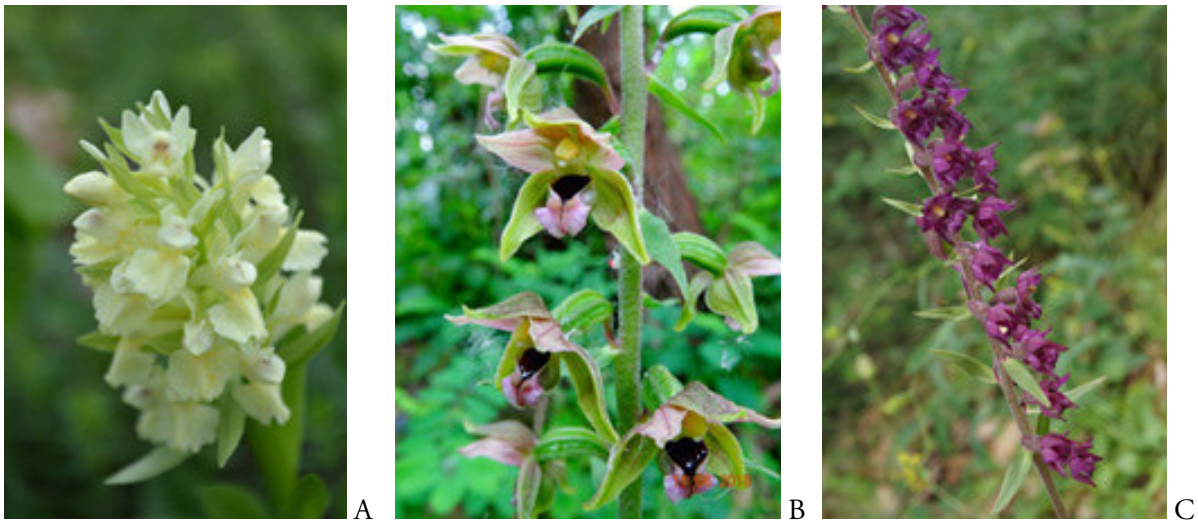

Fig. 5: A – *Dactylorhiza sambucina* (L.) Soó; B – *Epipactis helleborine* (L.) Crantz; C – *Epipactis atrorubens* (Hoffm.) Besser

Fig. 6: A – *Herminium monorchis* (L.) R. Br.; B – *Neottia nidus-avis* (L.) Rich.; C – *Neottia ovata* (L.) Bluff & Fingerh.

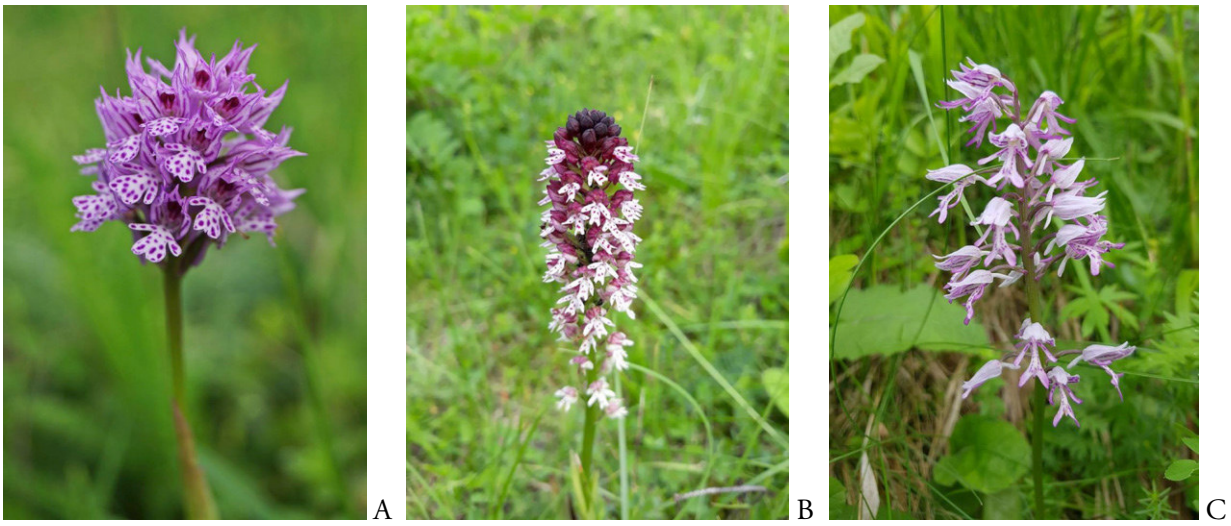

Fig. 7: A – *Neotinea tridentata* (Scop.) R. M. Bateman, Pridgeon & M. W. Chase; B – *Neotinea ustulata* (L.) R. M. Bateman, Pridgeon & M. W. Chase; C – *Orchis militaris* L.

Fig. 8: A – *Platanthera bifolia* (L.) Rich.; B – *Spiranthes spiralis* (L.) Chevall.

Regarding the number of species, we noted that in the Grădiștea Muncelului Cioclovina Natural Park, the genus *Dactylorhiza* and *Anacamptis* are well represented, by 7, respectively 4 species (fig. 9). *Cephalanthera*, *Orchis, Epipactis, Neottia, Neotinea, Platanthera* and *Gymnadenia* genera have numbered up to 3 species, while *Herminium* and *Spiranthes* genera have only one species in the studied area. The genera *Gymnadenia, Platanthera, Anacamptis* and *Dactylorhiza* have species with a large number of individuals spreaded in the same area.

The peak of flowering occurs in May-June, when differently colored flowers in red give an unmistakable look to the meadows and hay fields in the park. The blooming period for *Spiranthes spiralis* is August-September. Most of the species of orchids were identified in habitats 9150, 6520 and 6210*).

In 2018, due to climate change, orchids showed a flowering advance of about 2–3 weeks compared to previous years, when orchid species blooming in April (*Dactylorhiza, Orchis*).

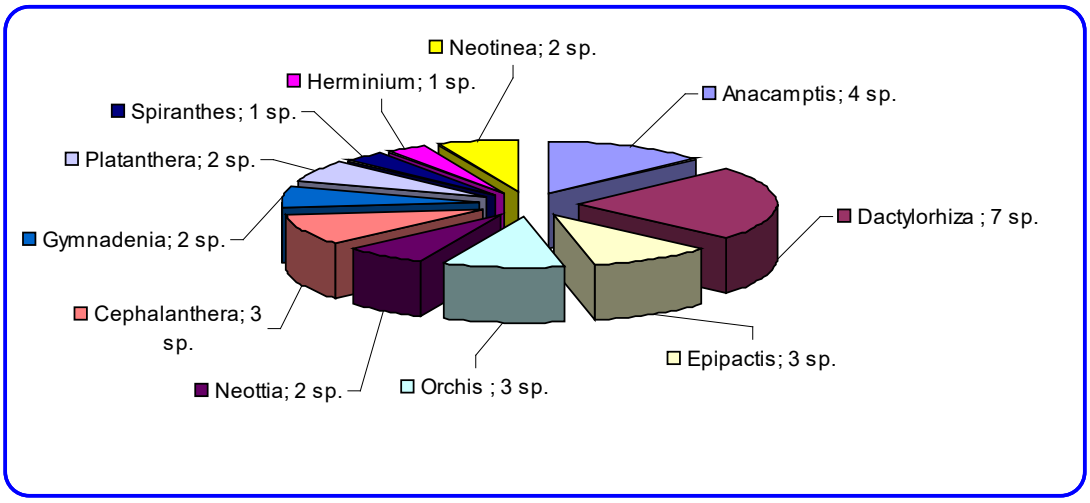

Fig. 9: Taxonomic analyze of Orchidaceae family from the sudied area

Some species as *Cephalanthera rubra, C. damasonium, Neottia nidus-avis, N. ovata* and *Epipactis helleborine* vegetate especially in the forestry 9150, 9110. In fact, the forests from Grădiştea Muncelului Cioclovina Natural Park provide favorable ecological conditions for the most orchid species that vegetate at the forest edge (*Cephalanthera rubra, C. damasonium, Dactylorhiza sambucina, D. fuchsii*, *Epipactis atrorubens, E. helleborine, Gymnadenia conopsea, G. odoratissima, Anacamptis coriophora, Orchis mascula, O. militaris, Neotinea tridentata, Platanthera bifolia* etc.). Some of these species are found also on sunny meadows such: *Dactylorhiza sambucina, D. fuchsii*, *Gymnadenia conopsea, Anacamptis coriophora, A. morio, Neotinea ustulata. Epipactis palustris, Herminium monorchis*, *Anacamptis palustris* ssp. *elegans* are characteristic to wet grasslands.

The geoelements spectrum highlights the high number of Eurasian species (10), accompanied by the European and Central European species with 8 species (fig. 10). The other categories of floristic elements: Carpathian-Balkan, Submediterranean, Subatlantic, Ponto-Panonnian are poorly represented by one or two species.

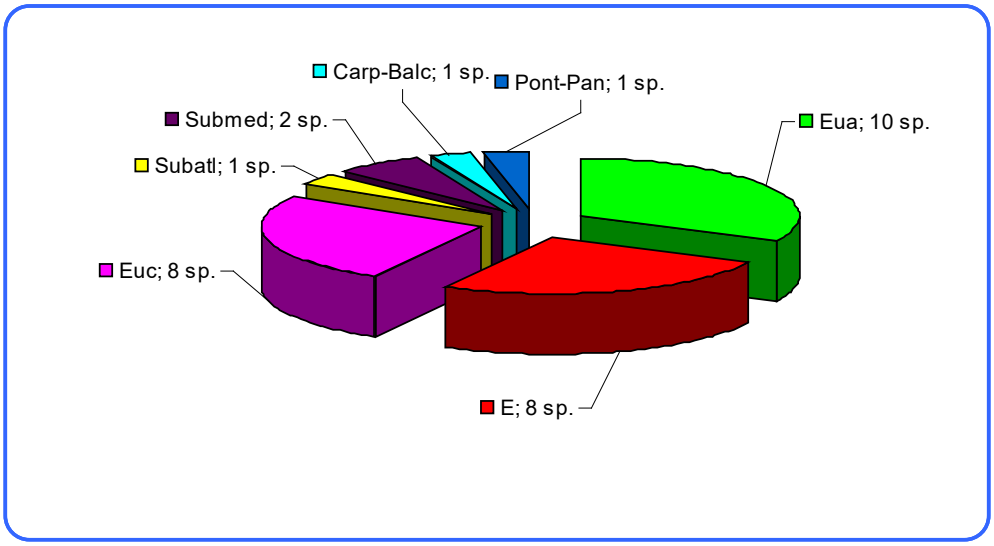

Fig. 10. Spectrum of geoelements for orchids flora

Taking into account the orchid species preferences for light, the majority are those that tolerate partial shading (L_7=43.33%) followed by heliophilous (L_8=20%) and meso-heliophilous (L_6=10%). In terms of temperature requirements, most orchid species are mesotherms (T_5=43.33%; T_6=10%), accompanied by those with wide ecological valencies (T_X=20%). From the humidity point of view, the largest percentage of orchid species are mesophilous (U_5=36.66%), followed by the meso-xerophilous (U_4=32.25%) (fig. 11). Taking into account the soil reaction, the most numerous were moderate-acidophilous species (R_5=36.66%) and eurionic (R_X=26.66%). From the soil trophicity point of view, the oligotrophic and euritrophic species have been noted by equal weight (N_2=30%; N_X=30%) accompanied by the oligo-mesotrophic (N_3=20%) (fig. 12).

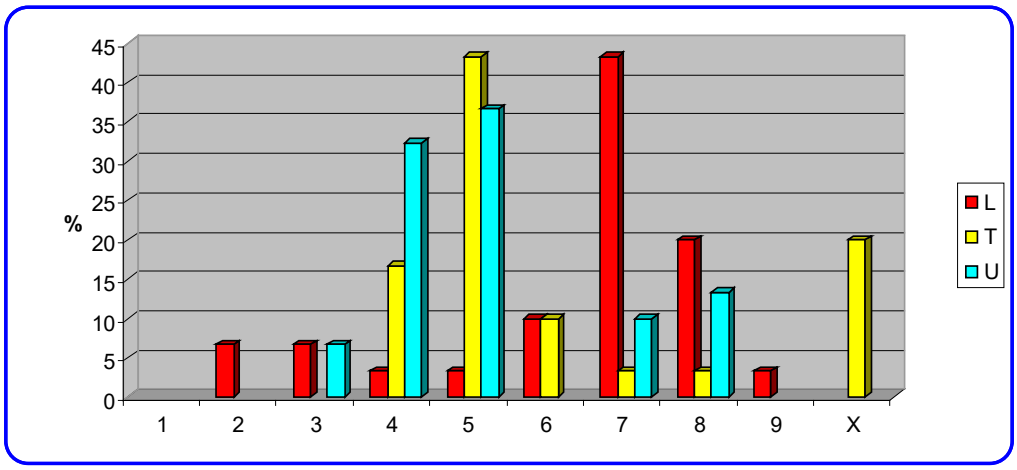

Fig. 11: Ecological spectrum of orchids flora (light, temperature, humidity)

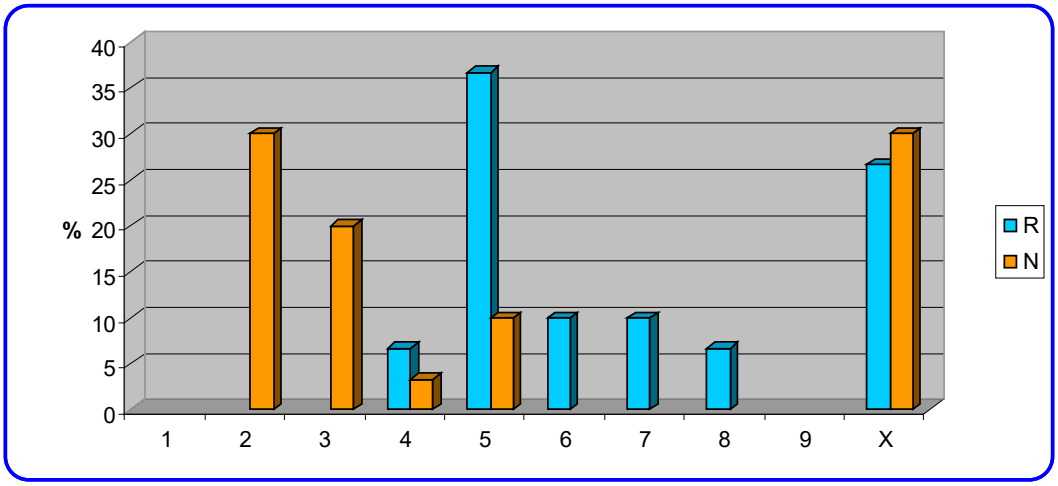

Fig. 12: Ecological spectrum of orchids flora (soil reaction, trophicity)

Conclusions

If we admit that the spread of orchids depends on the impact of human activities on their favorite biotopes, then we also have the explanation for their regression [7], that started in the last century.

In the Grădiştea Muncelului Cioclovina Natural Park it was found that the orchids meet rarely, their populations have a significantly smaller number of individuals, and the areas of spreading are more and more restricted.

The list of relatively rare plants found in this park includes more and more orchids (*Cephalanthera damasonium, Spiranthes spiralis, Dactylorhiza majalis, Neotinea tridentata, Orchis purpurea, Herminium monorchis, Anacamptis pyramidalis*).

Fortunately, there are also frequent species found in biotopes with an impressive number of individuals (*Cephalanthera longifolia, C. rubra, Dactylorhiza sambucina, Gymnadenia conopsea, Orchis militaris*) and even abundant common species (*Anacamptis morio, Neotinea ustulata, Dactylorhiza maculata, Epipactis palustris)* whose beauty we can enjoy in natural meadows.

The main pressures that affect the orchids survival in this area are: deforestation, over-collection, overgrazing, drainage of the marshes, habitat fragmentation etc. Some measures of conservation are necessary to protect orchids in the area of Grădiştea Muncelului Cioclovina Natural Park: awareness of local communities and the public about the existence of these plants, their importance, their status of protection and preservation, avoiding uncontrolled tourism, avoiding the overgrazing.

We can only express the joy of the visible progress recorded in the Grădiştea Muncelului Cioclovina Natural Park, which stimulates the growing interest of tourists in discovering these true wonders of nature and to express the hope that future generations will enjoy the our wild orchids.

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SPECII DE ORHIDEE IDENTIFICATE ÎN PARCUL NATURAL GRĂDIŞTEA MUNCELULUI CIOCLOVINA

(Rezumat)

Parcul Natural Grădiștea Muncelului Cioclovina cuprinde, între limitele sale, șase dintre cele mai spectaculoase rezervaţii naturale ale judeţului Hunedoara: Complexul carstic Ponorici-Cioclovina, Peștera Tecuri, Peștera Șura Mare, Cheile Crivadiei, Punctul fosilifer Ohaba-Ponor, Dealul și Peștera Bolii. Lucrarea descrie speciile de orhidee identificate până în prezent în Parcul Natural Grădiștea Muncelului Cioclovina și particularităţile biologice și ecologice ale acestora.

Acest parc adăpostește 30 specii de orhidee, cu diferite cerinţe ecologice, răspândite în numeroase habitate naturale (păduri, pajiști, tufărișuri, grohotișuri, turbării, mlaștini) care au, totuși, câteva caracteristici comune, legate de natura calcaroasă a substratului, aciditatea acestuia, umiditatea, regimul de lumină și microclimatul local. Viabilitatea pe termen lung a orhideelor din Parcul Grădiștea Muncelului Cioclovina este afectată de defrișări, colectarea indivizilor, suprapășunat, drenarea mlaștinilor, fragmentarea habitatelor etc.

POTENTIATION OF ANTIBACTERIAL EFFECT OF ANTIBIOTICS IN THERAPY OF BACTERIAL INFECTIONS

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Abstract: Antibiotic resistance of strains isolated from nosocomial infections are a major problem worldwide. Considering that antibiotics can no longer cope with adaptive resistance mechanisms of MDR strains, herbs are a reliable source of diminishing their resistance. The bacterial strains with high resistance to all classes of antibiotics were analyzed for the decreasing resistance using the fresh extract of walnut *Juglans nigra* L. exocarp in combination with all antibiotic classes. The synergistic activity between the plant extract and the antibiotic was 85% suggesting reactivation of the antibiotic arsenal against MDR strains.

Keywords: *Juglans nigra* exocarp extracts, MDR strains, synergistic antibiotic and herbs extracts

Introduction

The list of plants with curative effects against a wide variety of organic and infectious diseases has expanded, as analytical methods have enabled compounds to be identified with therapeutic effects in particular against infectious bacterial diseases, in the context of the expansion of the antibiotic resistance phenomenon. More than one quarter of the drugs administered in industrialized countries are obtained directly or indirectly from herbs. These preparations are referred to generically antibacterial "non-antibiotic" [1].

The mechanisms of action of the plant compounds are not elucidated. In most studies the antimicrobial activity of plant extracts is attributed to polyphenols content [3].

The antibacterial activity of phenolic compounds has been evaluated against several pathogenic bacterial species and published in a large number of papers.

Mechanisms of action of polyphenols against pathogenic bacteria are hypothetical:

– inhibition of hydrolytic enzymes (proteases and glycolysis enzymes), possibly through a reaction with sulphidyl groups or non-specific protein interactions;

– inactivating bacterial adhesins;

– inactivation of cell membrane transport proteins;

– non-specific interactions with the carbohydrate components of the bacterial cell;

– denaturation of proteins: flavonoids and tannins have a bactericidal effect, by denaturing effect on proteins cell [2].

Materials and methods

A total of 20 strains highly resistant to antibiotics were isolated from several infections from the patients hospitalized at "Theodor Burghele" Hospital, Bucharest. Identification of bacterial strains and antibiotic resistance profile were performed using a compact automated VITEK®2 system (BioMérieux Inc, Durham, NC) according to the manufacturer's instructions, in the hospital laboratory.

For obtaining the hydroethanolic extract, we transformed 300 g of fresh exocarp of *Juglans nigra* into dust using a grinder. Over the powder we poured 700 mL solution obtained from 200 mL of distilled water and 500 mL ethanol (70%). The solution thus obtained was kept in an amber glass container at a temperature of 4° C with stirring every day. After ten days the solution was placed in a rotary evaporator for 10–15 minutes after which the supernatant was removed using a Whatman no. 41 filter. Finally we obtained "dry stock" solution of which serial dilutions (in distilled water) were prepared.

To evaluate the synergism of the antibiotic-herbs extract, we used the standardized disk diffusion method but adapted to the experimental purpose: antibiotic-impregnated disks were pipetted with a volume of 10 μL of plant extract. Plates were incubated at 37° C / 18–24 h after which the bacterial growth inhibition zone was read. The values of the inhibition areas were compared with those obtained under the extracts. Increasing the diameter of the inhibition zone was the indicator for the synergistic effect, and otherwise, decreasing the diameter of the inhibition zone indicated an antagonistic relationship.

Results and discussions

The objective of the analysis was to evaluate the antibacterial effect of herbs extracts in the synergistic potential association with antibiotics. The combination of conventional antibiotics in which the bacterial strains were resistant in combination with herbs extracts, can restore the efficiency of the treatment due to the synergistic antibiotic-extract effect [5].

The analyzed microorganisms were multi-drug-resistant strains. In order to evaluate the effects of combining plant extracts with antibiotics, we determined the MIC values of plant extracts as a reference point for defining interactions with antibiotics [4].

The extract from *J. nigra* exocarp influenced differently the activity of the associated antibiotic. Zones of inhibition (Fig. 1) had values between 7–32 mm. Each experiment was repeated 3 times and the diameter of the inhibition zone was the arithmetic mean of these values. The deviation was 0.5 mm. Table 1 summarizes the data that reflects the synergism of *J. nigra* exocarp extract with the antibiotic.

The minimal inhibitory concentration of *J. nigra* extract determined by the binary dilution method is illustrated in the diagram of Fig. 2.

An intensive inhibitory synergistic interaction of bacterial growth was performed by the *J. nigra* extract in association with β-lactam antibiotics (ceftazidime, cefepime, meropenem), as well as antibiotic inhibitors of protein synthesis (gentamycin), with cellular metabolism inhibitors (sulfamethoxazole, trimethoprim), or with inhibitors of bacterial DNA replication (levofloxacin).

In association with meropenem there were 4 antagonistic cases for the strains: *P. aeruginosa*$_{I11}$, *E. coli*$_{III3}$, *E. coli*$_{III5}$, *A. faecalis*$_{III12}$ and 4 indifferent to: *P. aeruginosa*$_{II4}$, *A. faecalis*$_{I25}$, *K. pneumoniae*$_{ATCC700603}$, *P. aeruginosa*$_{I24.}$

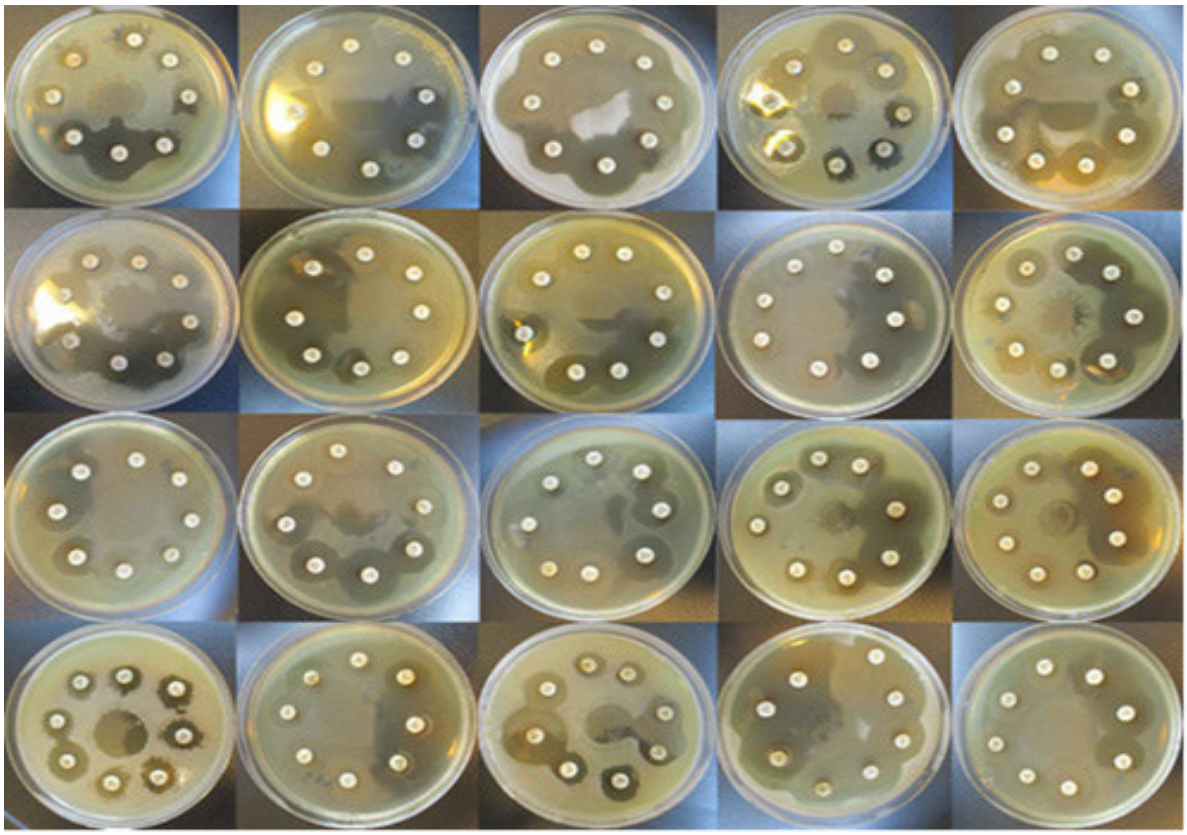

Fig. 1: Growth inhibition areas after the combination of the *J. nigra* exocarp extract and the antibiotic-impregnated disks. Clear areas around the disk represent the area of inhibition of bacterial growth. Bacterial strains in the order of the plates from left to right: *K. pneumoniae*$_{IV11}$, *P. aeruginosa*$_{II27}$, *A. faecalis*$_{IV12}$, *P. aeruginosa*$_{II4}$, *A. baumannii*$_{I5}$, *K. pneumoniae*$_{I14}$, *P. aeruginosa*$_{I11}$, *K. pneumoniae*$_{I19}$, *P. aeruginosa*$_{I4}$, *E. coli*$_{III3}$, *A. faecalis*$_{I25}$, *P. mirabilis*$_{II32}$, *E. coli*$_{I2}$, *E. coli*$_{III5}$, *A. faecalis*$_{V32}$, *P. aeruginosa*$_{I24}$, *K. pneumoniae*$_{I1I9}$, *A. faecalis*$_{III12}$, *K. pneumoniae*$_{I6}$, *K. pneumoniae*$_{ATCC700603}$

Table 1: Antibiotic synergism with hydroethanolic extract of *J. nigra*

Strain	Minimum inhibitory area (±0.5 mm) of the *J. nigra* extract (JN) alone and with antibiotics and how potentiation of antibiotic (antagonistic-A, synergistic-S, indifferent-I)																
	JN	CN	CN +JN	FEP	FEP +JN	SXT	SXT +JN	LEV	LEV +JN	TZP	TZP +JN	AMC	AMC +JN	CAZ	CAZ +JN	MEM	MEM +JN
K.p$_{IV11}$	17	0	10S	10	14S	0	15S	0	12S	0	14S	0	16S	0	16S	21	22S
P.a$_{II27}$	23	0	15S	0	18S	0	18S	0	14S	0	18S	0	18S	0	18S	8	20S
A.f$_{IV12}$	18	0	16S	0	25S	0	28S	0	17S	0	22S	0	24S	0	24S	15	28S
P.a$_{II4}$	15	0	12S	0	12S	0	14S	0	13S	22	22S	0	18S	0	17S	22	22S
A.b$_{I5}$	21	0	14S	0	20S	0	30S	0	25S	0	32S	0	32S	0	28S	14	24S
K.p$_{IV4}$	18	0	12S	0	12S	0	14S	14	14I	14	32S	0	32S	0	18S	22	24S
P.a$_{I11}$	20	0	12S	0	12S	0	20S	15	12A	0	25S	0	28S	0	18S	16	12A
K.p$_{I19}$	22	0	14S	0	16S	15	24S	0	22S	0	24S	0	22S	0	18S	15	20S
P.a$_{I4}$	22	0	16S	0	18S	14	25S	15	25S	0	20S	0	28S	0	20S	14	16S
E.c$_{IV23}$	18	0	14S	0	16S	12	20S	12	30S	12	32S	0	20S	0	18S	21	16A
A.f$_{I25}$	24	0	16S	0	16S	14	18S	15	16S	0	19I	0	18S	0	16S	14	14I
P.m$_{II32}$	18	0	18S	0	14S	0	16S	0	18S	10	22S	0	22S	0	18S	0	14S
E.c$_{V28}$	17	0	0I	0	0I	0	16S	0	32S	7	16S	0	32S	0	20S	15	30S
E.c$_{III16}$	21	0	7S	0	0I	23	18A	0	0I	19	19I	0	18S	0	18S	22	21A
A.f$_{V32}$	12	0	7S	0	12S	0	14S	0	18S	0	22S	0	18S	0	20S	16	18S
P.a$_{I27}$	18	0	12S	0	12S	0	14S	0	12S	0	16S	0	14S	0	14S	15	15I
K.p$_{II29}$	16	0	7S	0	0I	0	10S	0	12S	0	14S	0	12S	0	16S	15	22S
A.f$_{II12}$	18	0	10S	0	12S	0	12S	15	16S	0	18S	0	16S	0	16S	15	14A
K.p$_{I6}$	24	0	20S	0	30S	0	28S	0	30S	7	30S	0	28S	0	28S	15	30S
K.p$_{ATC}$	18	14	14I	20	20I	25	25I	30	30I	25	25I	25	25I	18	18I	32	32I

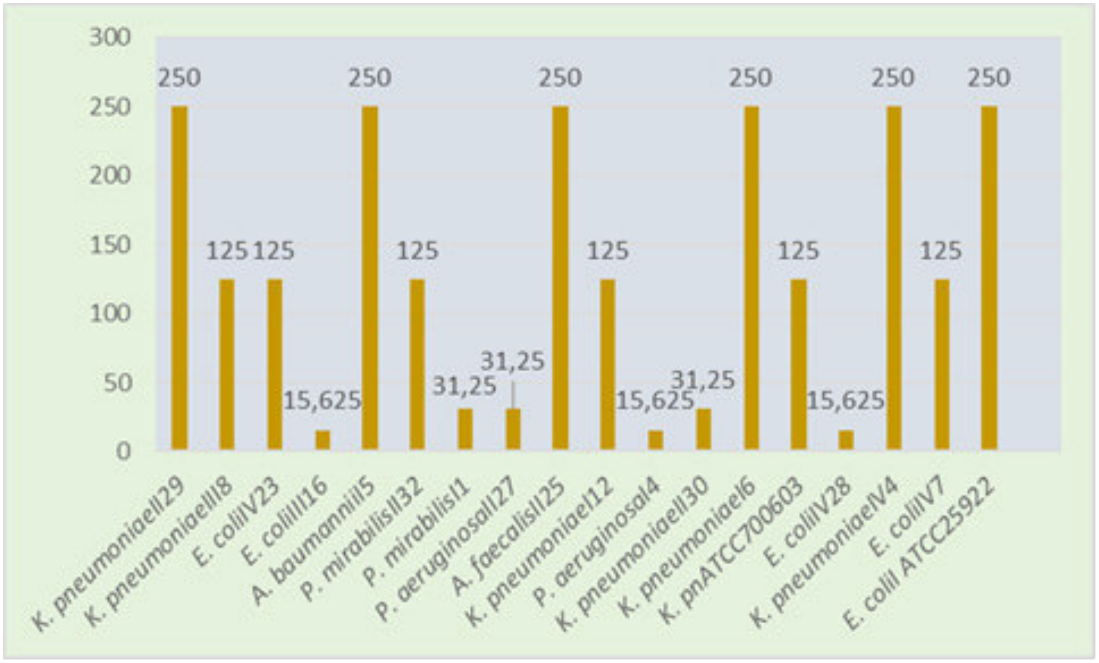

Fig. 2: Minimal inhibitory concentration of the association of *J. nigra* exocarp extract with antibiotic against growth of bacterial strains. The values are between 15 and 250 µg/ml. The lowest inhibitory values correspond to strains *E. coli*$_{III16}$, *E. coli*$_{IV28}$ and *P. aeruginosa*$_{I4}$.

In association with trimethoprim / sulfamethoxazole, there was only one case of antagonism for the *E. coli*$_{III5}$ strain and indifference to *K. pneumoniae*$_{ATCC700603}$.

In combination with levofloxacin, the extract had an antagonistic effect for the *P. aeruginosa*$_{I11}$ strain and ATCC700603 was indifferent to: *K. pneumoniae*$_{I14}$, *E. coli*$_{III5}$, *K. pneumoniae*$_{ATCC700603}$. The synergism between antibiotic and plant extract was 85%.

Optimal synergistic antibacterial activity was recorded in the association of *J. nigra* exocarp (in concentration of 250 µg/ml) extract with ceftazidime, amoxiclav, gentamicin and cefepime. The CMI of the extract of *J. nigra* in combination with antibiotics had values between 15–250 µg/ml.

The therapeutic efficacy of aminoglycosides has been diminished by the selection and dissemination of resistant bacterial strains. The therapeutic efficacy of aminoglycosides has been diminished by the selection and dissemination of resistant bacterial strains. In some cases, the level of resistance has reached the point where it has become virtually useless. Inactivation by enzymatic modification is the most common mechanism of resistance to aminoglycosides. Bacterial strains resistant to aminoglycosides have also been identified as producing ESBL, which contributes to the multi-resistance phenotype. The extract from *J. nigra* produced an intense effect of potentiating the antibacterial activity of gentamicin. One strain (*E. coli*$_{I2}$) remained neutral.

For the semi-quantitative quantification of the synergic effect of *J. nigra* extract with antibiotics, we used the serial microdilution method. A conventional method (according to EUCAST / 200 norms) to obtain different concentrations of antimicrobial agent for the purpose of establishing MIC, it is to obtain a stock solution of 10,240 mg/l, of which 1 ml was measured volume of extract stock. By adding a volume of 19 ml Muller-Hinton broth is obtained the final concentration, as shown in Table 2.

Antibiotics in combination with the *J. nigra* extract altered the permeability of the bacterial cell membrane by increasing the influx of antibiotic (Table 3).

Table 2: Preparation of dilutions of antimicrobial agents for MIC calculation using agar medium:

Concentration of stock solution [mg/l]	Volume of stock solution [ml]	Volume of distilled water [ml]	The antimicrobial concentration obtained [mg/ml]	The final concentration obtained after the addition of 19 mg agar
10240	1	0	10240	512
10240	1	1	5120	256
10240	1	3	2560	128
2560	1	1	1280	64
2560	1	3	640	32
2560	1	7	320	16
320	1	1	160	8
320	1	3	80	4
320	1	7	40	2
40	1	1	20	1
40	1	3	10	0.5
40	1	7	5	0.25
5	1	1	2.5	0.125
5	1	3	1.25	0.06
5	1	7	0.625	0.03
0.625	1	1	0.3125	0.015
0.625	1	3	0.1562	0.008
0.625	1	7	0.0781	0.004

Table 3: Influence of *J. nigra* extract on the antibiotic resistance profile of *P. aeruginosa* and *E. coli* strains

Strain	Antibiotics and the MIC in the presence and absence of *J nigra* extract											
	Ciprofloxacin		Cefepime		Amoxiclav		Gentamicin		Norfloxacin		Ceftazidime	
	alone	+JN	alone	+JN	alone	+JN	alone	+JN	alone	+JN	alone	+JN
P.aeruginosa$_{II27}$	128	16	128	16	128	16	32	16	128	32	256	32
P.aeruginosa$_{II4}$	64	8	256	32	32	4	32	8	256	64	512	64
P.aeruginosa$_{II11}$	256	32	128	16	64	8	128	16	512	32	64	16
E.coli$_{III3}$	128	16	128	8	128	32	32	4	128	32	32	16
P.aeruginosa$_{I4}$	256	64	256	32	64	16	64	8	128	16	32	8
E.coli$_{I2}$	64	8	128	16	32	8	32	16	256	8	128	32
E.coli$_{III5}$	128	32	64	4	64	16	64	8	128	16	512	32

The synergistic action of the *J. nigra* extract with antibiotics against *P. aeruginosa* and *E. coli* suggests the complexity of the compounds action modality resulting from secondary metabolism.

Conclusions

The synergism of the walnut exocarp extract with the antibiotic was clearly predominant, which leads to the hypothesis of the extracts action mechanisms similar to antibiotics. The analyzed strains were multi-resistant, but in combination with the plant extracts, they became sensitive. Simultaneous administration of antibiotics and herbal active substances would significantly increase antibacterial activity and diminish the harmful effect of the antibiotic by overdosing or of the bacterial diversified resistance mechanisms.

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POTENȚAREA EFECTULUI ANTIBACTERIAN AL ANTIBIOTICELOR ÎN TERAPIA INFECȚIILOR BACTERIENE

(Rezumat)

Rezistența la antibiotice a tulpinilor bacteriene izolate din infecții nozocomiale reprezintă o problemă majoră la nivel mondial. În contextul în care antibioticele nu mai pot face față la mecanismele de rezistență adaptative ale tulpinilor MDR, plantele medicinale reprezintă o sursă sigură de diminuare a rezistenței acestora. Tulpinile bacteriene, cu rezistență mare la toate clasele de antibiotice, au fost analizate pentru diminuarea rezistenței utilizând extract hidroetanolic din *Juglans nigra*, în asociere cu toate clasele de antibiotice. Activitatea sinergică dintre extract și antibiotic a fost în raport de 85%, ceea ce sugerează reactivarea arsenalului anibioticelor împotriva tupinilor MDR.

ZOOLOGY

MULTIANNUAL DYNAMICS AND ACTUAL STATE OF SHREW COMMUNITIES IN THE REPUBLIC OF MOLDOVA

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Abstract: The paper is based on the existing bibliographical data, on the collection of vertebrate animals of the Institute of Zoology and on personal studies performed between 2003–2017 in various types of ecosystems on the whole territory of the Republic of Moldova. During the last 60 years, there were registered considerable modifications of shrew communities' structure on the whole territory of the republic. The species *Sorex araneus* is the most common and widespread among shrews; its abundance was the highest in the majority of studied periods (25%–70%), as well as in the past century (40%–72%). The pygmy shrew is rather spread all over the republic's territory, its abundance varied between 5% and 26% in the past century and between 7% and 46% in the last years of study. The bicolor white-toothed shrew was one of the rarest species in the past century with the abundance of below 7% and in the last years of study, it became one of the most common among shrews (up to 43%). The lesser white-toothed shrews is wide spread in various types of ecosystems, including the localities, with an abundance between 6% and 36% in the study years and below 22% in the past century. The Mediterranean water shrew that was one of the most abundant in the past century (up to 30%), at present is critically endangered with very low abundance (2.3% to 7.1%), being the most sensitive to the destruction and transformation of its natural habitats. In the third edition of the Red Book of the Republic of Moldova, the water shrew was included as critically endangered species, the Mediterranean water shrew – as endangered species and bicolor shrew as vulnerable species.

Keywords: shrew species, multiannual dynamics, state, ecosystems

Introduction

The shrews (Soricidae, Soricomorpha) are the smallest mammals of the world, but they are of great importance for environment and for human economy, being important links within the animal trophic chains. This group was rather poor studied in the Republic of Moldova in comparison with other mammal groups. There are 6 shrew species inhabiting the republic territory: common shrew (*Sorex araneus*), pygmy shrew (*S. minutus*), bicolor white-toothed shrew (*Crocidura leucodon*), lesser shrew (*C. suaveolens*), water shrew (*Neomys fodiens*) and Mediterranean water shrew (*N. anomalus*). The water shrew was mentioned only by Brauner [5], but the detailed studies accomplished in the past century [2, 3, 7, 8, 9, 25] did not reveal the presence of this species. Its occurrence was mentioned in pellets of some predatory birds from Codri forest reserve in the central zone [27].

The studies of shrews started in the 60's – 70's of the past century when they were rather well studied and practically only one valuable paper was published [9]. Some data concerning

shrew species can be found in other papers, where shrew species are mentioned and some information concerning their abundance can be found [1, 2, 4, 10, 11, 13]. Since 2003 the detailed study of shrew species from the territory of the republic has begun [14, 16, 18], including some papers on shrew dynamics [15, 17]. The mentioned papers present data before 2009, but in the last 8 years considerable modification of shrew species state occurred. In the last years, the shrew studies focused on their spreading, occurrence in certain areas and the ecological analysis that included the abundance, dominance, frequency, ecological significance [20, 21, 22, 24].

The paper presents information on multiannual dynamics of shrew communities from the 60's of the past century till present days and the actual status of shrew species on the territory of Republic of Moldova is analysed.

Material and methods

The paper is based on the existing bibliographical data, on the collection of vertebrate animals of the Institute of Zoology and on personal studies performed between 2003–2017 in various types of ecosystems on the whole territory of the Republic of Moldova (fig. 1).

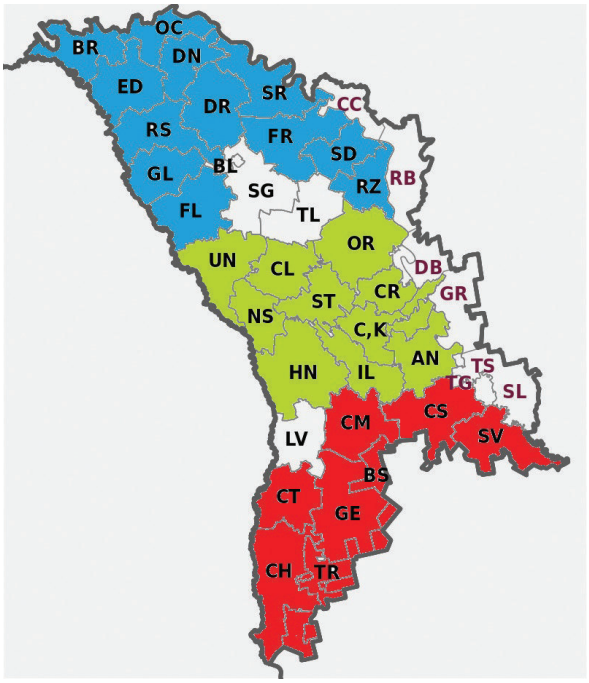

Fig. 1: Studied districts of the Republic of Moldova

In the northern zone the studies were performed in Briceni, Ocniţa, Edineţ, Drochia, Soroca, Râşcani, Glodeni, Rezina, Floreşti, Şoldăneşti and Făleşti districts; in the central zone – Chişinău municipality, Orhei, Călăraşi, Ungheni, Străşeni, Nisporeni, Criuleni, Hânceşti, Ialoveni and Anenii-Noi districts; in the southern zone – Cimişlia, Căuşani, Ştefan-Vodă, Basarabeasca, Cantemir, Cahul and Taraclia districts. The territories of the reserves Pădurea Domnească, Dobruşa, Codri, Plaiul Fagului, Trebujeni, Prutul de Jos were investigated, as well as anthropogenic ecosystems. The following types of ecosystems were studied: natural forest, paludous, riparian, agrocoenosis, wet forest, as well as different types of ecotone: forest belt, forest-paludous, forest-agrocoenosis, paludous-agrocoenosis, paludous-grassland.

The material was collected with snap traps, fall traps, live traps and by gathering dead individuals. The individuals were identified, measured, weighed, sex, age, physiological and reproductive state were registered, and the skulls were preserved for further morphological studies. In order to reveal the actual state of shrew species the indexes of abundance (A), frequency (F) and ecological significance (W) were calculated: A = 100n/N, where n – number of individuals of certain species in the sample, N – total individual number; F = 100p/P, where P – total number of samples, p – no of samples where the species is present; W = FxA/100, where F is frequency of certain species and A – abundance index. The species with the significance lower than 1% in the studied biotope are considered accidental; 1.1 – 5 % – accessorial; 5.1–10% – characteristic and W>10% – constant.

Results and discussions

During the last 60 years, there were registered considerable modifications of shrew communities' structure on the whole territory of the republic. In the period 1950–1969 the natural ecosystems occupied larger surfaces and the many wet habitats were still intact. In this period the dominant species among shrews in the republic was *S. araneus*, with almost 50%, followed by *N. anomalus* (25%) that was very abundant in wet habitats. In the southern zone in the lower course of Prut River the Mediterranean water shrew was reaching up to 60% from all the shrews and 10% from all the small mammals [9]. In 50's–60's of the past century the lower Prut area of flood plain occupied large surfaces, with many floating islets, formed of rush, reed, covered with dense herbaceous vegetation and abundant litter, where the hygrophilous shrew species could find favourable trophic and shelter conditions. The pigmy (*S. minutus*) and lesser (*C. suaveolens*) shrews were rather spread on the republic's territory, but their abundance was lower – around 10% (fig. 1). The bicolour shrew was rather rare (up to 6%) and together with *C. suaveolens* was recorded in humid, as well as in more arid biotopes, such as fields, pastures, slopes with herbaceous or bush vegetation. The *Sorex* and *Neomys* species had characteristic ecological significance in various types of forest ecosystems, in paludous and riparian biotopes.

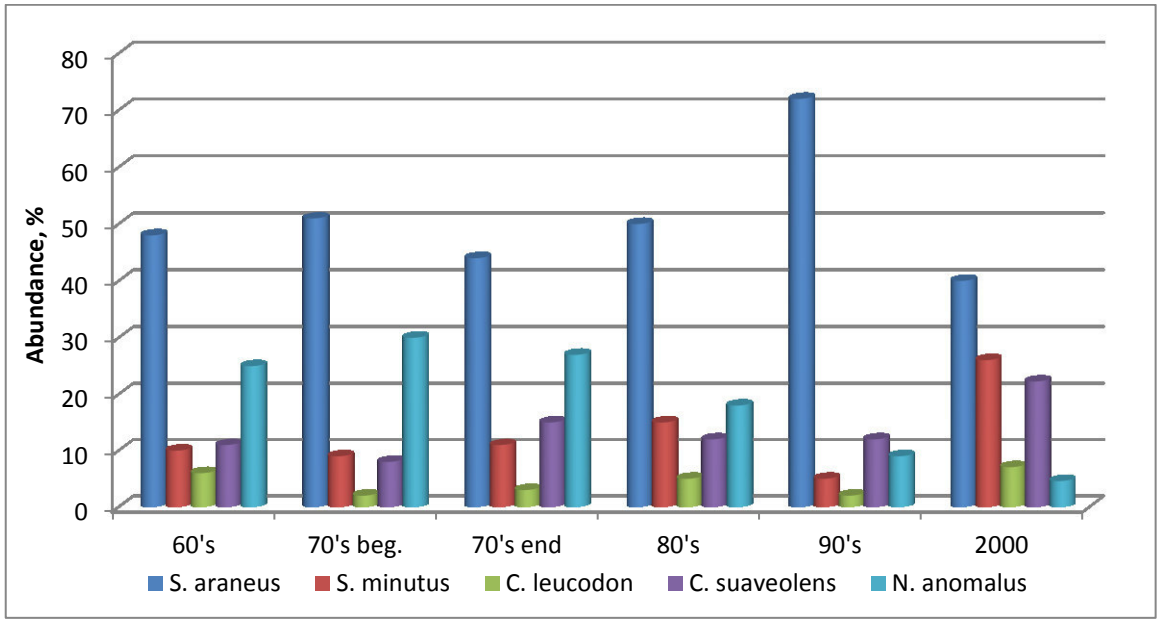

Fig. 2: Dynamics of shrew community structure before 2000

In the 1970's the dominant species among shrews also was *S. araneus*, followed by *N. anomalus*. The percent of common shrew was the highest at the beginning of 70's (51%) and slightly decreased toward the end of the decade (44%). It was registered in most of the ecosystems: forest (insular forests, central forest, forest shelter belts), in meadows of Nistru and Prut valleys, and in various types of wet biotopes. In insular forests from the northern part the common shrew constituted about 9–15% from all the small mammals, in wet oak forests with abundant shrub and herbaceous vegetation its abundance reached 20%, while in lower Prut marshes this species constituted up to 55% from all the small mammals [3, 9]. The Mediterranean shrew abundance increased in comparison to the previous decade (up to 30%) and together with the common shrew constituted more than 80% of shrew population. Although, the pigmy and lesser shrews were rather spread on the republic territory, they had low abundance; only 8–9% at the

beginning of 70's and increased to 11–15% toward the end of the decade. *Crocidura leucodon* was a very rare species registered only in "Codri" forest reserve [9] with very low abundance of 2–3% (fig. 2). In that period some studies on urban fauna have started and the shrew species were recorded as faunal components of cities and towns of Republic of Moldova [1]. The pigmy and lesser white-toothed shrews had approximately the same frequency and constituted about 20% from the whole shrew population.

In the 1980's, although the existent in literature data are very scarce [4, 13, 27], it was found that the abundance of common shrew was maintaining at high levels and the species constituted half of shrew population (fig. 1). It was the only species among shrews that was recorded in forest shelter belts [13]. The Mediterranean water shrew was registered only in natural reserves in biotopes near water basins and its abundance decreased below 20%. The abundance of pigmy shrew increased to 15%, it was recorded mostly in wet biotopes of "Codri" forest reserve [4]. The lesser shrew was maintaining at 12–15%, while the abundance of both species of white toothed shrews remained very low and did not overpass 5%.

The 1990's was the period of deep social and economic changes that lead to the modification of ecosystem structure and of the whole landscape of the republic. The processes of natural habitat destruction, such as forest cutting, water habitat modification and pollution, increasing of recreational activity etc. were rather intense. Therefore, the shrew species density decreased drastically in comparison to other groups of mammals. In this period the common shrew showed high degree of adaptability and had the highest abundance among shrews, constituting more than 70% from the shrew population on the whole territory of the republic and having a constant ecological significance in various types of natural ecosystems [10, 11]. *Sorex minutus* and *N. anomalus* were registered mostly in wet habitats and near water basins from natural reserves with the abundance of 5% and 9%, respectively. In other ecosystems the Mediterranean shrew was not recorded at all, while the pigmy shrew was accidental in forest ecosystems. It was noted the strong decreasing of Mediterranean water shrew by more than three times since the 70's till the end of 90's. This fact can be explained by the disappearance of floating islets after an intense flooding at the end of 70's, drying of lower Prut and Nistru swamp ecosystems in the 80's and by intense pollution of surface waters in 90's. The abundance of lesser shrew was maintaining at 12%, while that of bicolour shrew was only 1–2% and toward the end of the past century it became one of the rarest mammal species (fig. 1). As consequence, *C. leucodon* was included in the Red Book of Moldova, 2nd edition, as critically endangered [6].

At the end of 90's – beginning of new century first decade many abandoned lands started to revert to their natural state as natural biotopes: pastures, meadows, lands with abundant bush vegetation etc. These modifications lead to the new changes of the shrew communities' structure. The differences between the abundance of different species were not so obvious. Thus, the common shrew remains the dominant species, but its abundance decreased to 42%. The abundance of pigmy shrew and of lesser shrew increased almost twice (26% and 22%, accordingly). It was noted an increase of bicolour white-toothed shrew abundance up to 7%, while the abundance of *N. anomalus* decreased drastically to less than 5%, which is 2 times lower than in the 90's and 6 times lower than in 70's (fig. 2).

Since 2003 systematic monitoring and detailed studies of shrew communities modifications were performed. The common shrew is the dominant species in most of the years, except 2004 and 2008, being registered in the majority of studied ecosystems with a frequency of 84%. The pigmy shrew's abundance increased in all the periods (20–47%), except 2009, when it was less than 10%. The species frequency was rather high – 68%, it being recorded in wet habitats, in forest, paludous, riparian biotopes and their ecotones. In general, in the first two years of study

the *Sorex* species had a very high dominance, they constituted 70%–90% of the whole shrew community.

The abundance of bicolour white-toothed shrew remained very low in the first years of study, then varied between 6% and 30% and increased to more than 37% in 2009. The total species frequency was of 9.7% while in its preferred habitats (forest and paludous ecosystems) its frequency reached 40% [17, 18]. The lesser shrew had low abundance in 2003 and 2009 (below 10%), then increased in 2004–2006 above 11%, while in the other study periods it's abundance reached above 20% and in 2008 it even was the dominant species among shrews (fig. 3). It was noted that the lesser shrew was the dominant species in various types of localities, including Chișinău city [19, 26], where it had characteristic significance (8.3%). The general frequency of the species was 37.8% and reached 80% in urban ecosystems.

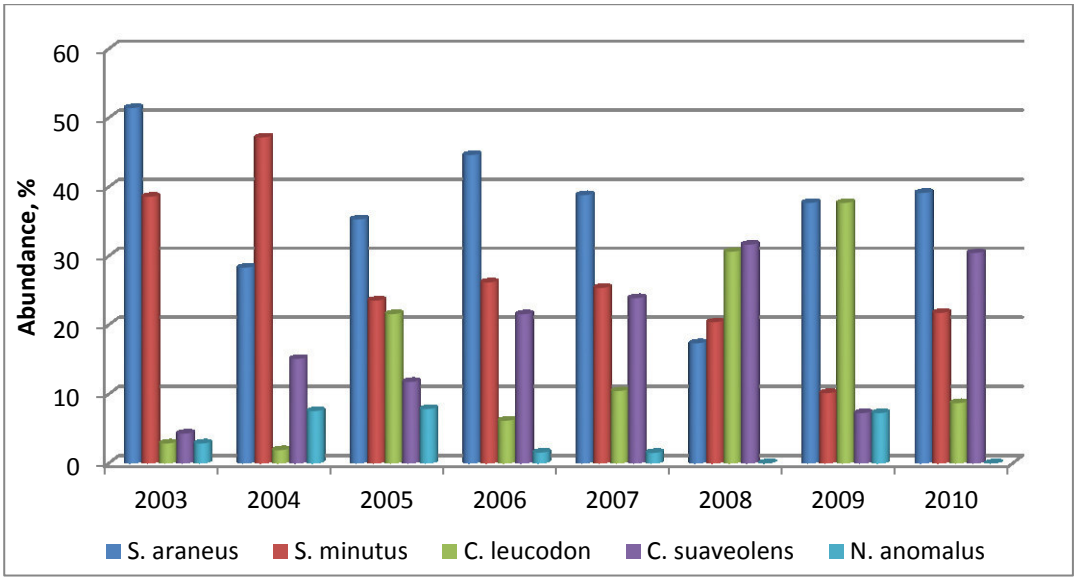

Fig. 3: Dynamics of shrew community structure in the study period 2003–2010

Starting with 2003 the Mediterranean water shrew was the rarest shrew species. Its abundance decreased drastically, the maximum value being registered in 2005 (7.8%), while in 2008 and 2010 the species was not recorded (fig. 3). The frequency of *N. anomalus* was very low (below 5%) and it was registered only near aquatic basins of natural reserves with accessorial or accidental ecological significance (0.2%–2.7%).

In the last years of study the situation within shrew communities showed some difference between years. The common shrew is dominant only in 2013 and in the last 3 years of study, of which in the last two years it has a very high abundance (52%–70%) and a frequency of 85.7%. The species had a characteristic ecological significance (9.1%) in wet forests, paludous biotopes and their ecotones, accessorial significance (3.9%) in natural forests, in forest belts and accidental significance (0,8%) at the ecotone of agricultural ecosystems. The abundance of pygmy shrew varied between 7.5% in 2014 to 25.6% in 2012, when it was one of the dominant species (fig. 4). It has a characteristic ecological significance (6.8%) in paludous biotopes and their ecotones and is accessorial or accidental in other ecosystems (0.7%–3.8%).

The proportion of *Crocidura* species varied in large limits. From 2011 to 2014 the abundance of *C. leucodon* increased from 20% to 43%, in 2014 being the dominant species with a frequency of 47%, while in the last 3 years it had a low abundance (up to 10%) and a frequency

of 14%. *Crocidura suaveolens* had rather high abundance in 2011–2013 and in 2015 (25%–35%) and was one of the dominant species, but in the last two years its abundance decreased to 6% (fig. 4). The frequency of the species remains high in localities (68%) with characteristic ecological significance (9.1%) and lower in other types of ecosystems: 22% in agrocoenoses and their ecotones and 17% in natural ecosystems, where the species was accessorial or accidental (0.8%–4.8%).

The status of Mediterranean shrew remains critical: it was registered in 2012–2016 with very low abundance of 2.3% to 7.1% (fig. 4). It was recorded only in wet biotopes from the reserves and protected areas [12, 22, 24], with the frequency between 7% and 23% with accidental of accessorial ecological significance (0.1%–2.4%).

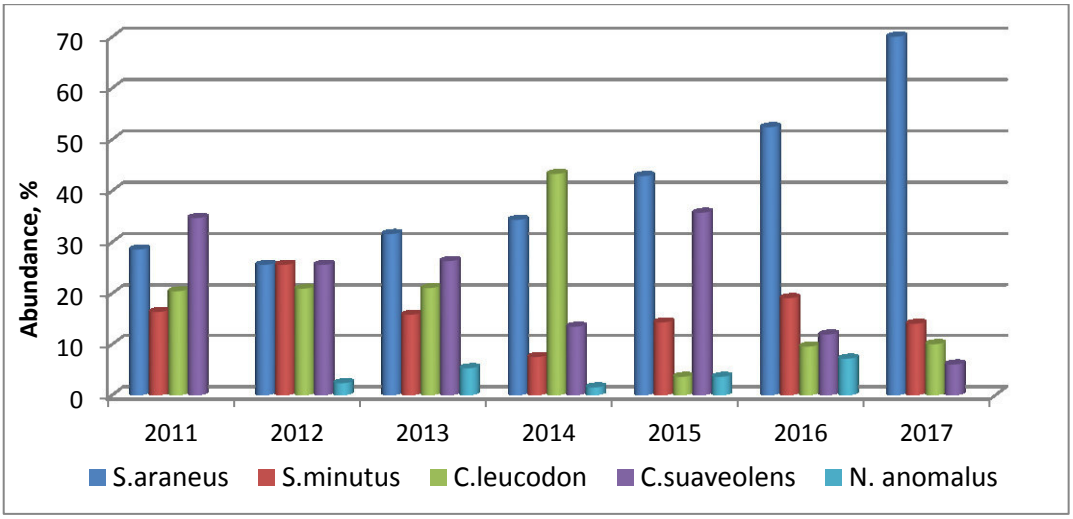

Fig. 4: Dynamics of shrew community structure in the study period 2011–2017

After assessing the present state of the shrew species in the Republic of Moldova, it was concluded that the species *S. araneus* is the most common and widespread among shrews, the pygmy shrew is rather spread all over the republic's territory, but is less abundant and rarer, and the lesser shrew is widespread mostly in localities and other anthropized ecosystems. The species *N. fodiens* was not registered on the republic's territory, it was mentioned only for Pădurea Domneasca forest reserve in the north of the republic [12]; *Neomys anomalus* became a very rare species, while the state of *C. leucodon* improved all over the territory of the republic. As consequence, in the third edition of the Red Book of the Republic of Moldova [23] the water shrew was included as critically endangered species, the Mediterranean water shrew – as endangered species, while in bicolor shrew the status changed from critically endangered [6] to vulnerable species.

The shrew species are sensitive to environmental changes and can serve as indicators of ecosystem functional stability. The semiaquatic species are indicators of surface water pollution and their continuously decreasing trend indicate the alarming situation of wet habitats on the entire republic's territory. The rare species and their habitats need urgent protection measures.

The work was performed under the fundamental project 11.817.08.14F.

Conclusions

During the last 60 years there were registered considerable modifications of shrew communities structure on the whole territory of the republic. The species *S. araneus* is the most common and widespread among shrews, its abundance was the highest in the majority of studied periods (25%–70%), as well as in the past century (40%–72%). It is the most well adapted species among shrews. The pygmy shrew is rather spread all over the republic's territory, its abundance varied between 5% and 26% in the past century and between 7% and 46% in the last years of study. The bicolor white-toothed shrew was one of the rarest species in the past century with the abundance of below 7% and in the last years of study it became one of the most common among shrews (up to 43%). The lesser white-toothed shrews is wide spread in various types of ecosystems, including the localities, with an abundance between 6% and 36% in the study years and below 22% in the past century. The Mediterranean water shrew that was one of the most abundant in the past century (up to 30%), at present is critically endangered with very low abundance (2.3% to 7.1%), being the most sensitive to the destruction and transformation of its natural habitats. In general all shrew species are sensitive to anthropic disturbances and can serve as good ecological indicators of ecosystem stability. Further measures on the protection of shrew species and their habitats must be taken.

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DINAMICA MULTIANUALĂ ȘI STAREA ACTUALĂ A COMUNITĂȚILOR DE CHIȚCANI ÎN REPUBLICA MOLDOVA

(Rezumat)

Datele din lucrare se bazează pe informația bibliografică existentă, pe colecția de vertebrate terestre a Institutului de Zoologie, precum și pe cercetările personale efectuate în perioada 2003–2017, în diverse tipuri de ecosisteme de pe întreg teritoriul republicii. Pe parcursul ultimilor 60 de ani s-au înregistrat modificări esențiale ale structurii comunităţilor de soricide, în diverse tipuri de ecosisteme pe teritoriul republicii. Specia *Sorex araneus* este cea mai răspândită și comună dintre chițcani, cu cea mai mare abundență în majoritatea perioadelor de studiu (25%–70%), precum și în secolul trecut (40%–72%). Chițcanul pitic este destul de răspândit pe întreg teritoriul republicii, abundența acestuia a variat între 5% și 26%, în cercetările anterioare și între 7% și 46%, în ultimii ani de studiu. Chițcanul de câmp era una dintre cele mai rare specii în secolul trecut, cu o abundență sub 7%, iar în ultimii ani de studiu a devenit una din speciile comune (până la 43%). Chițcanul de grădină este larg răspândit în diverse tipuri de ecosisteme, inclusiv în localități cu abundența cuprinsă între 6% și 36%, în perioada de studiu și sub 22%, în cercetările anterioare. Chițcanul de mlaștină, care era una dintre cele mai abundente specii în secolul trecut (până la 30%), în prezent este o specie rară, periclitată cu abundență foarte scăzută (2.3% – 7.1%), fiind cea mai sensibilă la transformarea și distrugerea habitatelor naturale. În ediția a III-a a Cărții Roșii a Republicii Moldova, chițcanul de apă a fost inclus ca specie critic periclitată, chițcanul de mlaștină – ca specie periclitată și chițcanul de câmp – ca specie vulnerabilă.

NEW RECORDS OF SOME RARE AND PROTECTED INSECTS SPECIES FROM THE REPUBLIC OF MOLDOVA

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Abstract. The paper includes new data about nineteen insect species, most of them rare, from orders Diptera, Lepidoptera, Coleoptera and Odonata revealed in the Republic of Moldova during the years 2015–2018. The list of species, localities, data collection, distribution and protection status are included.

Keywords: new data, rare species, protection, legislation.

Introduction

The Class Insecta is vast in numbers of species in comparison to other living organisms. In 1982 Erwin [2] estimated up to 30 million species but new estimates of species boundaries revealed by DNA sequences, increase their total suggested number up to 40 million.

Many insect species are strictly protected by International Convention on the Conservation of European Wildlife and Natural Habitats, which is a binding international legal instrument in the field of nature conservation, covering most of the natural heritage of the European continent.

The Emerald Network, launched by the Bern Convention is a special tool for protection of European natural sites, to conserve wild flora and fauna and their natural habitats, as well as to promote regional cooperation in this field. The list of insects from the Republic of Moldova included in the Emerald Network consist of 24 species from orders Lepidoptera, Coleoptera, Orthoptera and Odonata.

The European Red List is a review of the status of European species according to IUCN regional Red Listing guidelines. The Red Book of the Republic of Moldova (2015) includes 80 species of Insecta from eight orders: Diptera (one species), Hymenoptera (14), Lepidoptera (31), Coleoptera (25), Neuroptera (1), Orthoptera (4), Mantoidea (2) and Odonata (3).

However the number of rare and vulnerable species of animals protected by law in the Republic of Moldova is very small compared to their number included in the European legislation and most of the knowledge about insects' biodiversity in our country remains fragmented.

This paper includes the observation on insect species from the Republic of Moldova carried out in the field trips during several years with special point on rare and protected species.

Material and methods

The specimens of rare and protected insect species have been observed and photographed in their natural habitats in 16 different localities of the Republic of Moldova during years 2015–2018. Between the studied habitats there are the forest belt on the base of willow, poplar and aspen trees growing along the bank of the Prut River in the localities Nemțeni, Măcărești, Sculeni and Zberoaia; the forest belt on the base of willow near locality Naslavcea and the calcareous canyon covered with deciduous forest on the base of oak trees from two Protected Areas Vîșcăuți and Grădina Turcească located on the bank of the Dniester River. Among other studied habitats, it would be important to note some areas covered by deciduous forests on the base of oak trees such as Landscape Reserves Dobruța and Pohrebeni, Protected Area Vila Nisporeni and Nature Reserve Plaiul Fagului located in the central part of the country, as well as two lakes one of them near the locality Fundul Galbenei and the other Lake Cahul, located near the locality Etulia, the shore of which is covered with sand and palustral vegetation, being located in southern Moldova, near the border with Ukraine.

The additional observations were carried out in urban green spaces of the Chișinău city such as Alunelul, Valea Morilor and the old Jewish cemetery.

The distributions of species throughout the country and its protection status are given using the Red Book of the Republic of Moldova (2015). All the photographs included in the work are original.

Result and discussion

As a result of investigations 19 species of rare insects from orders Diptera (1 species), Lepidoptera (9), Coleoptera (4) and Odonata (5) were revealed. Eleven species from our list are protected by law and included in the Red Book of the Republic of Moldova. However several revealed species such as *Apatura ilia*, *Lycaena dispar*, *Eucharia festiva*, *Calopteryx splendens* and *Libellula depressa* are considered rare and included or in the European Red List of Butterflies, or in Appendix II of Bern Convention or in the Red Books of several regions of Russia and other countries.

Order Diptera

Family Asilidae

Satanas gigas (Eversmann, 1855) – 1.08.2018, ♀, Leuntea, flooded forest on the bank of the old Dniester River bed. Leg. dr. Sulesco T. In the Republic of Moldova was identified in the central and southern regions.

Species included in the Red Book of the Republic of Moldova.

Order Lepidoptera

Family Nymphalidae

Apatura ilia (Denis & Schiffermüller, 1775) –11.07.2018, 4 specimens, Plaiul Fagului Natural Reserve, on the road between the forest and the lake, found after the rain.

Not protected in the Republic of Moldova, but protected in several European countries and included in the European Red List of Butterflies. It occurs in a number of protected areas across its range.

Hypodryas (*Euphydryas*) *maturna* (Linnaeus, 1758) – 21.07.2016, many specimens of dead butterflies on the forest road, Bolduresti; 21.07. 2016, several specimens, Măcărești, forest belt of the Prut River; 22.05.2018, numerous specimens, Protected Area Vila Nisporeni, on the bushes flowers (Photo 1). In the Republic of Moldova it was identified in the central and southern regions.
Species included in the Red Book of the Republic of Moldova and Appendix II of Bern Convention.

Neptis sappho (Pallas, 1771) – 03.07.2015, 4 specimens, 22.05.2018, 2 specimens, Protected Area Vila Nisporeni, road through the forest. In the Republic of Moldova it was identified in northern and central regions.
Species included in the Red Book of the Republic of Moldova and in the European Red List of Butterflies.

Vanessa atalanta (Linnaeus, 1758) – 29.07. 2016, 2 specimens, Fungul Galbenei, herbaceous plants on the shore of lake; 16.06.2016, numerous specimens, Boldurești, road through the natural deciduous forest; 16.06.2016, several specimens, Zberoaia, forest belt on the bank of the Prut River; 4.08.2017, one specimen, Sculeni, meadows on the bank of the Prut River; 3 specimens, Etulia, herbaceous plants on the shore of Lake Cahul (Photo 3).
Not protected in the Republic of Moldova.

Family Lycanidae
Lycaena dispar (Haworth, 1802) – 29.07.2016, several specimens, Fungul Galbenei, meadows near the lake; 30.07.2017, numerous specimens, Protected Area Vila Nisporeni; 22.05.2018, several specimens, Zberoaia, natural forest near the Prut River; 21.07. 2016, ♀, Măcărești, forest belt of the Prut River (Photo 4).
The species has been declining in many European countries, due to habitat loss. Currently *Lycaena dispar*, is in severe decline in North-West Europe, but expanding in Central and Northern Europe, preferring wet places. In the Republic of Moldova the species develops two generations per year, growing on host plants from family Polygonaceae. It is a common species in the Republic of Moldova.
Species included in Appendix II of Bern Convention.

Family Papilionidae
Papilio machaon Linnaeus, 1758 – 3 specimens, Etulia, bank of the Lake Cahul. Species occurs throughout the country (Photo 3).
Species included in the Red Book of the Republic of Moldova, Ukraine and Red Book of some region in Russia such as Moscow Region. It is protected also in several European countries.

Parnassius mnemosyne Linnaeus, 1758 – 22.05.2018, ♂, Vila Nisporeni, road through the forest. Species occurs in northern and central regions.
Species included in the Red Book of the Republic of Moldova, Appendix II of Bern Convention and European Red List of Butterflies.

Zerynthia polyxena (Denis et Schiffermuller, 1775) – 1.05.2016, ♂, Nemțeni, forest belt of the Prut River. Species occurs throughout the country.

Species included in the Red Book of the Republic of Moldova and Appendix II of Bern Convention.

Family Sphingidae
Smerinthus ocellatus (Linnaeus, 1758) – 7.07.2016, 1 specimen, Naslavcea, on the trunk of old *Salix* tree (Photo 5).
Not protected.

Family Erebidae
Eucharia festiva (Hufnagel, 1766) – 2.05.2016, 1 specimen, Bacioi, in the yard of a household.
Not protected in the Republic of Moldova but included in the Red Book of the Republic of Belarus, Latvia and Lithuania. It occurs in a small number, locally.

Order Coleoptera

Family Cerambycidae
Aromia moschata (Linnaeus, 1758) – 17.06.2018, ♀, Nemțeni, forest belt on the bank of the Prut River. Species occurs in the central and northern parts of the country and in floodplain forest of the Nistru River.
Species included in the Red Book of the Republic of Moldova, Ukraine and Latvia.

Rosalia alpina (Linnaeus, 1858) – 11.07.2018, ♂, Plaiul Fagului Natural Reserve, on a cut oak trunk (Photo 6). In the present time this species is very rare in Moldova but in 1917, Miller and Zubovsky [7] cited it as being very common in the country, the presence of which was also noted around the Chişinău city. In 1957 Medvedev and Shapiro [6] cited it in the list of species, but without additional data on its distribution. Now the species occurs only in the central region of the Republic of Moldova covered by natural deciduous forest.
Species included in the Red Book of the Republic of Moldova and Appendix II of Bern Convention.

Family Lucanidae
Lucanus cervus (Linnaeus, 1758) – 30.08.2017, some specimens of dead beetles near the trunk of cut oak tree, Landscape Reserve Dobruşa; 19.10.2017, numerous bodies of dead beetles, Landscape Reserve Pohrebeni; 22.05.2018, ♂, Protected Area Vila Nisporeni, natural deciduous forest; 29.05.2018, ♂, Protected Area Vîşcăuţi, natural deciduous forest; 02.06.2018, ♂, Nemțeni, forest belt on the bank of the Prut River; 12.06.2018, ♂, Chişinău, Jewish cemetery with old oak tree; 15.06.2018, numerous specimens of both sex, Nature Reserve Plaiul Fagului; 19.06.2018, ♂, Chişinău, urban park Alunelul (Photo. 7). The specimens of *Lucanus cervus* were present in seven localities, including several urban parks from Chişinău city. Species occurs throughout all the country.
Species included in the Red Book of the Republic of Moldova and Appendix III of Bern Convention.

Family Scarabaeidae
Oryctes nasicornis (Linnaeus, 1758) – 15.07.1014, 2♂ and ♀, Bacioi, under bark of decomposed trunk of walnut (*Juglans regia* L.); 21.07 2016, ♂, Măcărești, oak trunk in the forest belt on the bank of the Prut River (Photo 8). Species occurs throughout the country.

Species included in the Red Book of the Republic of Moldova.

Order Odonata

Four of five cited below dragonflies species are not protected by law and the status of their population in IUCN Red List are stable or increasing (https://portals.iucn.org). Between 22 dragonfly species threatened in Europe only three are listed on the Annexes of the Habitats Directive which was compiled in the 1980s. Since then several western European dragonfly species showed a strong decline or their decline has stopped, and some of them even show a clear recovery. Due to the actual water pollution and low water flow into rivers over the last decades, the species of Odonata are in constant danger, because most of them are very sensitive to water quality, especially water oxygen (https://www.iucnredlist.org/).

Unfortunately, in the Republic of Moldova no complex research has been carried out regarding the biodiversity of Odonata. Only larval forms of species found in the samples of hydrobiologists have been recorded during the years and cited by Vladimirov [10]; Mushchinskij [8] and others. Some result of investigation on species diversity of adult Odonata were included in the papers of (Andreev et al. [1]; Dyatlova [2] etc.).

Family Aeshnidae

Anax imperator (Leach, 1815) – 29.07.2016, several specimens, Fungul Galbenei, shore of lake (Photo 9). Species occurs throughout the country.
Species included in the Red Book of the Republic of Moldova.

Anax parthenope (Selys, 1839) – 10.06.2018, 2 specimens, Chişinău, shore of lake, urban park Valea Morilor; 13.06.2018, 4 specimens, shore of lake, urban park Dendrarium.
Not protected.

Family Calopterygidae

Calopteryx splendens Harris, 1780 – 4.08.2017, numerous specimens, Sculeni, water edge of the Prut River; 16.06.2016, 3 specimens, Zberoaia, forest belt and water edge of the Prut River; 21.07.2016, numerous specimens, Cosăuți, palustral vegetation on the bank of the Dniester River; 13.06.2018, several specimens, Chișinău, small river in the urban park Dendrarium; 17. 06.2018, 2 ♂, 3 ♀, Nemțeni, forest belt and water edge of the Prut River. Species is very sensitive to the amount of oxygen in the water.
Not protected in the Republic of Moldova. The species is quite vulnerable and locally widespread; included the Red Books of several Russian regions as a vulnerable species.

Calopteryx virgo Linnaeus, 1758– 4.08.2017, numerous specimens, Sculeni, palustral vegetation on the bank of the Prut River (Photo 10). Like the previous species, it is very sensitive to water quality, especially to oxygen in the water.
Not protected.

Family Libellulidae

Libellula depressa (Linnaeus, 1758) Collected – 29.07.2016, several specimens, on the palustral vegetation on the shore of lake near locality Fungul Galbenei (Photo 11).
Not protected. Included in the Red Books of several regions of Russia.

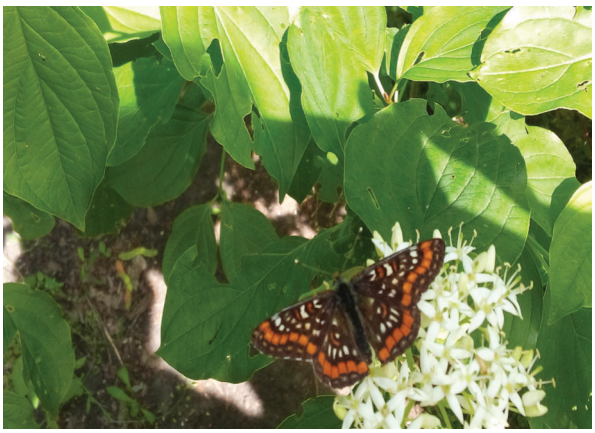

Photo 1: ***Hypodryas (Euphydryas) maturna*** **(photo Buşmachiu)**

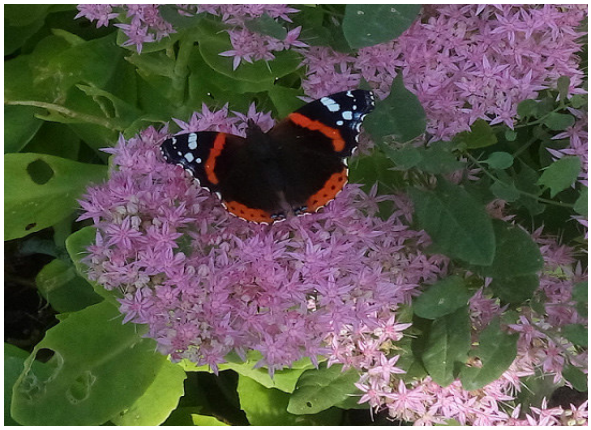

Photo 2: ***Vanessa atalanta*** **(photo Buşmachiu)**

Photo 3: ***Papilio machaon*** **(photo Buşmachiu)**

Photo 4: ***Lycaena dispar*** **(photo Buşmachiu)**

Photo 5: ***Smerinthus ocellatus*** **(photo Buşmachiu)**

Photo 6: ***Rosalia alpina*** **(photo Buşmachiu)**

Photo 7: *Lucanus cervus* (photo Bușmachiu)

Photo 8: *Oryctes nasicornis* (photo Bușmachiu)

Photo 9: *Anax imperator* (photo Andreev)

Photo 10: *Calopteryx virgo* (photo Bușmachiu)

Photo 11: *Libelulla depresa* (photo Andreev)

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DATE NOI PRIVIND UNELE SPECII DE INSECTE RARE ȘI PROTEJATE DIN REPUBLICA MOLDOVA

(Rezumat)

Lucrarea include date noi privind distribuția speciilor rare de insecte din ordinele Diptera, Lepidoptera, Coleoptera și Odonata în diverse habitate din Republica Moldova în decursul anilor 2015–2018. Se prezintă lista specilor, locul și data colectării, arealul și starea lor de protecție.

THE CENSUS OF THE WATER BIRDS FROM SOME DAM BASINS OF THE ARGEŞ RIVER (2018)

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Abstract: The results of the International Water Birds Count performed on January 13, 2018 on the dam basins from the ROSPA0062 Lacurile de acumulare de pe Argeş are presented in this paper. Located in the Southern part of Romania, the area is the subject of the ornithological researches since the late of 1960s, before the construction of these reservoirs.

Thirty-nine species of birds and more then 10,000 individuals were registered, among them 29, respectively 9,866, are characteristic to the wetlands. *Anas platyrhynchos*, *Aythya ferina*, *Larus canus*, and *Larus ridibundus* were the best represented, they having more than 70% of the strength of the dependent of water species. Only 4 species (*Phalacrocorax pygmeus*, *Egretta alba*, *Aythya nyroca* and *Circus cyaneus*) belong to the Annex I of the Birds Directive.

Some considerations about the constancy, dominancy, distribution of species on the dam basins and the anthropogenic factors that negatively influence the diversity of birds from the area are done in the paper, too.

Keywords: birds, Special Protected Area, International Water Birds Count, anthropogenic impact.

Introduction

Between January 10 and 20, chiefly at the week-end of this period, the International Water Birds Count takes place in our country. It is an activity coordinated on a global scale by the Wetlands International, and, at local level, by the Romanian Ornithological Society, in partnership with the Milvus Group. The aim of the event is to synchronically evaluate, in all participant countries, the strengths of the species dependent of wetlands to establish their numerical and distributional tendencies, as well as the menaces they are prone to and the conservation facts that are necessary. The special protected areas are mainly envisaged, as they are annually visited [23]. The first actions of this type were managed in Romania only in Dobrogea, between 1958 and 1969, and, after a break of almost two decades, it was resumed by the Natural Monuments Commission and the Center of Biological Researches from Cluj-Napoca, coordinated by IWRB (International Waterfowl and Wetlands Research Bureau), thanks to several Romanian and foreigner ornithologists [19].

In Argeş County, the study of the wetland avifauna started immediately after the construction of the first dam basin, Vidraru [11]. It was continued in the subsequent years also on other dam basins recently created on the Argeş River [18], some data being collected also as part of

the winter water birds census as well [19]. The count became regularly after the Romanian Ornithological Society was setup, in 1990, and a part of its results was published mainly after 2000 [3, 4, 6, 7, 8, 9, 10, 12, 13, 14, 15, 17].

Material and methods

The study was performed on the dam basins Vâlcele (640 ha), Budeasa (643 ha), Bascov (140 ha), Piteşti (150 ha) and Goleşti (680 ha) from the Argeş River [22], which are elements of the ROSPA0062 Lacurile de acumulare de pe Argeş ("The dam basins of the Argeş River"), component of the Natura 2000 Network (Fig. 1). The Argeş River springs from Făgăraş and Iezer – Păpuşa Mountains and the reservoirs are located near Argeş Platform, in the North, Cotmeana Platform, in the West, Cândeşti Platform, in the East, and Piteşti High Plain, in the South.

The vegetation of the dam basins is composed by reed bed, bulrush, alder, and willow, and it is present mainly upstream and along of the banks without bevels. The nearby hills are covered with orchards, forests of beech, hornbeam, oak etc., rarely with planted coniferous, and grasslands. The meadows from the valley are cultivated with cereals, fodder, and diverse green goods. The settlements were founded at the foothills or in the meadows, many relatively close to the water.

The continental climate is specific to the area. It has hilly characteristics and plains features, in the South. The water has 9 °C at Piteşti (the average annual temperature) and a bridge of ice is formed, principally in January [1].

As field methodology, the itinerary method and the one of the fixed points of observations were used. The lakes were visited on January 13, 2018. Binoculars (10x50), a spotting scope (14–45x50) and a photo device (42x optical zoom) were employed.

The scientific nomenclature and classification are compatible with the Hamlin Guide [2].

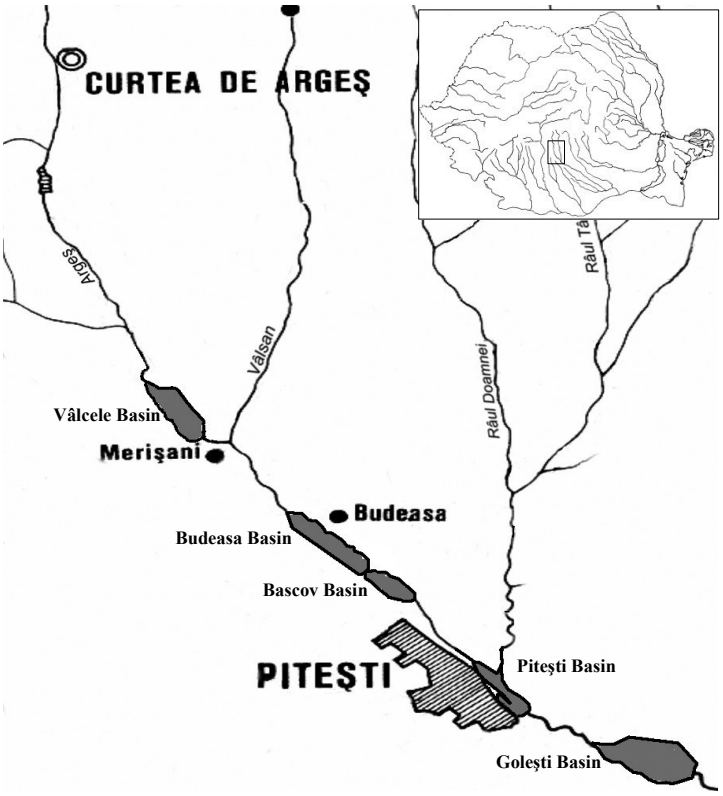

Fig. 1: The map of the studied area.

Results and discussions

Thirty-nine species of birds that belong to 9 orders (Podicipediformes, Pelecaniformes, Ciconiiformes, Anseriformes, Falconiformes, Gruiformes, Charadriiformes, Piciformes, and Passeriformes) were registered during the census. They numbered 10,122 individuals that are a few bellow the annual mean for the 2000–2018 interval, when the minimums of species and individuals were registered in 2001; the maximum was recorded in 2008, for the number of species, respectively 2012, for the number of individuals (Tab. 1).

Table 1: The main parameters for the species and individuals (2000–2018).

Parameter	No. species	No. specimens
Mean	39.10	12,788.47
Minimum	13	2,443
Maximum	48	23,696

As usually, the Goleşti Basin had the highest number of individuals and species (5,217, respectively 21). It was followed by the Piteşti Basin (3,286 individuals, respectively 19 species), a small lake by comparison, but greatly silted and appealing to the birds, although it is situated in the proximity of the city. Budeasa and Vâlcele Basins, despite of their large size, had relatively low numbers of individuals. Bascov Basin was, as every year, the last from the both viewpoints (Tab. 2). As we see in another paper [16], considering the hydrotechic factor, hunting, fishing, anthropogenic derange, wastage, and the nautical sportive activities, the Budeasa Basin is the most exposed to the human negative impact, and the Goleşti and Piteşti basins are the least affected by the people harmful actions. Bascov and Vâlcele are placed between these extremes, but we considered that each of the factors has the same importance, which, in reality, can be wrong. At the moment of the current observations, the direct human impact was very low (the fishing – 1 angler on Goleşti, 1 angler on Bascov and 11 anglers on the dam, plus a boat, on Budeasa, and the anthropogenic derange) or absent (the hunting and the nautical sportive activities), but for the birds, it is also important what happened previously.

Table 2: The distribution on basins of species and individuals.

Species	Goleşti Basin	Piteşti Basin	Bascov Basin	Budeasa Basin	Vâlcele Basin
No. species	21	19	6	14	19
No. individuals	5217	3285	79	957	584

Regarding only the 21 species dependent on wetlands, the number of the 9,866 individuals varied similarly, but, this time, the majority of the species was registered on the Piteşti Basin and not on Goleşti (Fig. 2, Tab. 3). The anthropogenic impact, the surface of the basins, the available food and shelters contribute to this distribution.

Only two species (*Phalacrocorax carbo* and *Larus argentatus*) were observed on all dam basins (Tab. 3), though, according to the last studies [20], *Larus argentatus* was divided in more species, among which *Larus cachinnans* and *Larus michahellis* were seen in the area. Particularly on the Goleşti Basin, and also on the Budeasa Basin, it is very difficult to differentiate them, even the spotting scope was used, because of the big distance between them and the observer.

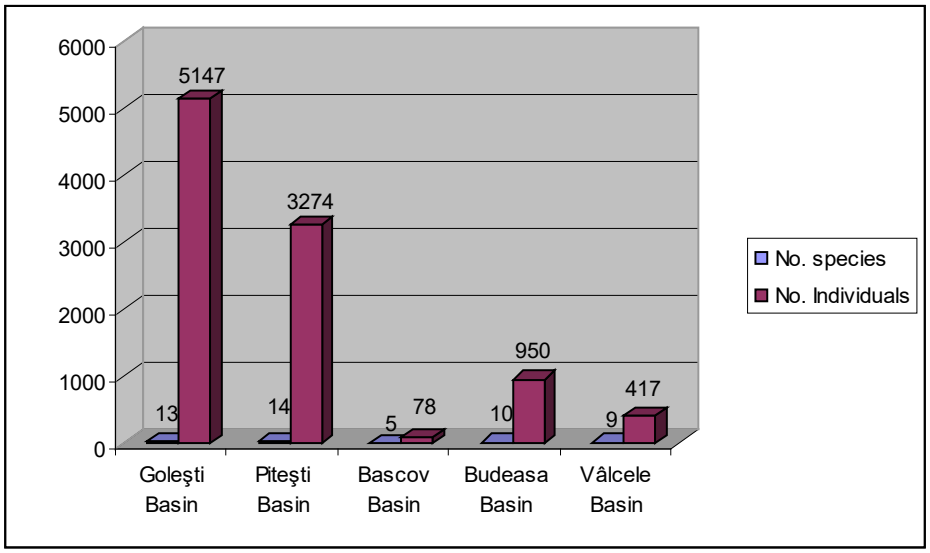

Fig. 2: The distribution of the species and individuals on every basin.

Phalacrocorax carbo, *Anas platyrhynchos*, *Anas crecca*, *Fulica atra*, *Larus argentatus* and *Pica pica* were the euconstant species (15.38%). Four species (*Cygnus olor*, *Aythya fuligula*, *Larus canus*, *Larus ridibundus*, 10.26%) were constant, 12 species (30.77%) were accessory and 17 species (43.59%) were occasional. In respect of the dominancy, 4 species (*Anas platyrhynchos*, *Aythya ferina*, *Larus canus*, and *Larus ridibundus*, 10.26%) were eudominant, 3 species (*Anas crecca*, *Fulica atra* and *Larus argentatus* ssp. *michahellis* and *cachinnans*, 7.69%) were dominant, 0 species (0%) were subdominant, 3 species (7.69%) were recedent and 29 species (74.36%) were subrecedent (Tab. 3). Amog the eudominant species, that totalised 9,866 individuals (70.77% of all strengths of the dependent on wetlans species), *Anas platyrhynchos* and *Larus canus* preferred the Goleşti Basin and *Aythya ferina* and *Larus ridibundus*, the Piteşti Basin. These species avoided the Bascov Basin during the observations. The occurrence on the basins depends on the earlier mentioned artificial and natural factors, while the degree of tolerance of the birds depends on the non-natural ones (Fig. 3).

Tab. 3: The presence, abundance, constancy, dominancy and the appurtenance of the species observed on the dam basins to the Annex I of the Birds Directive.

Species	Goleşti	Piteşti	Bascov	Budeasa	Vâlcele	Amount	Constancy	Dominancy	Birds Directive
*Podiceps cristatus**	+					1	C1	D1	
*Tachybaptus ruficollis**		+			+	20	C2	D1	
*Phalacrocorax carbo**	+	+	+	+	+	110	C4	D1	
*Phalacrocorax pygmeus**	+	+				14	C2	D1	AI
*Egretta alba**				+	+	14	C2	D1	AI
*Cygnus olor**		+		+	+	129	C3	D2	
*Anas platyrhynchos**	+	+		+	+	1442	C4	D5	

*Anas penelope**			+			54	C1	D1	
*Anas crecca**	+	+		+	+	750	C4	D4	
*Tadorna tadorna**	+					11	C1	D1	
*Aythya fuligula**	+	+			+	158	C3	D2	
*Aythya ferina**	+	+				1373	C2	D5	
*Aythya nyroca**		+				2	C1	D1	AI
*Bucephala clangula**					+	41	C1	D1	
*Mergus albellus**				+		2	C1	D1	
Buteo buteo	+				+	3	C2	D1	
Circus cyaneus	+					1	C1	D1	AI
*Gallinula chloropus**			+			4	C1	D1	
*Fulica atra**	+	+	+	+		662	C4	D4	
*Larus argentatus**	+	+	+	+	+	909	C4	D4	
*Larus canus**	+	+		+		2555	C3	D5	
*Larus ridibundus**	+	+		+		1613	C3	D5	
Dendrocopos major					+	1	C1	D1	
Lanius excubitor					+	1	C1	D1	
Pica pica	+	+	+	+		11	C4	D1	
Corvus monedula		+				3	C1	D1	
Corvus frugilegus	+	+				42	C2	D1	
Corvus cornix				+		3	C1	D1	
Corvus corax					+	2	C1	D1	
Turdus merula					+	1	C1	D1	
Parus caeruleus		+			+	2	C2	D1	
Parus major		+		+		3	C2	D1	
Passer domesticus					+	4	C1	D1	
Passer montanus	+				+	25	C2	D1	
Fringilla coelebs	+			+		3	C2	D1	
Carduelis carduelis	+				+	19	C2	D1	
Carduelis cannabina	+					2	C1	D1	
*Emberiza schoeniclus**	+	+				2	C2	D1	
Emberiza citrinella					+	130	C1	D2	

Legend: * – species dependent of wetlands, + presence, C1 – occasional species, C2 – accessory species, C3 – constant species, C4 – euconstant species, D1 – subrecedent species, D2 – recedent species, D3 – subdominant species, D4 – dominant species, D5 – eudominant species.

By the Index of relation (calculated by Gache [5]), the Charadriiformes (with 50.15% of the strength of all species) and the Anseriformes (with 39.14% of the strength of all species) were the overdominant orders. They included all eudominant and dominant species, except *Fulica atra*, an eudominant species from the Gruiformes order. The other orders were complementary.

Only 4 species belonged to the Annex I (species that are the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution, cf. http://ec.europa.eu/) of the Birds Directive. They, generally, had low strengths: 12 individuals of *Phalacrocorax pygmeus* were observed on Goleşti Basin and 2 individuals on Piteşti Basin, 13 individuals of *Egretta alba* were observed on the Budeasa Basin, 2 individuals of *Aythya nyroca* were observed on the Piteşti Basin and 1 individual of *Circus cyaneus* was observed on the Goleşti Basin (Tab. 3).

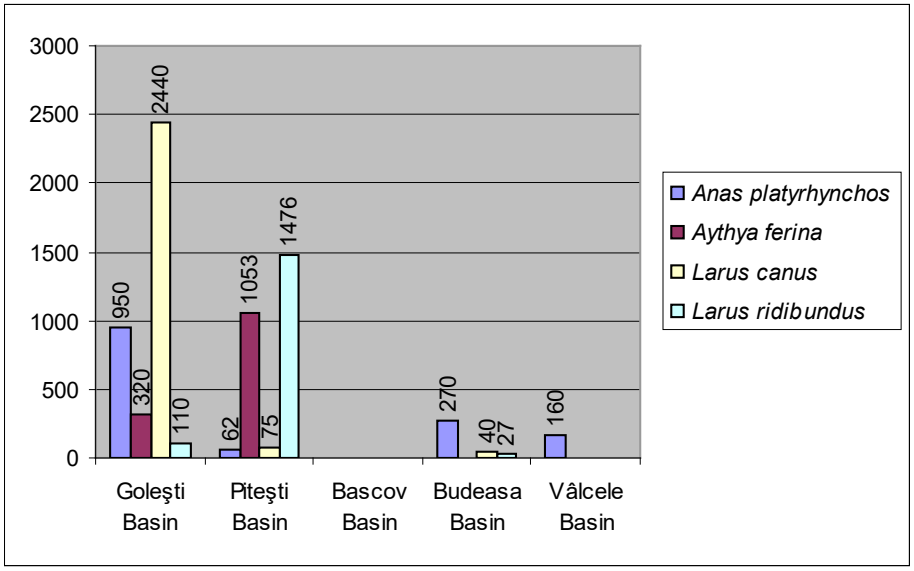

Fig. 3: The distribution on the basins of the eudominant species strengths.

Conclusions

The avifauna of the dam basins from the Argeş River, visited during the International Water Birds Count, carried out in January 13, 2018, summed 39 species and 10,122 individuals, amounts very close to the means of the census for 2000–2018 interval of time.

As usually, the Goleşti and Piteşti Basins were chosen by most of the birds, both as species and number, while the Bascov Basin was the least populated.

Phalacrocorax carbo, *Anas platyrhynchos*, *Anas crecca*, *Fulica atra*, *Larus argentatus* (*Larus cachinnans* and *Larus michahellis*, by the newest classifications) and *Pica pica* were the euconstant species, being observed on the majority of the reservoirs (*Phalacrocorax carbo* and *Larus argentatus* on all five).

Anas platyrhynchos, *Aythya ferina*, *Larus canus* and *Larus ridibundus* were the eudominant species, the two species of gulls, from the *Larus* genus, having the highest strengths among them.

The strengths of the eudominant species influenced the participation of the orders to the formation of the avicoenose, so that the Charadriiformes and the Anseriformes were the overdominant orders, the other ones being complementary.

Only 4 species (*Phalacrocorax pygmeus*, *Egretta alba*, *Aythya nyroca* and *Circus cyaneus*) belonged to the Annex I of the Birds Directive, that confers them the highest level of protection.

Obviously, the complete list of species of birds present at the moment of census on the basins was longer, because, according to the methodology, we focused mainly on the water species, and, probably, many passeriform birds and other small or hidden species remained unobserved. Although at the time of observations, direct negative human impact was insignificant, it is frequently present in the area. Together with the other disturbing agents, it diminishes especially the wetland birds' diversity, a fact visible mainly on the Bascov Basin, where a permanent nautical base for the athletes was built. Actions to reduce the anthropogenic pressure at the level of the whole protected area should be taken.

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RECENSĂMÂNTUL PĂSĂRILOR DE APĂ DE PE UNELE LACURI DE ACUMULARE ALE RÂULUI ARGEŞ (2018)

(Rezumat)

În această lucrare, sunt prezentate rezultatele Recensământului Internaţional al Păsărilor de Apă, realizat la 13 ianuarie 2018, pe lacurile de acumulare din ROSPA0062 Lacurile de acumulare de pe Argeş. Localizată în partea de sud a României, aria este subiectul cercetărilor ornitologice încă de la sfârşitul anilor 1960, anterior construirii acestor lacuri de acumulare.

Au fost înregistrate 39 de specii de păsări şi mai mult de 10000 de exemplare, dintre care 29, respectiv 9866, sunt caracteristice zonelor umede. *Anas platyrhynchos*, *Aythya ferina*, *Larus canus* şi *Larus ridibundus* au fost cel mai bine reprezentate, ele totalizând peste 70% din efectivul speciilor dependente de apă. Doar 4 specii (*Phalacrocorax pygmeus*, *Egretta alba*, *Aythya nyroca* şi *Circus cyaneus*) aparţin Anexei I a Directivei Păsări.

În lucrare, sunt făcute, de asemenea, unele consideraţii privitoare la constanţa, dominanţa, distribuţia speciilor pe lacurile de acumulare şi factorii antropici care influenţează negativ diversitatea păsărilor din zonă.

FAUNISTICAL ANNOTATIONS STAFYLINIDAE: EUAESTHETINAE, SCAPHIDIINAE, STENINAE AND PAEDERINAE FROM THE REPUBLIC OF MOLDOVA

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Abstract: On the basis of its own materials and the collection of the Institute of Zoology, Chișinău (Republic of Moldova), a list of the staphylinide species of the subfamilies Euaesthetinae, Scaphidiinae, Steninae and Paederinae (Coleoptera, Staphylinidae) was drawn up. For each species, information on previous citations, geographical distribution and bio-ecological aspects was provided. The presented materials represent a succession of collections for periods 1959–1991 and 2005–2014.

Keywords: subfamilies (Euaesthetinae, Scaphidiinae, Steninae, Paederinae), collection points, Republic of Moldova

Introduction

The present faunistic research concerns 4 subfamilies: Euaesthetinae, Scaphidiinae, Steninae and Paederinae from the Staphylinidae family, the Coleoptera order. The study contributes to the completion of the database for the species in the above mentioned subfamilies during the period 1959–1991 and 2005–2014.

Material and research methods

The material presented in the paper comes from personal collections and autochthonous entomologists: Plugaru S., Stepanov R., Ostaficiuc V., Neculiseanu Z., Danila A., Ciubcic V., Bacal S., Mihailov I., who collected the material from different insect groups including staphylinids from 1959 until 2014 .

The Coleoptera of the family Staphylinidae were collected by various methods: manual (in the morning hours on herbaceous plants, trees and shrubs), entomological mesh (during the day), trap (in the dusk and at night), traps soil (Barber type, the pot was buried at ground level for 7 days, as a fixative solution served the 1/10 kitchen salt solution).

In the laboratory, accumulated materials and unidentified collections were determined according to the classic model of external morphology [16], comparison with standard material, male genitalia visualization. The identification of the specimens were realised using the

MBC–10 binocular microscope. The identified specimens were deposited in the collection of the Entomology Museum of the Zoology Institute of Republic of Moldova.

Results and discussions

Staphylinide species presented in the paper are grouped into 4 subfamilies: Euaesthetinae, Scaphidiinae, Steninae and Paederinae, belonging to the Staphylinidae family, the Coleoptera order. The largest is the subfamily Paederinae with 37 species and 12 genus, in descending order follows the subfamily Steninae with 19 species and one genus, Scaphidiine with 2 species of two genus and Euaesthetinae with one species. From the data of the examined material it was found that the species from the researched subfamilies were collected from the whole territory of the Republic of Moldova. Research has been carried out both in natural ecosystems – Scientific Reserves and in different agricultural crops.

The list of analyzed species includes information on: the staphylinide species quoted in the native literature, the collection points, the number of copies, the gender of the specimen, the habitat, the trophic preference and the geographical distribution.

Abbreviations. In the faunistic list, the collectors' names from Entomology Museum of the Zoology Institute of Republic of Moldova, are abbreviated as follows: S.R. – Stepanov R.; P.S. – Plugaru S.; O.V. – Ostaficiuc V.; N.Z. – Neculiseanu Z., D.A. – Danila A.; C.V. – Ciubcic V.; B.S. – Bacal S.; M.I. – Mihailov I.

List of Staphylinidae species from the Republic of Moldova (Euaesthetinae, Scaphidiinae, Steninae, Paederinae)

SUBFAMILY/GENUS/SPECIES

Subfamily Euaesthetinae Thomson, 1859

Genus *Euaesthetus* Gravenhorst, 1806

1) *Euaesthetus bipunctatus* (Ljungh, 1804)

Bibliography citation: [5, 6]

Examined material: Copanca, district Căuşeni, 8.05.2009 – 1 specimen (spec), collected in forest leaf litter, (collected: B.S.)

Geographical distribution: Palaearctic

Ecological characteristics: muscicolous, hygrophilous, phytodetriticolous

Subfamily Scaphidiinae Latreille, 1807

Genus *Scaphidium* Olivier, 1790

1) *Scaphidium quadrimaculatum* Olivier, 1790

Bibliography citation: [6, 11]

Examined material: Lărguța, district Cantemir, 24.06.2006 – 1 specimen (spec), collected in forest leaf litter, (collected: B.S.)

Geographical distribution: Palaearctic

Ecological characteristics: mycetophilous

Genus *Scaphisoma* Leach, 1815
2) *Scaphisoma boleti* (Panzer, 1793)
Bibliography citation: [6, 11]
Examined material: Lozova, Străşeni, Codru Reserve, 29.10.2014, 1 specimen (spec), dead wood, (collected: B.S.)
Geographical distribution: Euro Caucasian
Ecological characteristics: mycetophilous

Subfamily Steninae MacLeay, 1825

Genus *Stenus* Latreille, 1797
1) *Stenus flavipalpis* Thomson, 1860
Bibliography citation: [8]
Examined material: Cioreşti, Nisporeni, 13.06.1968 – 3 ♂♂ cow dung, meadow (collected: O.V.)
Geographical distribution: European
Ecological characteristics: humicolous, phytodetriticolous, predatory

2) *Stenus ater* Mannerheim, 1830
Bibliography citation: [8]
Examined material: Calfa, Anenii Noi, 25.05.1972 – 4 ♂♂ collected in forest leaf litter; Ivancea, Orhei, 26.05.1972 – 1 ♀ leaf litter (collected: O.V.), 25.04.1979 – 1 ♂ forest, leaf litter (collected: S.R.)
Collected material: Budeşti, mun. Chişinău, 06.05.2009 – 1 ♀ cattle manure (collected: M.I.)
Geographical distribution: Palearctic
Ecological characteristics: mycetophilous, humicolous, phytodetriticolous

3) *Stenus argus* Gravenhorst, 1806
Bibliography citation: [15]
Geographical distribution: Euro-Siberian
Ecological characteristics: humicolous, phytodetriticolous, predatory

4) *Stenus boops* Ljungh, 1804
Bibliography citation: [15]
Examined material: Lăpuşna, Cotovsc (current Hînceşti), 21.05.1968 – 1 ♂ pasture, horse manure; Lozova, Străşeni, 16.06.1972 – 1 ♀ the river bank; Ivancea, Orhei, 26.05.1976 – 1 ♀ the river bank (collected: O.V.)
Collected material: Leuntea, Căuşeni, 08.10.2009 – 2 ♂♂ the shore of the pond (collected: M.I.)
Geographical distribution: Euro-Asiatic
Ecological characteristics: humicolous, phytodetriticolous

5) *Stenus comma* Leconte, 1863
Bibliography citation: [15]
Examined material: Dubăsari Vechi, Criuleni, 19.06.1968 – 3 ♀♀ the bank of the Dniester; Ghidighici, Străşeni, 18.07.1968 – 8 ♀♀ the shore of the lake (collected: O.V.). Vatici, 10.05.1979 – 1 ♂ forest, leaf litter; Ivancea (Orhei), 11.05.1979 – 3 ♂♂ forest, leaf litter (collected: S.R.)

Collected material: Budeşti, mun. Chişinău, 25.06.2008 – 1 ♂ orchard poorly maintained, cattle manure (collected: M.I.)
Geographical distribution: Holarctic
Ecological characteristics: humicolous, phytodetriticolous, predatory

6) *Stenus morio* Gravenhorst, 1806
Bibliography citation: [2, 8]
Collected material: Ustia, Criuleni, 16.05.2009 – 1 ♂ forest strip roads, cattle manure; Molovata Veche, Dubăsari, 17.05.2009 – 1 ♂ canyon, cattle manure; Făureşti, mun. Chişinău, 13.08.2009 – 7 (2 ♂♂, 5 ♀♀) the river bank, cattle manure (collected: M.I.)
Geographical distribution: Holarctic
Ecological characteristics: humicolous, phytodetriticolous, predatory

7) *Stenus planifrons* Rey, 1884
Bibliography citation: [6, 9]
Collected material: Ustia, Criuleni, 16.05.2009 – 1 ♂ forest strip roads, cattle manure; Molovata Veche, Dubăsari, 17.05.2009 – 1 ♂ canyon, cattle manure; Băcioi, mun. Chişinău, 08.04.2009 – 1 ♂ wheat autumn (collected: M.I.)
Geographical distribution: Euro-Mediteranean
Ecological characteristics: humicolous, phytodetriticolous, predatory

8) *Stenus cicindeloides* (Schaller, 1783)
Bibliography citation: [15]
Geographical distribution: Palearctic
Ecological characteristics: humicolous, phytodetriticolous, predatory

9) *Stenus clavicornis* Scopoli, 1863
Bibliography citation: [15]
Examined material: Cioreşti, Nisporeni, 13.06.1968 – 1 ♀ under dried tobacco plants; Edineţ, 19.05.1971 – 2 ♂♂ the river bank; Durleşti, mun. Chişinău, 25.05.1971 – 2 ♀♀ the river bank; Ivancea, Orhei, 26.05.1972 – 1 ♂, 21.05.1978 – 1 ♂ forest, leaf litter (collected: O.V.); Vatici, Orhei, 01.05.1979 – 1 ♀ (collected: S.R.)
Collected material: Budeşti, mun. Chişinău, 25.06.2008 – 1 ♂ cattle manure, orchard poorly maintained (collected: M.I.)
Geographical distribution: Holarctic
Ecological characteristics: mycetophilous, phytodetriticolous, humicolous, predatory

10) *Stenus ganglbaueri* Bernhauer, 1905
Bibliography citation: [15]
Geographical distribution: Euro-Caucazian
Ecological characteristics: humicolous, phytodetriticolous, predatory

11) *Stenus impressus* Germar, 1824
Bibliography citation: [15]
Geographical distribution: European
Ecological characteristics: humicolous, phytodetriticolous, predatory

12) *Stenus humilis* Erichson, 1839
Bibliography citation: [6, 13]
Examined material: Dubăsari Vechi, Criuleni, 21.06.1968 – 1 ♀ forest, leaf litter; Hîrtop, Dubăsari, 21.06.1968 – 1 ♀ forest, leaf litter; Iablona Nouă, Glodeni, 18.07.1968 – 1 ♂ on decaying plants (collected: O.V.)
Collected material: Budeşti, mun. Chişinău, 25.06.2008 – 1 ♀ orchard poorly maintained, cattle manure (collected: M.I.)
Geographical distribution: Holarctic
Ecological characteristics: humicolous, phytodetriticolous, predatory

13) *Stenus ochropus* Kiesenwetter, 1858
Bibliography citation: [5, 6, 9]
Examined material: Lozova, Străşeni, 20.06.1972 – 1 ♂ forest, leaf litter (collected: O.V.); Teliţa Nouă, Anenii Noi, 20.06.1972 – 3 ♂♂ forest, leaf litter (collected: N.Z.); Chişinău, 07.04.2005 – 1 ♂ forest, leaf litter (collected: C.V.)
Collected material: Micăuţi, Străşeni, 03.06.2009 – 1 ♂ leaf litter (collected: M.I.)
Geographical distribution: Euro-Caucazian
Ecological characteristics: humicolous, phytodetriticolous, predatory

14) *Stenus claritaris* Puthz, 1971
Bibliography citation: [6, 9]
Collected material: Băcioi, mun. Chişinău, 08.04.2009 – 1 ♂ wheat autumn (collected: M.I.)
Geographical distribution: Euro-Asiatic
Ecological characteristics: humicolous, phytodetriticolous, predatory

15) *Stenus montenegrinus* Puthz, 1972
Bibliography citation: [17]
Geographical distribution: European
Ecological characteristics: humicolous, phytodetriticolous, predatory

16) *Stenus pallitarsis* Stephens, 1833
Bibliography citation: [8]
Geographical distribution: Euro-Mediteranean
Ecological characteristics: humicolous, phytodetriticolous, predatory

17) *Stenus providus* Erichson, 1839
Bibliography citation: [15]
Examined material: Durleşti, mun. Chişinău, 12.11.1996 – 2 ♂♂ forest, leaf litter (collected: D.A.); city Chişinău, 20.04.2005 – 1 ♂ forest, leaf litter (collected: C.V.)
Geographical distribution: Vest-Palearctic
Ecological characteristics: humicolous, phytodetriticolous, predatory

18) *Stenus proditor* Erichson, 1839
Bibliography citation: [5, 6]
Collected material: Tapova, Rezina, 30.03.2010 – 1 specimen (collected: B.S.)
Geographical distribution: Transpalearctic
Ecological characteristics: humicolous, phytodetriticolous, stenotopic, paludicolous, hygrophilous

19) *Stenus longipes* Heer, 1839
Bibliography citation: [5, 6]
Collected material: Tătărăuca Nouă, Soroca, 02.08.2010 – 2 specimen (collected: B.S.)
Geographical distribution: European
Ecological characteristics: humicolous, phytodetriticolous, riparian, hygrophilous

Subfamilia Paederinae Fleming, 1821

Genus *Astenus* Dejean, 1833
1) *Astenus bimaculatus* (Erichson, 1840)
Bibliography citation: [19]
Geographical distribution: Euro-Mediteranean
Ecological characteristics: phytodetriticolous, saprophagous

2) *Astenus gracilis* (Paykull, 1789)
Bibliography citation: [8]
Collected material: Horeşti, Ialoveni, 15.07.2010 – 1 ♀ cattle manure (collected: M.I.)
Geographical distribution: Euro-Asiatic
Ecological characteristics: phytodetriticolous, saprophagous

3) *Astenus lyonessius* (Joy, 1908)
Bibliography citation: [15]
Geographical distribution: Euro-Asiatic
Ecological characteristics: phytodetriticolous, saprophagous

Genus *Ochthephilum* Stephens, 1829
4) *Ochthephilum fracticorne* (Paykull, 1800)
Bibliography citation: [17, 20]
Examined material: Cioreşti, Nisporeni, 13.06.1968 – 1 ♂ on tobacco plants (collected: O.V.)
Geographical distribution: Holarctic
Ecological characteristics: the specie fly to the trap with ultraviolet light, phytodetriticolous, predatory

Genus *Leptobium* Casey, 1905
5) *Leptobium gracile* (Gravenhorst, 1802)
Bibliography citation: [6, 20]
Examined material: Truşeni, Străşeni, 12.07.1968 – 1 ♀ on cabbage leaves; Dubăsari Vechi, Criuleni, 21.06.1968 – 1 ♀ forest, leaf litter; Sculeanca, Chişinău, 24.06.1968– 1 ♂ on decaying plants; Cotovsc (current Hînceşti), 13.07.1981 – 3 ♀♀ forest, leaf litter; Cioreşti, Nisporeni, 15.05.1991 – 1 ♂ alfalfa field (collected: O.V.); city Chişinău, 22.03.2005 – 1 ♀ forest, leaf litter (collected C.V.)
Geographical distribution: Euro-Mediteranean
Ecological characteristics: phytodetriticolous, predatory

6) *Leptobium dimidiatum* (Gridelli, 1926)
Bibliography citation: [5, 6]
Geographical distribution: Euro-Mediteranean
Ecological characteristics: humicolous, phytodetriticolous

Genus *Achenium* Leach, 1819
7) *Acheniumdepressum* (Gravenhorst, 1802)
Bibliography citation: [4, 6, 20]
Examined material: Vatici, 19.05.1979 – 1 ♂ forest, leaf litter; Ivancea (Orhei), 28.04.1979 – 1 ♂ forest, leaf litter (collected: S.R.); Speia, Anenii Noi, 18.08.1979 – 1 ♀ forest, leaf litter (collected: O.V.)
Geographical distribution: European
Ecological characteristics: phytodetriticolous, predatory

8) *Achenium humile* (Nicolai, 1822)
Bibliography citation: [6, 15]
Geographical distribution: Euro-Siberian
Ecological characteristics: phytodetriticolous, predatory

Genus *Lathrobium* Gravenhorst, 1802
9) *Lathrobium brunnipes* (Fabricius, 1793)
Bibliography citation: [6, 15]
Examined material: Cioreşti, Nisporeni, 08.06.1968 – 1 ♀ forest, leaf litter; Lozova, Străşeni, 08.06.1972 – 6 ♂♂ reserve, forest, leaf litter; Speia, Anenii Noi, 21.08.1979 – 4 ♂♂ forest, leaf litter; city Orhei, 21, 24.05.1984 – 6 ♂♂ forest, leaf litter; city Briceni, 06.06.1984 – 1 ♀ forest, leaf litter; city Călăraşi, 21.07.1984 – 2 ♀♀ forest, leaf litter; city Ocniţa, 06.06.1984 – 1 ♀ leaf litter (collected: O.V.)
Geographical distribution: Euro-Caucazian
Ecological characteristics: coprophilous, phytodetriticolous, predatory

10) *Lathrobium elegantulum* Kraatz, 1857
Bibliography citation: [6]
Geographical distribution: European
Ecological characteristics: humicolous, phytodetriticolous

11*) Lathrobium elongatum* (Linnaeus, 1767)
Bibliography citation: [18]
Examined material: Ivancea, Orhei, 25.05.1972 – 2 ♀♀ forest, leaf litter (collected: O.V.)
Geographical distribution: Euro-Asiatic
Ecological characteristics: coprophilous, phytodetriticolous, predatory

12) *Lathrobium fovulum* Stephens, 1833
Bibliography citation: [6, 15]
Geographical distribution: Vest-Palearctic
Ecological characteristics: coprophilous, phytodetriticolous, predatory

13) *Lathrobium fulvipenne* Gravenhorst, 1806
Bibliography citation: [6, 15, 17, 20]
Examined material: Cioreşti, Nisporeni, 07.06.1968 – 2 ♂♂ forest, leaf litter; Rebeni, Ungheni, 17.07.1968 – 1 ♂ on decomposed oak wood (collected: O.V.)
Geographical distribution: Holarctic
Ecological characteristics: coprophilous, phytodetriticolous, predatory

14) *Lathrobium furcatum* Czwalina, 1888
Bibliography citation: [6, 17, 20]
Geographical distribution: Euro-Asiatic
Ecological characteristics: coprophilous, phytodetriticolous, predatory

15) *Lathrobium geminum* Kraatz, 1857
Bibliography citation: [6, 17]
Examined material: Palanca, Ştefan-Vodă, 16.07.1974 – 1 ♂ to electrical light (collected: O.V.)
Geographical distribution: European
Ecological characteristics: coprophilous, phytodetriticolous, predatory

16) *Lathrobium longulum* Gravenhorst, 1802
Bibliography citation: [3, 6]
Examined material: Peresecina, Orhei, 28.06.2008 – 2 ♂♂ forest, leaf litter; Reserve „Plaiul Fagului", 16.02.2009 – 2 ♀♀ forest, leaf litter (collected: B.S.)
Geographical distribution: Euro-Mediteranean
Ecological characteristics: coprophilous, phytodetriticolous, predatory

17) *Lathrobium taxi* Bernhauer, 1902
Bibliography citation: [6, 15, 17]
Examined material: Lăpuşna, Cotovsc (current Hînceşti), 22.05.1968 – 2 ♂♂ horse manure; Cioreşti, Nisporeni, 08.06.1968 – 1 ♂ forest, leaf litter wet, 13.06.1968 – 1 ♂ on tobacco plants; Hîrtop, Dubăsari, 20.06.1968 – 10 ♀♀, 21.06.1968 – 4 ♀♀ forest, leaf litter; Rebeni, Ungheni, 16.07.1968 – 1 ♂ to ultraviolet light; Durleşti, mun. Chişinău, 22.06.1980 – 3 ♀♀, 06.04.1983 – 3 ♀♀ forest, leaf litter; city Cotovsc (current city Hînceşti), 13.07.1981 – 4 ♀♀ forest, leaf litter; Lozova, Străşeni, 17.05.1984 – 6 ♂♂ reserve, forest, leaf litter; Speia, Anenii Noi, 21.08.1979 – 2 ♂♂ forest, leaf litter (collected: O.V.); Ivancea, Orhei, 10.05.1979 – 1 ♂ leaf litter (collected: S.R.)
Collected material: Micăuţi, Străşeni, 03.06.2009 – 1 ♀ leaf litter of oak (collected: M.I.)
Geographical distribution: European
Ecological characteristics: coprophilous, phytodetriticolous, predatory

Genus *Tetartopeus* Czwallina, 1888
18) *Tetartopeus terminatus* (Gravenhorst, 1802)
Bibliography citation: [6, 15]
Geographical distribution: Holarctic
Ecological characteristics: phytodetriticolous, humicolous, predatory

19) *Tetartopeus quadratus* (Paykull, 1789)
Bibliography citation: [6, 17, 20]
Examined material: Durleşti, Străşeni, 20.05.1968 – 1 ♀ forest, leaf litter; Lăpuşna, Cotovsc (current Hînceşti), 22.05.1968 – 1 ♀ horse manure; Dubăsari Vechi, Criuleni, 19.06.1968 – 5 ♀♀ forest, leaf litter; Hîrtop, Dubăsari, 21.06.1968 – 2 ♂♂ forest, leaf litter; Sculeanca, city Chişinău, 24.06.1968 – 2 ♂♂ under dry herbs (collected: O.V.)
Geographical distribution: Euro-Siberian
Ecological characteristics: humicolous, phytodetriticolous, predatory

20) *Tetartopeus scutellaris* (Nordmann, 1837)
Bibliography citation: [1, 5, 6]
Examined material: Tătărăuca Nouă, Soroca, 02.08.2010 – 1 spec.
Geographical distribution: Euro-Mediteranean
Ecological characteristics: humicolous, phytodetriticolous, hygrophilous, riparian

Genus *Lithocharis* Dejean, 1833
21) *Lithocharis nigriceps* Kraatz, 1859
Bibliography citation: [6, 17]
Examined material: Ivancea, Orhei, 01.09.1974 – 1 ♀ forest, leaf litter; Ratuş, Teleneşti, 14.07.1984 – 1 ♂ forest, leaf litter (collected: O.V.)
Collected material: Saharna, Rezina, 28.08.2010 – 1 ♂ reserve, the bank of the Dniester, decaying plant matter (collected: M.I.)
Geographical distribution: Euro-Asiatic
Ecological characteristics: humicolous, phytodetriticolous, saprophagous

22) *Lithocharis ochracea* (Gravenhorst, 1802)
Bibliography citation: [4, 6, 15, 20]
Geographical distribution: Cosmopolit
Ecological characteristics: humicolous, phytodetriticolous, saprophagous

Genus *Sunius* Curtis, 1829
23) *Sunius fallax* (Lokay, 1919)
Bibliography citation: [4, 5, 6]
Examined material: Grădiniţa, Căuşeni, 16.10.2008 – 1 spec, plant litter; Leuntea, Căuşeni, 08.10.2009 – 2 spec, plant litter
Geographical distribution: European
Ecological characteristics: phytodetriticolous, humicolous, sylvicolous, hygrophilous, predatory

24) *Sunius melanocephalus* (Fabricius, 1793)
Bibliography citation: [3, 15]
Examined material: Dubăsari Vechi, Criuleni, 19.06.1968 – 2 ♂♂ forest, leaf litter; city Slobozia, 16.05.1984 – 1 ♀ apple orchard; Lozova, Străşeni, 17.05.1984 – 5 ♂♂ reserve, forest, leaf litter; city Cotovsc (current Hînceşti), 12.06.1984 – 1 ♀ forest, leaf litter; Durleşti, mun. Chişinău, 14.06.1984 – 1 ♀ forest, leaf litter; Copanca, Căuşeni, 24.08.1984 – 6 ♂♂ forest, leaf litter (collected: O.V.); Ivancea, Orhei, 25.03.1979 – 1 ♀, 19.06.1980 – 1 ♀ forest, leaf litter (collected: S.R.)
Geographical distribution: Holarctic
Ecological characteristics: mycetophilous, humicolous, phytodetriticolous, predatory

Genus *Medon* Stephens, 1833
25) *Medon ferrugineus* (Erichson, 1840)
Bibliography citation: [2, 6]
Examined material: Lărguța, Cantemir, 27.06.2006-08.07.2006 – 1 spec. Traps Barber
Geographical distribution: Palearctic
Ecological characteristics: humicolous, phytodetriticolous

Genus *Paederus* Fabricius, 1775
26) *Paederus littoralis* Gravenhorst, 1802
Bibliography citation: [6, 20]
Examined material: Iablona Nouă, Anenii Noi, 18.07.1968 – 1 ♀ on decaying plants; city Chişinău, 07.05.1977 – 1 ♀ forest, leaf litter; Speia, Anenii Noi, 21.08.1979 – 1 ♂ forest, leaf litter (collected: O.V.); Ivancea, Orhei, 02.04.1962 –1 ♀, 18.05.1980 – 1 ♀ forest, leaf litter (collected: S.R.)
Collected material: Ialpug, Chimişlia, 07.10.2009 – 3 ♂♂ the river bank; Ciumai, Vulcăneşti, 19.06.2010 – 1 ♀ the shore of the pond (collected: M.I.)
Geographical distribution: Mediteranean
Ecological characteristics: mycetophilous, humicolous, phytodetriticolous, predatory

27) *Paederus fuscipes* Curtis, 1826
Bibliography citation: [6, 20]
Examined material: Ivancea, Orhei, 11.09.1959 – 1 ♂, 10.05.1976 –1 ♂, 12.05.1976 – 1 ♂, 21.05.1978 – 1 ♂ on decomposed oak wood; Bahmut, Călăraşi, 05.09.1960 – 1 ♀, 17.08.1961 – 1 ♀ forest, leaf litter (collected: Plugaru S.); Rebenii Vechi, Ungheni, 18.07.1968 – 1 ♀ collected to the electric lamp; Chiţcani, Slobozia, 04.08.1968 – 1 ♀ forest, leaf litter; Vulcăneşti, 06.08.1979 – 1 ♀ alfalfa; Giurgiuleşti, Cahul, 09.07.1987 – 1 ♀ to ultraviolet light (collected: O.V.); city Chişinău, 23.04.2007 – 2 ♀♀ parc, leaf litter (collected: C.V.)
Collected material: Congaz, U.T.A. Gagauzia, 08.06.2008 – 3 ♂♂ forest, leaf litter; Coloniţa, mun. Chişinău, 21.04.2008 – 1 ♂ wheat autumn; Brînzeni, Edineţ, 21.05.2011 – 7 ♀♀, 31.05.2011 – 1 ♂, 03.06.2011 – 2 ♀♀, 18.06.2011 – 3 ♀♀ forest, trap with light (collected: M.I.)
Geographical distribution: Cosmopolit
Ecological characteristics: humicolous, phytodetriticolous, predatory

28) *Paederus riparius* (Linnaeus, 1758)
Bibliography citation: [4, 6, 17, 20]
Geographical distribution: Holarctic
Ecological characteristics: humicolous, phytodetriticolous, predatory

Genus *Scopaeus* Erichson, 1839
29) *Scopaeus laevigatus* Gyllenhal, 1827
Bibliography citation: [6, 8]
Collected material: Leuntea, Căuşeni, 08.10.2009 – 1 ♂ forest (collected: M.I.)
Geographical distribution: Palearctic
Ecological characteristics: collected to the trap with light, mycetophilous, coprophilous, predatory

30) *Scopaeus longicollis* Fauvel, 1873
Bibliography citation: [12, 6]
Collected material: Saharna, Rezina, 28.08.2010 – 1 ♂ reserve, the bank of the Dniester, vegetable debris (collected: M.I.)
Geographical distribution: European
Ecological characteristics: mycetophilous, coprophilous, predatory

31) *Scopaeus minutus* Erichson, 1840
Bibliography citation: [6, 13]
Examined material: city Chişinău, 04.04.1968 – 1 ♀, 07.04.1968 – 1 ♀ under stones; Grătieşti, mun. Chişinău, 26.08.1968 – 7 ♀♀ on the beet field (collected: O.V.)
Geographical distribution: Vest-Palearctic
Ecological characteristics: mycetophilous, coprophilous, predatory

32) *Scopaeus ryei* Wollaston, 1872
Bibliography citation: [5, 6]
Examined material: Răscăieţi, Ştefan Vodă, 29.10.2009 – 1 specimen, plant litter
Geographical distribution: European
Ecological characteristics: humicolous, phytodetriticolous, xerophilous

Genus *Rugilus* Leach, 1819
33) *Rugilus angustatus* Geoffroy, 1785
Bibliography citation: [6, 9]
Examined material: city Ocniţa, 06.06.1984 – 1 ♂ forest, leaf litter (collected: O.V.)
Geographical distribution: Euro-Mediteranean
Ecological characteristics: humicolous, coprophilous, phytodetriticolous, predatory

34) *Rugilus orbiculatus* (Paykull, 1789)
Bibliography citation: [6, 19, 20]
Examined material: Truşeni, Chişinău, 12.07.1968 – 1 ♂ onion field; Şaptebani, Rîşcani, 05.05.1971 – 10 ♂♂ on decaying plants; Gîrbova, Ocniţa,12.04.1983 – 1 ♀ cattle manure; city Slobozia, 16.05.1984 – 1 ♀ apple orchard (collected: O.V.)
Geographical distribution: Cosmopolit
Ecological characteristics: mycetophilous, humicolous, coprophilous, phytodetriticolous, predatory

35) *Rugilus rufipes* Germar, 1836
Bibliography citation: [6, 17]
Examined material: Dubăsari Vechi, Criuleni, 19.06.1968 – 1 ♂, 21.06.1968 – 1 ♂ forest, leaf litter; Sculeanca, city Chişinău, 24.06.1968 – 4 ♂♂ on decaying plants; Cioreşti, Nisporeni, 13.06.1968 – 1 ♀, 15.06.1968 – 1 ♀ forest, leaf litter; city Cotovsc (current city Hînceşti), 24.05.1984 – 9 (6 ♂♂, 3 ♀♀), 08.07.1984 – 2 ♂♂ forest, leaf litter (collected: O.V.); Codrii Tigheci, 31.05.2005 – 1 ♀ elm tree (collected: B.S.)
Geographical distribution: Euro-Siberian
Ecological characteristics: mycetophilous, humicolous, coprophilous, phytodetriticolous, predatory

36) *Rugilus similis* Erichson, 1839
Bibliography citation: [4, 6, 20]
Geographical distribution: Euro-Mediteranean
Ecological characteristics: humicolous, coprophilous, phytodetriticolous, predatory

37) *Rugilus subtilis* Erichson, 1840
Bibliography citation: [5, 6, 14, 17]

Examined material: Dubăsari Vechi, Criuleni, 19.06.1968 – 1 ♂ forest, leaf litter; Cioreşti, Nisporeni, 06.06.1968 – 1 ♂ forest, leaf litter; Calfa, Anenii Noi, 25.05.1972 – 2 ♂♂ forest, leaf litter; Ruseştii Noi, Ialoveni, 19.07.1980 – 1 ♀ on decaying plants; city Donduşeni, 29.05.1984 – 3 ♂♂ park „Taul", leaf litter; Ivancea, Orhei, 20.10.1974 – 1 ♀ forest, leaf litter (collected: O.V.), 03.07.1980 – 1 ♂ forest, leaf litter (collected: S.R.); Codrii Tigheci, 30.05.2006 – 1 ♂ elm tree (collected: B.S.)
Collected material: Bozieni, Hînceşti, 07.06.2008 – 1 ♂ forest strip roads; Chetrosu, mun. Chişinău, 19.07.2008 – 1 ♀ the shore of the pond (collected: M.I.)
Geographical distribution: European
Ecological characteristics: humicolous, coprophilous, phytodetriticolous, predatory

As a result of the research, it was found that most species were collected from the litter of forest ecosystems, some of them saprobionte (phytodetriticolous), fewer species were collected from grassy or woody plants, moss, mushrooms or animal manure. *Lathrobium taxi* (39 specimens), *Paederus fuscipes* (29 specsimens), *Lathrobium brunnipes* (21 specimens) and *Rugilus rufipes* (20 specimens) were the most frequently collected species during the study. *Lathrobium taxi* and *Paederus fuscipes* were found in 10 collecting sites each, *Rugilus subtilis* in 9 collecting sites, *Lathrobium brunnipes* and *Sunius melanocephalus* were found in 7 collecting sites, *Paederus littoralis* in 6 collecting sites. Five species were collected from 4 localities, 3 localities and 2 localities; 17 species were recorded only in one site; also, 17 species were reported only in native literature. Most species can be characterized as species with high level of adaptation to different habitats.

The material discussed includes species with large distributional ranges [7], such as: Palaearctic, Transpalaearctic, West Palaearctic, Holarctic, European, Euro-Caucasian, Euro-Asiatic, Euro-Siberian, Euro-Mediterranean, Mediterranean and Cosmopolitan.

Most of the species are characterised by a high ecological plasticity, including eurytopous, ripicolous, sylvicolous, phytodetriticolous, humicolous (ground), pholeophilous, muscicolous, mycetophilous, hygrophilous, paludicolous, myrmecophilous, coprophilous and xerophilous species.

Conclusions

The fauna of staphylinids discussed in this paper belongs to 4 subfamilies, 16 genera and 59 species. The most abundant species discussed in the paper were: *Lathrobium taxi*, *Paederus fuscipes*, *Lathrobium brunnipes*, *Rugilus rufipes, Sunius melanocephalus and Stenuscomma.* In the examined zone, prevails these staphylinid species: European, Holarctic, Euro-Mediterranean, and Palaearctic.

Species cited in the paper are part of the basic collection (Coleoptera, Staphylinidae) stored and maintained in the Entomology Museum of the Zoology Institute of Republic of Moldova.

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ADNOTĂRI FAUNISTICE (COLEOPTERA, STAPHYLINIDAE, EUAESTHETINAE, SCAPHIDIINAE, STENINAE, PAEDERINAE) DIN REPUBLICA MOLDOVA

(Rezumat)

Pe baza materialelor proprii, cât și a colecției Institutului de Zoologie din Chișinău (Republica Moldova), s-a întocmit lista speciilor de stafilinide din subfamiliile: Euaesthetinae, Scaphidiinae, Steninae și Paederinae (Coleoptera, Staphylinidae). Pentru fiecare specie s-au prezentat informații referitoare la citările anterioare, distribuția geografică și aspecte bioecologice. Materialele prezentate constituie o succesiune a colectărilor pe perioadele 1959–1991 și 2005–2014.

INVESTIGATION ON THE WILD FAUNA OF COMMUNITY INTEREST FROM THE GRĂDIŞTEA MUNCELULUI CIOCLOVINA NATURAL PARK (STUDY CASE – GRĂDIŞTEA DE MUNTE – VALEA ALBĂ – GODEANU – MUNCELUL)

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Abstract: Grădiştea Muncelului – Cioclovina Natural Park is home for many species that have a special protection and conservation regime. The investigations on the fauna were carried out during 2016–2018 as an integral part of the identification/monitoring actions included in the Park Monitoring Plan. The transects were established in the most frequented places by the animals, based on the data recorded in the field, by the staff of the park. The wild fauna is very diversified (insects, amphibians, reptiles, mammals) and it is affected especially by anthropozoogenic activity.

Keywords: fauna, protection status, Grădiştea Muncelului Cioclovina Natural Park.

Introduction

Thanks to the biogeographical, biological and climatic elements, the Grădiştea Muncelului Cioclovina Natural Park hosts a very rich and interesting fauna, where there are numerous animal species that have a special protection and conservation regime, some unique in the country or even in the world, especially insects.

Grădiştea Muncelului-Cioclovina Natural Park aims at the protection and preservation of landscape complexes where the interaction of human activities with nature over time has created a distinct area with significant landscaping and/or cultural value, often with high biological diversity.

Materials and methods

The investigations into the fauna of the Grădiştea Muncelului Cioclovina Natural Park were carried out during 2016–2018 (fig. 1). The identification/monitoring methods used for fauna were:

– for large mammals: transects, traces on snow/soil, identification of species after excrements and direct observation. Transects have been established along the main habitats. Transects have been made through a route that can be traversed on a working day. The trails are covered in about one day (about 3–5–7 km per day). The start and end points of observation were defined according to the areas known as carnivorous habitat. Each transect was covered three times in

winter, at intervals of at least one week and after the fall of snow. Every year the same fixed routes are covered. Park's staff went through the land so as to minimize disturbances in each year. Transect began on the preset routes until they noticed the first mammal trail. The best time to identify/monitor was immediately after the snow falls. All traces of mammals observed at a distance of 5 m on both sides of the transection line were investigated to determine the species to which they belong. The studied area was in the sectors with no. 2 and 3 of the park area, and the transects were established in the most frequented places of the animals, based on field records, by the park's staff . For identification/monitoring of the fauna there were established 3 transects: Anineş Valley – Small Valley – Strâmbu – Fog – Izvorele; Păltiorul – Lowland; Godeanu Valley – Zăcătorii Stream – Muncel. The mammals that were identified are: the wild cat, the common deer, the badger and the marten.

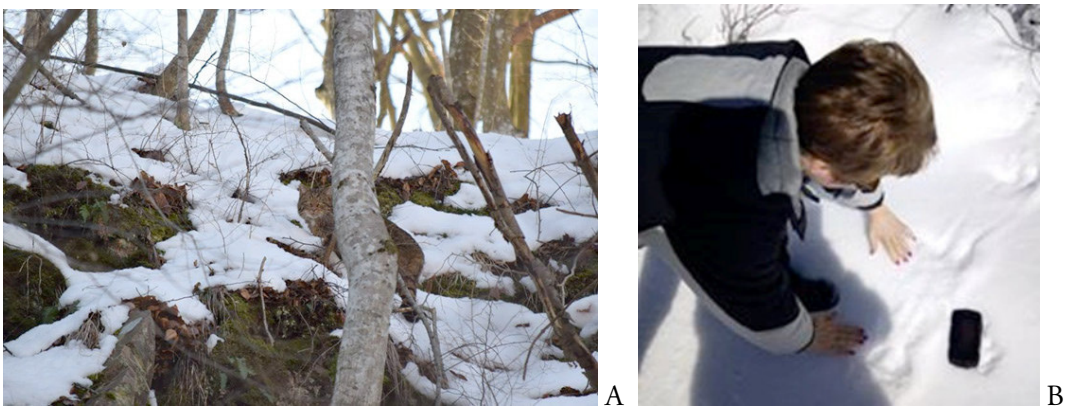
Throughout this study period, besides large mammals, amphibian and reptile species and insects with special protection status have also been identified.

Fig. 1: Wild fauna monitoring

Results and discussions

Felis silvestris Schreber, 1777 (Family Felidae)

The wild cat is a small feline, a carnivorous species feeding on small mammals such as rodents, birds and other similar animals.



A B

Fig. 2: A – *Felis silvestris* Schreber, 1777; B – Monitoring of *Felis silvestris* Schreber, 1777

It prefers the quiet, broad forests, with many old trees and/or shrubs. Like the eurasian lynx, it is a lonely animal, but during mating it can also be found in groups. It is easily

identified by traces left on the ground or on the snow. In the studied area, a number of 10 specimens were identified, with a higher frequency in the Ceata-Pustiosul-Şesuri area. Both traces left on snow and soil have been identified as well as observed live in the beech forest habitats (fig. 2: A, B).

IUCN protection status: endangered species, protected under the Habitats Directive, Annex IV; Bern Convention – Annex 2 – Strictly Protected Wild Fauna; OUG 57/2007 – Annex 4A; Romanian Vertebrate Red Book/2005. In the studied area the species has a favorable conservation status, especially since the crossings for identification/monitoring of the species are in wild areas and some are hardly accessible especially during the winter, after the snow fall.

***Cervus elaphus* Linnaeus, 1758 (Family Cervidae)**

The common deer is one of the largest species of cervids. The deer is a paricopic, ruminant mammal. The deer is housed in areas with extensive forests, which include meadows with springs, open forest of deciduous trees, high swamps and open mountain areas (sometimes above the forest boundary), pastures and meadows, which provide them with peace and food. In forest habitats it feeds mainly on trees or shrubs, but in other habitats also consumes grasses, rouges and bushes (www.iucnredlist.org). The frequented areas in which the species was identified and monitored in the park area: Vârtoape, Godeanu Valley, Meleia, Ceata, Pustiosu, Zăcătorii Stream (fig. 3. A, B). According to national legislation, the deer is a species of hunting interest included in Annex 1 of the 407/2006 Hunting Act [16].

IUCN Conservation Status: Wild Fauna Protected by the Bern Convention – Annex 3; OUG 57/2007 – Annex 5B; Romanian Vertebrate Red Book/2005.

A

B

Fig. 3: A – Excrements of *Cervus elaphus* Linnaeus, 1758; B – *Cervus elaphus* Linnaeus, 1758

***Meles meles* Linnaeus, 1758 (Family Mustelidae)**

The European badger is an omnivorous animal, feeding on fruits, seeds, larvae, gastropods, eggs (stolen from the birds nesting on the ground) etc.

It lives isolated, looking for the female only during the mating season (July – August) and, as soon as it occurs, leaves it. In the park area was identified by direct observations and by the identification of the shelters and traces on the ground, in the Ceata, the Zăcătorii Stream, Godeanu Valley, Meleia (fig. 4: A, B). In the studied area it has a favorable conservation status, being frequently encountered in the aforementioned locations throughout the year.

IUCN Conservation Status: threatened species, protected by Law 103/1996, Bern Convention – Annex 3 Protected Fauna Species; OUG 57/2007 – Annex 5B.

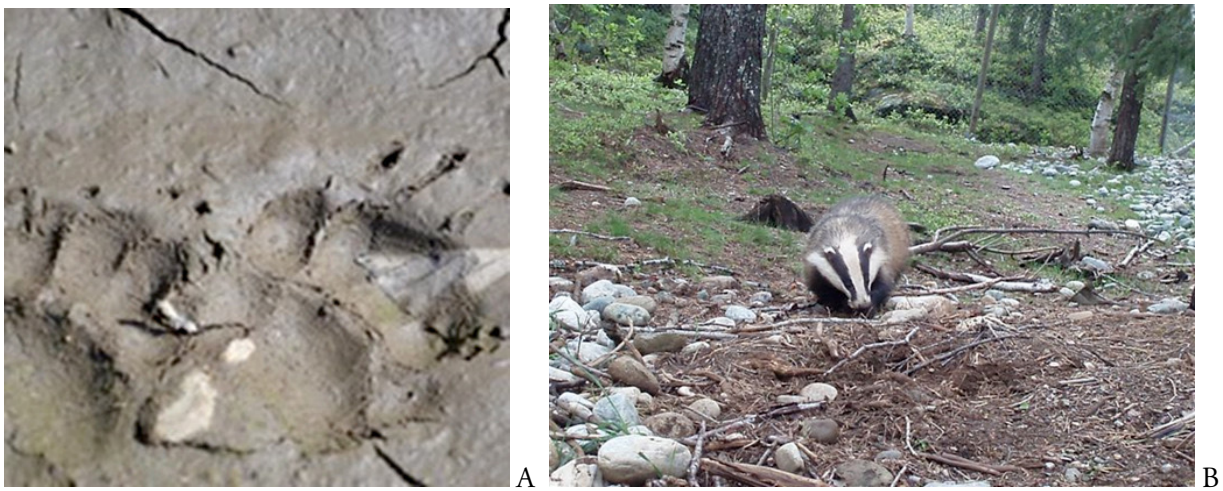


Fig. 4: A – Traces of *Meles meles* Linnaeus, 1758; B – *Meles meles* Linnaeus, 1758

***Martes martes* Linnaeus, 1758 (Family Mustelidae)**

It is a nocturnal carnivorous mammal. In Romania it is spread in all forests of the country, being more common in the mountains, up to the limit of forest vegetation. It lives in the woods and nests on the trees. In the park area it was identified in forest habitats in Ceata, Small Valley, Pustiosu, Şesuri, Godeanu Valley (fig. 5). A number of 10 specimens have been identified in these areas throughout the year, more frequently in the winter season.

IUCN conservation status: Species protected by the Habitats Directive – Annex V; Bern Convention – Annex 3 Protected fauna species; OUG 57/2007 – Annex 5A, Romanian Vertebrate Red Book/2005.

Fig. 5: *Martes martes* Linnaeus, 1758

Frequency of observation of reptiles is greater, almost double compared to amphibians, whose distribution was limited to wetlands or in their vicinity. The richest or most frequented areas in the park by reptiles were those with rocky habitats, meadows, hedges, forest clusters (Small Valley, Vărtoape-Dosul Vârtoapelor, Meleia, Godeanu). Among the identified snakes we mention Esculap's snake. Three specimens were identified in the area Small Valley-Godeanu.

***Zamenis longissimus* Laurenti, 1768 (Family Colubridae)**

Esculap's snake is a long snake and is considered to be the most arboreal snake that exists in Romania, because of its ability to climb in shrubs and trees. It can reach a length of 1.6–2 m. The color of the serpent is olive on the back with variations in some specimens to gray or yellowish. On the back of some individuals we can see broken lines or white dots. On the belly they have a white-yellowish coloration. In the mentioned areas the species was identified in rocky meadows and in karst areas, Vl. Godeanu, Grădiștea de Munte, (fig. 6).

IUCN Conservation Status: Species protected by the Bern Convention – Annex 2; OUG 57/2007 – Annex 4A, Romanian Vertebrate Red Book / 2005.

Fig. 6: *Zamenis longissimus* Laurenti, 1768

Among the amphibians, the *Bombina variegata* was studied, being present in the whole area of the park. In the studied areas, the species was in a favorable conservation status, it was common in grasslands, forests and temporary habitats (ponds on the edge of forest roads, or puddles from forestry exploitations or heavy rains).

***Bombina variegata* Linnaeus, 1758 (Family Bombinatoridae)**

It is a small frog, up to 5 cm, the individuals being partially or totally green on the back. The abdomen and the goose are colored in yellow, with a gray marbled drawing to black, dominating the yellow pigment. Coloration is very intense, being a means of warning of toxicity. They live in any eye of water, often in temporary pools, and can be reproduced even in soil bumps containing less than one liter of water. It has been found almost everywhere in places with a minimum of humidity, from 150 m to almost 2000 m altitude. It is a species of both diurnal and nocturnal activity, predominantly aquatic, highly tolerant and resistant. It was present in all temporary and permanent ponds, in grassland and forest habitats (fig. 7 A, B, C). It has a favorable conservation status, with many individuals being identified in the studied areas: Aninеș Valley, Albă Valley, Godeanu Valley, Mică Valley.

IUCN Conservation Status: has the official status of Species of Community Interest established on the basis of EU regulations and is included in Annex 2 and Annex 4 of the Habitats Directive; protected species and Bern Convention – Appendix 2 (strictly protected species) Bern Convention – Annex 3, GEO 57/2007 – Annex 3, OUG 57/2007 – Annex 4A, Romanian Vertebrate Red Book / 2005.

Fig. 7: A – Eggs of *Bombina variegata* Linnaeus, 1758; B – *Bombina variegata* Linnaeus, 1758 in dorsal view; C – *Bombina variegata* Linnaeus, 1758 in ventral view

***Triturus vulgaris ampelensis* Fuhn, 1951 (Family Salamandridae)**

It is an endemic species for Romania, spreaded within the Carpathian arch. It is quite common in its area but not very abundant, the populations being in decline. Habitat damage is the main factor of numerical change.

Relatively difficult to distinguish in the terrestrial phase of *Triturus vulgaris*. The differences are maximal in males during the reproduction period. It lives only in hill and mountain areas between 300–1200 m. It goes into the water very early, sometimes even in February. The males are the first ones which enter into the water, followed by females. The reproduction period lasts until April-May. In males, very well-developed secondary sexual characters occur during reproduction. Since the transfer of sperm is done without amplex, the male performs an entire sexual parade, of a complexity and special beauty, in front of the female. It should be noted that during the parade the partner does not touch, the transfer of the sperm by means of a spermatophore, deposited by the male on the substrate and picked up by the female. The sperm are then kept by the female for several weeks in an anatomical formation. Females lay the eggs staggered over time, being able to mate several times during a season under favorable conditions. A female can lay up to 400 eggs. Adults leave the aquatic environment after reproduction. In the lakes and ponds of the hill and mountain area, the breeding period is delayed and can be extended until July, depending on the temperature.

It is found in wetlands in ponds on the edge of the forests, in Grădiştei Valley, Godeanu Valley, Tâmpu (fig. 8).

IUCN protection status: species strictly protected by the Habitats Directive – Annex IV; OUG 57/2007 – Annex 3, OUG 57/2007 – Annex 4A, Romanian Vertebrate Red Book / 2005.

Fig. 8: *Triturus vulgaris ampelensis* Fuhn, 1951

***Ichthyosaura alpestris* Laurenti, 1768 (Family Salamandridae)**

It has average dimensions. The male has 8–10 cm, while the female 11–12 cm. The body is stuffed, its head slightly longer than wide. The tail is a sharpened end, with a lower and upper edge, of equal length or shorter length than the body. As long as it is in the water, the skin is smooth; on land it becomes rough on the dorsal side.

The males, during reproduction, have brightly colored, gray or purple, purple or purple backs, either uniform or with dark marbles. On the sides of the head, neck and body there are black, round, small spots on a white-silver background. The abdomen is yellow-wiped, orange or red. Sometimes they have black spots on the neck. Cloacal swelling is blackish. After reproduction, the backs darken towards the blue-blue. Females on the back are cafes, black or black olives, unspoiled or darker marbled areas. On the ground, the back is very dark, almost black.

It prefers cold, oligotrophic, clear vegetation. It is pretty pretentious to water quality. It can also be found in flowing waters. Sometimes it is in the water, especially in mountain, deep, without fish. It appears from 500 m altitude and can go up to 2000 meters.

The species was identified in the year 2018, in the Ceata area, in the temporary ponds adjoining the forest road Aninеş Valley – Fog. During the breeding season in April 2018, more than 20 specimens of which 12 males and 10 females were identified (fig. 9).

The species is listed on the Red List of the International Union for the Conservation of Nature. In Romania, it is considered as a protected species. Mountain triton is endangered by the disappearance of aquatic ecosystems and water pollution.

Mountain triton is a vulnerable species, the main factors of danger being the destruction and degradation of forest habitats and water pollution.

Fig. 9: *Ichthyosaura alpestris* Laurenti, 1768

Entomofauna is varied and quite rich in the park, because from a geographic point of view, the park has forests, hills and valleys of rivers, temporary ponds, secondary pastures with silviculture, limestone and sandy areas etc. In the Grădiștea – Godeanu Valley, most of the entomofauna species found in the park were identified.

***Callimorpha quadripunctaria* Ponda, 1761 (Family Erebidae)**

It prefers different mesophilous biotopes, forests and shrubs with abundant vegetation.

It is a monogonetic species (presents only one generation per year). Adults fly during the July-August period. They feed on inflorescences of different plant species. This species also has sexual dimorphism, females with glabra antennae (hairless) and male with hairy antennae.

This butterfly is frequently encountered during the day on *Eupatorium cannabinum*, especially on the watercourses and in wet meadows, where it feeds on nectar from inflorescences

and on which it camouflates very well. The species was identified in 2018, in August, 28 adults were observed in the Grădiştea de Munte area, on the hemp plant (*Eupatorium cannabinum*) located at the edge of the beech forests (fig. 10).

According to IUCN is a vulnerable species.

Fig. 10: *Callimorpha quadripunctaria* Ponda, 1761

***Rosalia alpina* LeConte, 1852 (Family Cerambycidae)**

It is an unmistakable species due to the characteristic color and antennas.

Adults are active in sunny days, but they can also appear in the twilight. It prefers old forests (trunk diameter over 20 cm), dry and sunny. They meet on trees, as well as on inflorescences, especially Apiaceae family, where they feed on pollen. Adults can be found from June to September.

The main critical period for the species is the larval development period. Larvae develop in dry and partially dry wood of attacked trees or physiologically debilitating. Therefore, the removal of degraded timber from the forest directly affects the existence of the species.

The species was identified in the old beech forests of Poiana Omului and Tâmpu during the period June to September (fig. 11).

The species is listed in the annexes of the Bern Convention as a rare species and threatened with extinction.

Fig. 11: *Rosalia alpina* LeConte, 1852

Conclusions

The fauna and flora species have a particular vulnerability and are constantly subject to the pressures, especially of the anthropic ones. It is therefore necessary to specify general management measures for all species of Community interest:

– Mapping, maintaining and improving existing species as well as population monitoring.

– Avoiding the disturbance of mammalian species.

– Prohibition of ATV motorcycle, motorcycle or sports cars practicing on forest roads.

– Education and awareness of the young generation on the need to protect the species and habitats in which they live.

– Combating poaching.

– Control of the herbicides use, chemical fertilizers and amendments.

– Grazing regulation.

– Restriction on the exploitation of wood.

As a corollary of the above we consider that only the proper application of management measures in the Grădiștea Muncelului Ciclovina Natural Park area will ensure the preservation of favorable conservation status of species and natural habitats.

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INVESTIGAŢII ASUPRA FAUNEI SĂLBATICE DE INTERES COMUNITAR DIN PARCUL NATURAL GRĂDIŞTEA MUNCELULUI CIOCLOVINA (STUDIU DE CAZ – GRĂDIŞTEA DE MUNTE – VALEA ALBĂ – GODEANU – MUNCELUL)

(Rezumat)

Parcul Natural Grădiștea Muncelului Cioclovina găzduiește numeroase specii de animale care au un regim special de protecție și conservare. Investigațiile asupra faunei din Parcul Natural Grădiștea Muncelului Cioclovina s-au realizat în perioada 2016–2018, ca parte integrantă a acțiunilor de identificare/monitorizare cuprinse în Planul de monitorizare al parcului. Transectele s-au stabilit în locurile cele mai frecventate de animale, pe baza datelor înregistrate în teren, de către personalul de teren. Fauna sălbatică este foarte diversificată (insecte, amfibieni, reptile, mamifere) și este afectată mai ales de activităţile antropozoogene.

ASTRAPAEUS ULMI (ROSSI, 1790) (COLEOPTERA, STAPHYLINIDAE) IN THE CENTRAL AREA OF THE REPUBLIC OF MOLDOVA

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Abstract: At the base of the work, regarding the presence of the *Astrapaeus ulmi* from the Staphylininae subfamily, the Staphylinidae family on the territory of the Republic of Moldova are the collecting missions performed during 1976–2010, from different biotopes. The information presented in the paper highlights the different types of habitat and species distribution in the central area of the country. Research and collecting were performed according to the specific methods of the analyzed group.

Keywords: *Astrapaeus ulmi*, fam. Staphylinidae, central area of the Republic of Moldova.

Introduction

This paper presents faunistic and ecological data relied on *Astrapaeus ulmi* (Rossi, 1790), (Staphylininae subfamily, Staphylinidae family) from the central area of the Republic of Moldova.

Information about the studied species is sporadic in the local scientific bibliography. In addition, these references not describe aspects related to biotopes, bio-ecological distribution, number of exemplars, morphological features, host plants etc. For these reasons, the purpose of this paper is to describe the chronological order of collecting of this species in the studied areas, while mentioning certain biological and ecological features.

Material and methods

The material examined in the paper includes collections of numerous local entomologists: Ostaficiuc V's collections cover the period 1976–1994, Dănila A. 1996–1997, Ciubcic V. 2008, Mihailov I. 2008–2010, Bacal S. 2010. The material is stored in the collection of the Entomology Museum of the Zoology Institute, Chișinău (Republic of Moldova). When collecting the material, both classical and group-specific entomological methods were used (Barber traps, film, rake, spade, rubber gloves, catching and sleeping solutions, scissors, bags of different sizes, labels etc.). The methods used were: plant shaking, litter bed raking, manual picking, flotation etc.

Results and discussions

The presence of *Astrapaeus ulmi* (Rossi, 1790) in habitats of the Republic of Moldova is continuously recorded in the general database of Coleoptera collection of the Entomology Museum of the Zoology Institute that is constantly updated; the specimens are stored in the collection of Staphylinidae.

Astrapaeus ulmi (Rossi, 1790) is a species of the Staphylinidae family, the Staphylininae subfamily, the only representative of the monotypic genus *Astrapaeus* Gravenhorst, 1802. In the fauna of the Republic of Moldova the presence of the species has been known since 1912 "Records of Coleoptera Material" Iaentzenschii E. [7]. Buşmachiu & Bacal [2] contribute to the study of this species, in relation to its presence in agricultural crops and highlighting the plant species on which it was found. Considered a unique pattern among staphylline, due to its morphological features and attractive colors; being a predator [4] and eurytopic species included in the classification: pedophilous, coprophilous, saprophagous (scavengers), species; over time has captured the attention of more and more researchers.

The collection of the species in natural and anthropic ecosystems was initiated in 1976. As a result, the studied material is listed in chronological order:

– Chișinău, (47°01'22.3932"N 28°50'07.2060"E), 07.08.1976 – 1 male collected in the trap with light, 27.05.1977 – 1 male collected from the soil, 12.06.1984 – 1 male collected from an ant;

– Cotovsc (current Hîncești), (46°50'00"N 28°25'00"E), 24.05.1984 – 1 female collected from litter;

– Băcioi (Chișinău), (46°54'44"N, 28°53'28"E), 20.08.1989 – 1 male collected from litter;

– Socoleni, (Anenii Noi district), (46°54'36"N 29°11'24"E), 20.06.1993 – 1 male collected from litter;

– Chişinău, 20.06.1994 – 1 male collected from litter (collected by Ostaficiuc V.);

– Durlești, (Chișinău), (47°01'04"N 28°45'45"E), 19.08.1996 – 1 male collected from alfalfa, 04.03.1997 – 1 male collected under the stone (collected by Dănilă A.);

– Chișinău (Valea Morilor), 18.03.2008 – 1 male collected under a debris (collected by Ciubcic V.);

– Ivancea (Orhei district), (47°17'05"N, 28°51'27"E), 13.06.2010 – 1 female collected from a corn plant (collected by Bacal S.);

– Chișinău, 22.07.2008 – 1male collected from the litter of a forest strip;

– Grătiești, 27.07.2008 – 1 male collected on cattle dung;

– Budești, 06.05.2009 – 1 male collected from litter;

– Durlești (Chișinău), 07.06.2010 – 1 male collected on a knotgrass plant, 18.06.2010 – 1 male collected on a chestnut tree;

– Vorniceni, (Strășeni district), (47°09'18"N 28°25'27"E), 23.04.2010 – 1 male collected from the litter of a forest strip (collected by Mihailov I.).

Analyzing the data of the collected individuals, one can notice that the insect has a large distribution area, but they are rather low represented in terms of numbers of individuals, not exceeding one specimen per habitat. The low incidence of the species in natural habitats is confirmed also by other studies [5]. Hence the fact that various factors can exert certain changes in the numerical potential and population development and influence the conservation of the species in natural and artificial habitats.

Spread. *Astrapaeus ulmi* is present in the following countries: Albania, Austria, Belgium, Bosnia and Herzegovina, Croatia, Czech Republic, Switzerland, France, Greece [1], Italy [3], Montenegro [1], Russia [1, 5, 6], Republic of Moldova [7, 2], Serbia, Slovakia, Slovenia, Spain, Ukraine, Hungary [1].

Bio-ecological aspects on the territory of the Republic of Moldova. Determined by the influence of biotic and abiotic factors, the presence and distribution of this species in the listed points is explained by the existence of the source of food – various insect species. Analyzing the exposed material, we notice that the species persists not only on the surface of the soil, in the litter, but also on different plants and animal manure. The species was collected also from a formicary (Chișinău, 12.06.1984). Considering the collecting places, the study was carried out only in the central area of the Republic of Moldova, and the most frequent collections were from Chișinău and Durlești. In total, 17 specimens were collected, which are stored in the Museum of Entomology Collection. In this context, for the enrichment of the faunistic heritage and knowledge of the distribution area of the species and other behavioral aspects, the research of species will be extended to the entire territory of the Republic of Moldova. These research could highlight the following: some morphological aspects at the population level, which could be achieved by biometric measurements on all stages of development of this species, taking as well into consideration the specialty literature; accentuation of certain preferences in populating new natural and / or anthropogenic habitats; the tracking of the faunistic composition per area for the registration of certain rankings based on certain analytical and synthetic indices; the purpose of verifying and comparing the occurrence of the species in the biotope surveyed according to the methods used for the collection; could find out more about the spectrum of agricultural plants, defined as a host in the process of development and maintenance of the species during the biological activity period.

By analyzing the collecting data of specimens of *Astrapaeus ulmi* (Rossi, 1790) in the central area of the Republic of Moldova, it is understood that the species maintains the "character" of uniform distribution and is characterized by a hidden lifestyle.

Conclusions

The species *Astrapaeus ulmi* (Rossi, 1790) is registered in the Collection of the Entomology Museum of the Zoology Institute Chișinău (Republic of Moldova) through 17 specimens. All specimens were collected from the central area of the Republic of Moldova. It is a polyphagous species, met in different biotopes, but one that has a pretty low number.

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ASTRAPAEUS ULMI (ROSSI, 1790) (COLEOPTERA, STAPHYLINIDAE) ÎN ZONA CENTRALĂ A REPUBLICII MOLDOVA

(Rezumat)

La baza lucrării, privind prezența speciei *Astrapaeus ulmi* din subfamilia Staphylininae, familia Staphylinidae pe teritoriul Republicii Moldova stau colectările realizate în perioada anilor 1976–2010, din diferite biotopuri. Informația expusă în lucrare, scoate în evidență diferite tipuri de habitate și distribuția acestei specii în zona centrală a Republicii Moldova. Cercetările și colectările s-au întreprins după metodele specifice grupului analizat.

PALEONTOLOGY

MAASTRICHTIAN CROCODILIAN AND DINOSAURS IN THE COLLECTION OF MUREŞ COUNTY MUSEUM

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Abstract: A small, but illustrative collection of Maastrichtian reptilian teeth and bones is hosted in the Natural Sciences Branch of the Mureş County Museum. The fossils were collected by József Fikk in 1943, and probably sold to the museum by Laszlo Fikk in 1962. This collection remained practically forgotten in, never mentioned in any paper. The teeth and bones refer to the crocodilian *Allodaposuchus precedens* and to various dinosaurs: indeterminate sauropods and ornithischians (probably, the duck bill dinosaur ?*Telmatosaurus transsylvanicus* and *Zalmoxes* sp.). For the fossils originating from Pui locality, the taphonomy is indicative for a fluvial channel fill rock, where the vertebrate remains were subject of dynamic hydrotaphonomy, before burial. But not all fossils are from Pui: the fossilization of some of the sauropod remains is indicative for Sânpetru, not for Pui, as the labels are indicating. Therefore, this museum is another one in Romania hosting latest Cretaceous reptiles originating from old field collecting missions.

Keywords: dinosaurs, Maastrichtian, old collections, Mureş County Museum, Romania.

Introduction

Maastrichtian dinosaurs from Transylvania are worldwide famous due to their peculiar evolution, presumed related to an island realm. Consequence of such peculiar environment in a very specific paleogeography, at least part of them dwarfed as adaptation of the restricted continental areas where they lived. This feature was firstly underlined by the Transylvanian paleontologist baron Nopcsa [49, 50, 51, 52], the subject being resumed in a lot of subsequent papers [e.g. 1, 8, 14, 21, 22, 72, 75, a.o.]. Nopcsa's first discoveries were from the Haţeg Basin, but very fast he extended his researches in Transylvania, finding dinosaur remains also in the Transylvanian Basin too [47, 48]. Nopcsa's discoveries were confirmed by new finds of Maastrichtian vertebrates [e.g. 8, 12, 13, 14, 16, 17, 18, 19, 24, 27, a.o.].

It worth to notice that in the Romanian museums or universities, there is not housed even a single vertebrate fossil donated by Nopcsa. He either donated (e.g. to the Hungarian Geological Institute in Budapest – MAFI [36], or to the National Natural Sciences Museum in Paris – MNHN – in 1923, when Marcelin Boule was director of laboratory [54]), or sold the

majority of the fossils he found to the British Museum of Natural History (nowadays Natural History Museum in London; [25, 54]). It is not surprisingly that in such context, after Nopcsa's tragic death happened in 1933, dinosaur fossils from Transylvania became coveted both by private collectors and museums.

Nowadays, institutional collections with Maastrichtian dinosaurs are hosted in Cluj-Napoca (Babeș-Bolyai University, in the Department of Geology, as well as in the Transylvanian Museum Society), Bucharest (University of Bucharest, Faculty of Geology and Geophysics and the Geological Institute Museum), Deva (Museum of Dacian and Roman Civilization), Oradea (Țării Crișurilor Museum, Department of Natural Sciences), Aiud (Natural Sciences Museum), Bârlad (Vasile Pârvan Museum) and probably Sebeș (Ioan Raica Municipal Museum). The number of specimens hosted in these collections is extremely variable. The largest collections are the ones from Cluj-Napoca, Bucharest and Deva, while others host just only few specimens, sometimes a single exhibit.

For decades, there were no mentions about any dinosaur and other Maastrichtian reptiles in other museums from Romania. But not very long time ago, in the collection of the Mureș County Museum, Natural Sciences Branch, we found a small sample of dinosaur and crocodile bones and teeth, labeled as originating from the well-known Maastrichtian vertebrate locality of Pui (Fig. 1a, b). According to the inventory ledger, these fossils were collected by someone

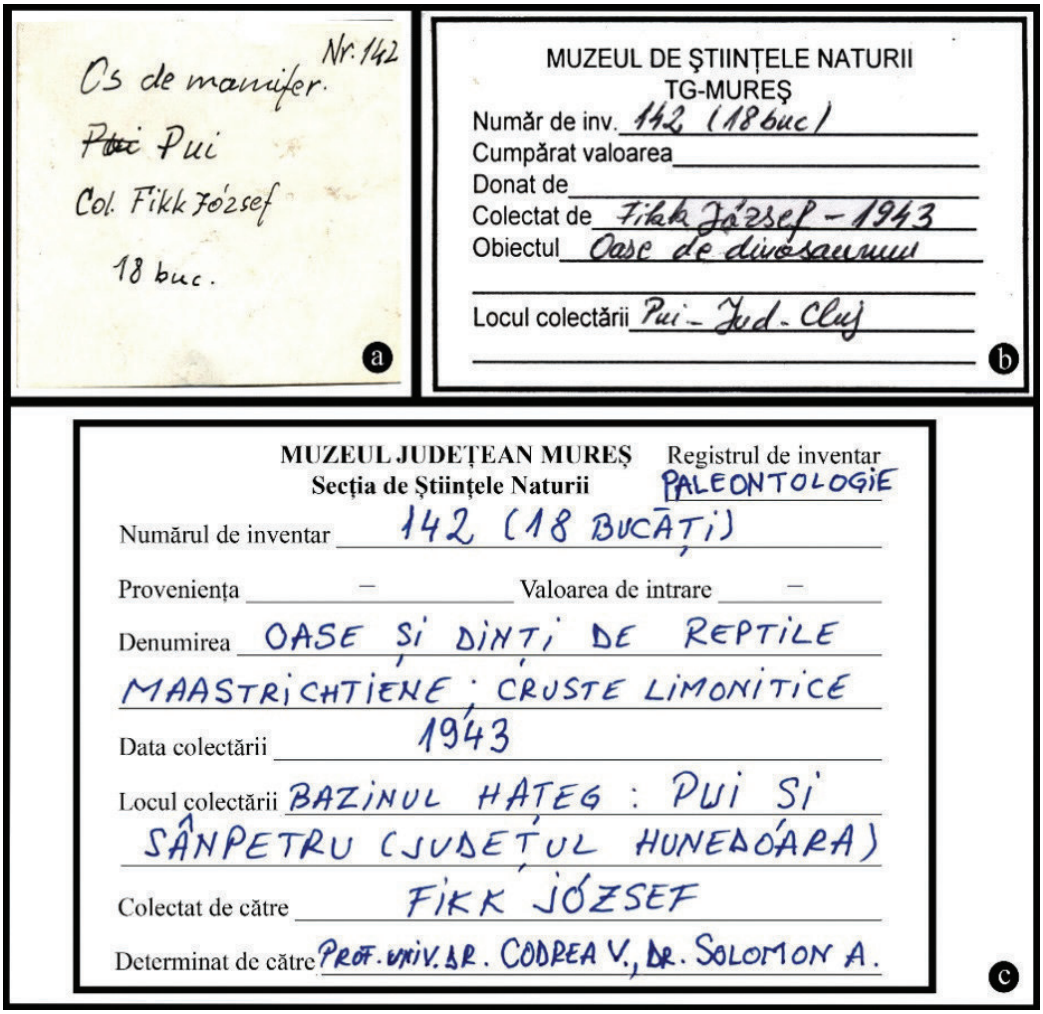

Fig. 1: Labels of the studied materials. a. „Original label"; b. A more recent label; c. Corrected label with determination of remains and clear indicated localities from where the fragments of bones and teeth originate.

named József Fikk, in 1943. In spite of our insistence, we were not able to find any detail about this person. Probably he was someone interested in natural sciences, and collected these bones during an excursion (or more) in the Hațeg sedimentary basin. The bones were probably sold to the museum in 1962 by Laszlo Fikk, but wrongly registered in the inventory as mammal bones (Fig. 1a) or only as dinosaur bones (1b). The corrected label was done based on the present study (Fig. 1c).

Systematic assignation of these fossils and an attempt of reconstruction of the Maastrichtian taphonomic environment where these bones and teeth accumulated are the goals of this paper.

Geological setting

Pui is the southeasternmost Maastrichtian vertebrate locality in the Hațeg sedimentary basin. The geology of this area was several times detailed in many studies [e.g. 9, 28, 30, 55, 56, 58, 59, 61, 64, 65, 66, 70, 71, a.o.). Therefore, to resume herein this topic would be redundant. One just mentions that the Maastrichtian fluvial deposits from Pui are with red mudstones in dominance, rich in white mica. These rocks originated from over bank sediments, while gritty sand and microconglomerates were channel fills. Rarely, ox-bow deposits with black mudstone rich in pyrite were reported [9, 69]. Some sauropod remains are indicative for Sânpetru, not for Pui as noted on the label (Fig. 1a). Both fossil-bearing localities, Pui and Sânpetru, are Maastrichtian in age, and despite the fact that the deposits from Pui were related to Sânpetru Formation [28, 32, 33, 47, 48, a.o.], Therrien's work [64] points out the major contrast concerning the dominance in color of the rocks from these two localities: while in Sânpetru, on the Sibișel Valley where the type-section of the Sânpetru Formation is located, the fluvial deposits are gray-yellow-greenish (Fig. 2a), in Pui the red mudstones are in prevalence (Fig. 2b). Based on this, Therrien [64] called the deposits from Pui "Pui beds", suggesting even a possible distinct formation, "Bărbat Formation".

Materials and methods

The studied sample includes sixteen bones and teeth fragments (none complete) belonging to various dinosaurs and to a crocodile. All fossils are hosted in the collection of the Mureș County Museum, Natural Sciences Branch (hereinafter, abbreviated as TMMNSP; P-Paleontology inventory).

The teeth and bones were either completely extracted from, or only partly cleaned of the adherent matrix rock, using professional chisels and hammer, or for finer cleaning, a pneumatic preparation tool Krantz W224 and compressed air hammer Krantz W860 were used. In a few cases, when the bones had to be glued, we used Geodur, Picătura® or Mowillite. The photographs were captured with Nikon D7000, and then processed in Adobe Photoshop CS2, Version 9.0.

The fossils systematic assignations were based either on references, or on direct comparisons with fossils hosted in the collection of the Laboratory of Paleotheriology and Quaternary Geology of the Department of Geology of the Babeș-Bolyai University Cluj-Napoca (hereinafter, abbreviated PQGUBB) and the Paleontology-Stratigraphy Museum (abbreviated PSMUBB) of the same university.

Fig. 2: Overview of Maastrichtian continental deposits of Sânpetru Formation. a. Sânpetru "Scoabă" locality, gray fluvial deposits in dominance – Sibișel Valley; b. Pui locality, red beds in dominance – Bărbat River; Note the different rock colors for the localities. Photographs are courtesy of the authors.

Systematic paleontology

Order Crocodyliformes HAY, 1930 (*sensu* BENTON & CLARK, 1988)
Suborder Eusuchia HUXLEY, 1875
Family Allodaposuchidae NARVÁEZ, BROCHU, ESCASO, PÉREZ-GARCIA, ORTEGA, 2015
Genus *Allodaposuchus* NOPCSA, 1928
Allodaposuchus precedens NOPCSA, 1928
(Figs. 3a, b, 4a, b)

Fig. 3: *Allodaposuchus precedens*, TMMNSP 142/17. Isolated tooth in rock matrix: a – lateral view; b – labial view.

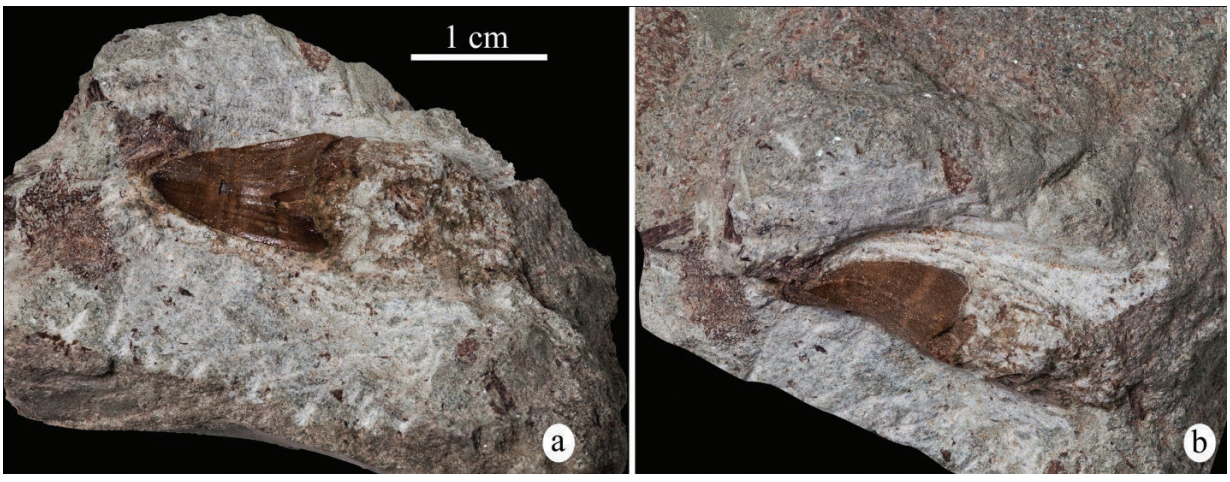

Fig. 4: *Allodaposuchus precedens*, TMMNSP 142/14. Tooth in rock matrix: a – lingual view, b – lateral view.

Description. Crocodiles are documented by a couple of teeth (TMMNSP 142/17, Fig. 3a-b, and TMMNSP 142/14, Fig. 4a-b), both prepared without complete removal of the rock matrix. Both are preserving their crowns only, the roots being either broken, or severely damaged. The roots were probably damaged or removed by the water stream. Both crowns are conical and slender, transversally compressed and medially twisted, with mesiodistal sharp carinae devoid of serrations, running from the base to the pointed apex, slightly lingually curved. The base of these crowns is oval, while the cross-section, although not very well exposed, should be sub-rounded,

a typical feature for this crocodile. The enamel is ornamented by vertical striations, spotlighted to the base of the crown, gradually reducing to the apex that seems rather smooth.

Measurements (mm).

	TMMNSP 142/17	TMMNSP 142/14
Antero-posterior diameter	11.1	8.4
Height	17.0	12.0

Discussions. The sizes, as well as the morphology of these teeth are in agreement with what is known in the largest crocodile ever reported from the 'Haţeg Island', *Allodaposuchus precedens* Nopcsa, 1928. Although it is a very old known crocodile species coined by Nopcsa [53], the teeth of this species remain rather poor known, as long as the huge majority of reports refer only to isolated teeth, as these ones from Pui. Very few fossils belonging to this crocodilian concern maxillaries and mandible fragments still nesting teeth. In spite of over one century of research in Transylvania, there is not available any complete mandible of this crocodile. Nopcsa's [53] type specimen does not refer to teeth and until now, only few fragments of mandible are available from Transylvania, the majority in a poor state of preservation. The teeth of this sample were compared with the ones on the skull originating from Oarda de Jos (PSMUBB V 438; Alba County, the Metaliferi sedimentary area; Delfino et al. [24], the neotype of this species, in Narváez et al. [37] and a new diagnosis in Narváez et al. [38]), as well as with various isolated teeth from Sânpetru, Pui or from Oarda de Jos, from the collections of the PQGUBB and PSMUBB, but also with some from several references [e.g. 2, 6, 35, 59]. Based on these comparisons, one may presume that both teeth could have positions in the anterior portion of the skull, on premaxillae. Following Buscalioni et al. [5], this kind of crocodile teeth tentatively can be separated into morphotypes. Based on their determination we may say that the teeth from Tîrgu Mureş represent morphotype B – with a slander crown (see description above and Buscalioni et al. [5], for details). This kind of morphotype was already reported from Pui from a similar type of rock [59] as the one which yielded the teeth from the present study.

For decades, this kind of teeth were assigned doubtless to *Allodaposuchus precedens*, the single crocodile reported from the 'Haţeg Island' with this kind of dentition. But not very long time ago, Martin et al. [35] underlined that the dentition is not distinctive between *A. precedens*, *A. subjuniperus*, *A. palustris*. Even if *A. palustris* could be a poor documented species based on too few characters, *A. subjuniperus* is considered valid. But for instance, in Transylvania *A. precedens* is the single species clearly documented, none of the other ones being reported until now. In this context, the teeth from Pui can be related to this species.

Dinosaurs
Dinosaria OWEN, 1842
Order Ornithischia SEELEY, 1887
Suborder Ornithopoda MARSH, 1881
Euornithopoda (*sensu* WEISHAMPEL, 1990)
Infraorder Iguanodontia SERENO, 1986
Family Rhabdodontidae WEISHAMPEL, JIANU, CSIKI & NORMAN, 2003
Genus *Zalmoxes* WEISHAMPEL, JIANU, CSIKI & NORMAN, 2003
cf. *Zalmoxes* sp.
(Fig. 5)

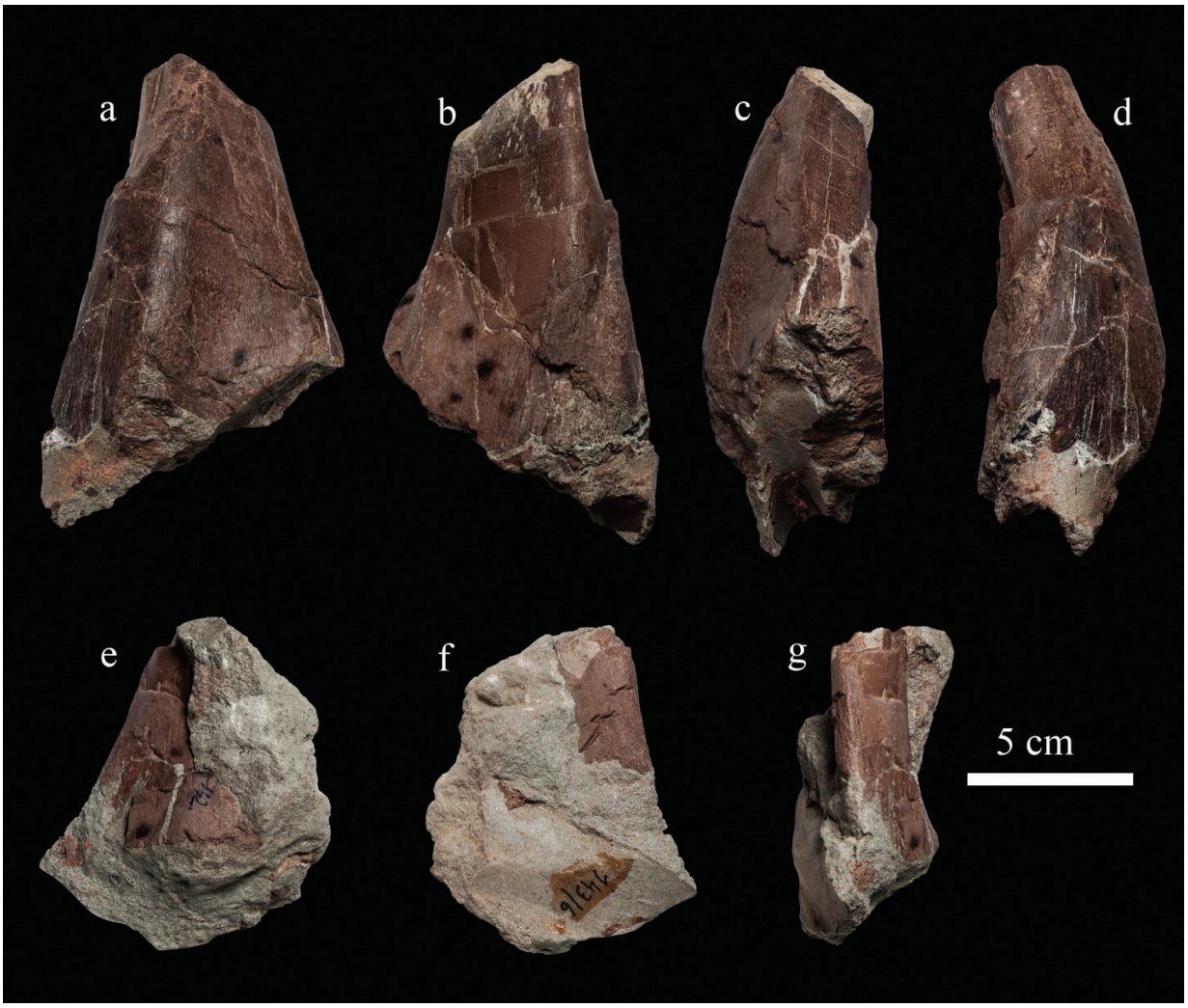

Fig. 5: *Zalmoxes* sp.: a-d. Distal fragment of (?) left tibia, TMMNSP 142/13. a – anterior view; b – posterior view; c – lateral view; d – medial view; e-g. Distal fragment of (?) right tibia, TMMNSP 142/6. e – anterior view; f – posterior view; g – lateral view.

Description. The distal fragment of the (?) left tibia TMMNSP 142/13 (Fig. 5a-d) clearly originates from sediments of channel filling type from Pui. The cross-section of the bone is subcircular. The bone is brownish and is distorted by the overburden sediments. As it was carelessly extracted, on the caudal face few areas with broken missing parts can be noticed. The bone gradually expands, and should have form two transverse malleoli and two distinct articular surfaces, as typical for *Zalmoxes*. But due the broken state of the bone, the overall morphology of these malleoli and articular surfaces is indistinctive. The bone morphology is similar to the one described by Godefroit et al. ([26]; specimens housed in PQGUBB collections), strongly different to the hadrosaur *Telmatosaurus transsylvanicus* Nopcsa, 1903. Another similar distal fragment of a (?) right tibia originating from a younger specimen is TMMNSP 142/6 (Fig. 5e-g). The salient external malleolus is much damaged toward the distal extremity. The bone is extremely poor preserved and sediment still covers a part of the bone. However, few distinctive details are preserved on this bone. Despite the above mentioned, the overall pattern of the bone is indicative for a young *Zalmoxes*.

Ornithopoda indet.
? Superfamily Hadrosauroidea SERENO, 1986
? Genus *Telmatosaurus* NOPCSA, 1903
? *Telmatosaurus transsylvanicus* (NOPCSA, 1900)
(Fig. 6)

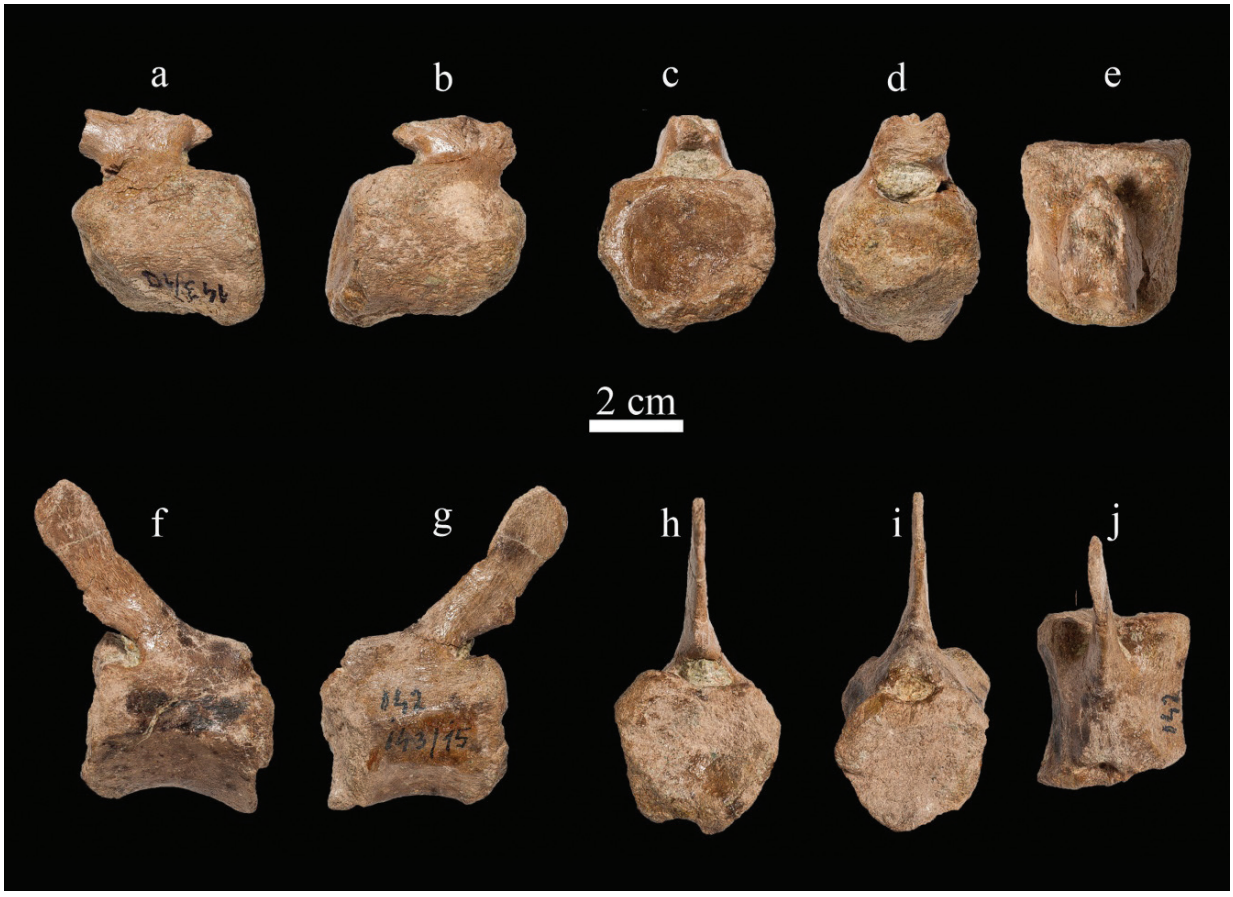

Fig. 6: ? Ornithopoda indet. (? *Telmatosaurus transsylvanicus*). a-e. Caudal vertebra TMMNSP 142/10 in: a – left lateral view; b – right lateral view; c – posterior view; d – anterior view; e – dorsal view. f-j. Caudal vertebra TMMNSP 142/15 in: f – right lateral view; g – left lateral view; h – posterior view; i – anterior view; j – dorsal view.

Two caudal vertebrae, both from the middle-distal portion of the tail are here tentatively assigned to the mentioned hadrosaur species, in fact the single duck-bill dinosaur ever reported from the 'Haţeg Island' [23, 41, 42, 45, 73].

TMMNSP 142/10 (Fig. 6a-e) preserves the centrum, much damaged. These damages occurred prior to burial and are evidence of influence of dynamic hydrotaphonomy. The most damaged areas are on the proximal articular surface where only a small portion remained pristine, and on whole ventral side, where no details are available for study. The distal articular facet is concave, with an oval outline. The centrum is broader than higher, with the broadest point distally situated (36 mm). Both prezygapophysis and postzygapophysis are broken, as well as the neural spine. Although broken, the neural spine seems to be backwards directed (Fig. 6a-b). The neural canal is sub-circular and filled by sediment (Fig. 6c-d). TMMNSP 142/15 (Fig. 6f-j) is better preserved. The proximal articular surface is much damaged. The better preserved distal articular surface is concave, heart-shaped. It is almost as broad (34.5 mm) as high (33.0 mm). On the ventral side, the longitudinal ridges are well distinct, showing a long groove between them (midline furrow *cf.* Csiki-Sava et al., [22]), with both

proximal and distal ends broken. The blade-like neural spine is strongly transversally compressed and backwardly inclined (Fig. 6f-g, j). Also such vertebrae are not very diagnostic we can notice that this morphology is closer to hadrosaurs' similar caudal vertebrae. Therefore, we tentatively assigned them to the single hadrosaur known in Maastrichtian from Transylvania, *Telmatosaurus transsylvanicus*. The neural canal is sub-circular and filled by sediment (Fig. 6h-i), as in TMMNSP 142/10.

The exact number of caudal vertebrae is unknown in *T. transsylvanicus*, but according to Weishampel et al. [73] there were probably more than fifty vertebrae. The overall morphology of the above described specimen is similar with the ones figured and described by Weishampel et al. [73] and Dalla Vecchia [23], and also resembles the morphology of the middle-distal caudal centrum of one vertebra from Csiki-Sava et al. [22].

Sauropoda MARSH, 1878
Titanosauriformes SALGADO, CORIA & CALVO, 1997
Titanosauria BONAPARTE & CORIA, 1993
Titanosauria indet.
(Fig. 7)

Two left femur fragments, seemingly originating from the same bone are available for study (TMMNSP 142/4; Fig. 7a-d and TMMNSP 142/2; Fig. 7e-h). The first one is from the posterior side towards the proximal extremity, while the second is from the distal part of the bone. Both are documenting a young specimen. The matrix rock is a greenish sandstone, rather nonspecific for the sediments from Pui, but closer as texture and color to the rocks of the Sânpetru Formation exposed mainly on the Sibișel Valley and its tributaries (see Fig. 2, for details). Probably, this is their true origin. In TMMNSP 142/4 the proximal end and the articular surfaces are missing due to taphonomy. If preserved, the articular ending of the bone should have been moderately expanded. The cranial (anterior) face of the bone is slightly concave (Fig. 7a). Unfortunately, the deltopectoral crest is not preserved, probably being broken due to the taphomomy. In TMMNSP 142/2 the distal part and the articular condyles are broken. However, we can observe that the broken condyles are extending on the caudal (anterior) face of the bone (Fig. 7e). The intercondylar sulcus is not very deep. The top of the fibular condyle is rounded and in a lower position than the tibial one, which is higher and sharper. Both fragments are showing few diagnostic features, being difficult to assign them to one of the two valid titanosaur species – *Magyarosaurus dacus* Heune, 1932 and *Paludititan nalatziensis* Csiki, Codrea, Jipa-Murzea & Godefroit, 2010. Another bone (TMMNSP 142/1; Fig. 7i-m) is also a femur fragment of a young sauropod dinosaur. In proximal dorsal view we can see the relatively thick cortex of the bone (Fig. 7m). This bone probably could originate from Pui, as marked on the label.

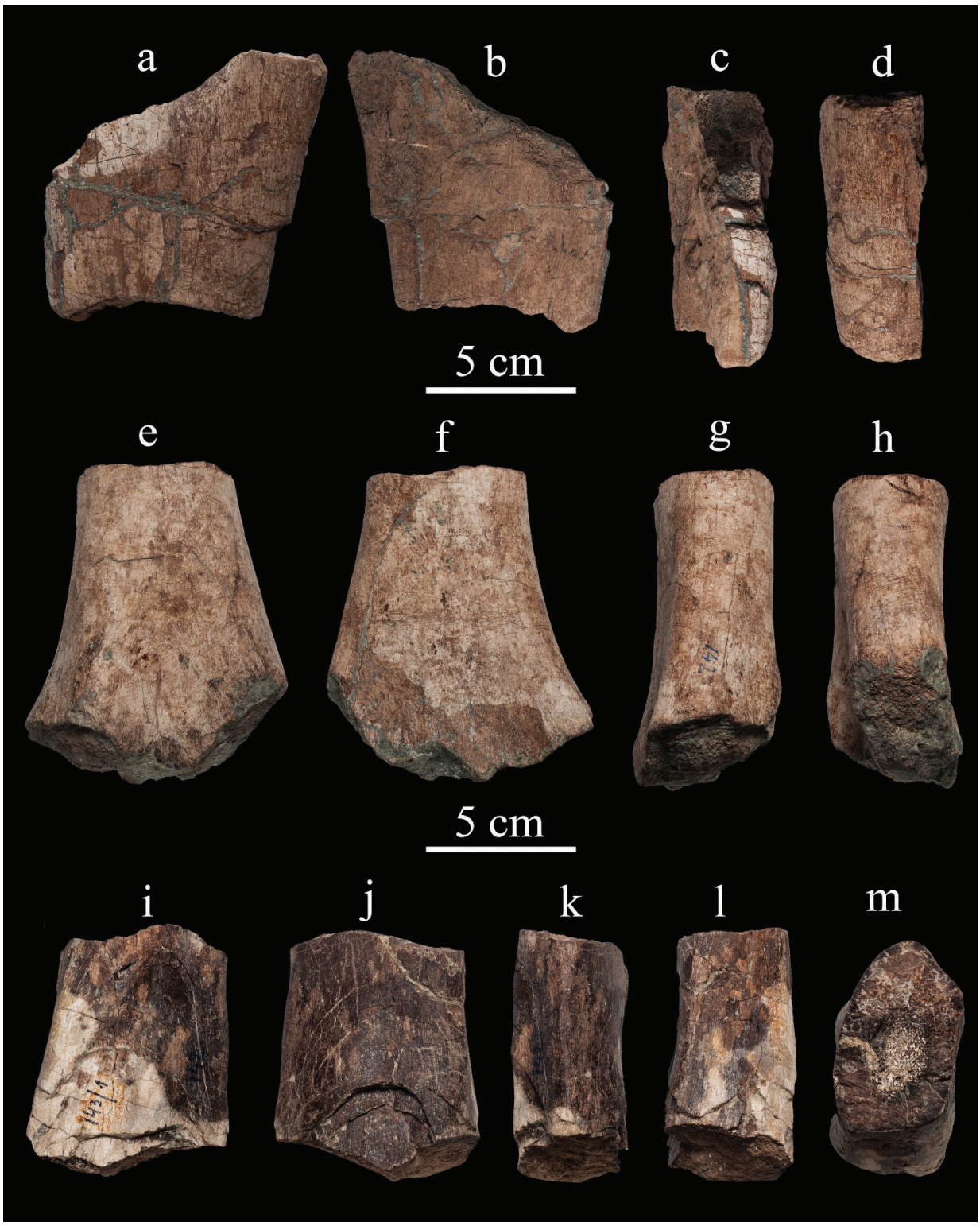

Fig. 7: Titanosauria indet. from Sânpetru (a-h) and Pui (i-m). a-d. Proximal fragment of a left femur, TMMNSP 142/4. a – anterior view; b – posterior view; c – medial view; d – lateral view; e-h. Distal fragment of a left femur, TMMNSP 142/2. e – posterior view; f – anterior view; g – lateral view; h – medial view; i-m. Right femur fragment, TMMNSP 142/1. i – anterior view; j – posterior view; k – lateral view; l – medial view; m – proximal dorsal view.

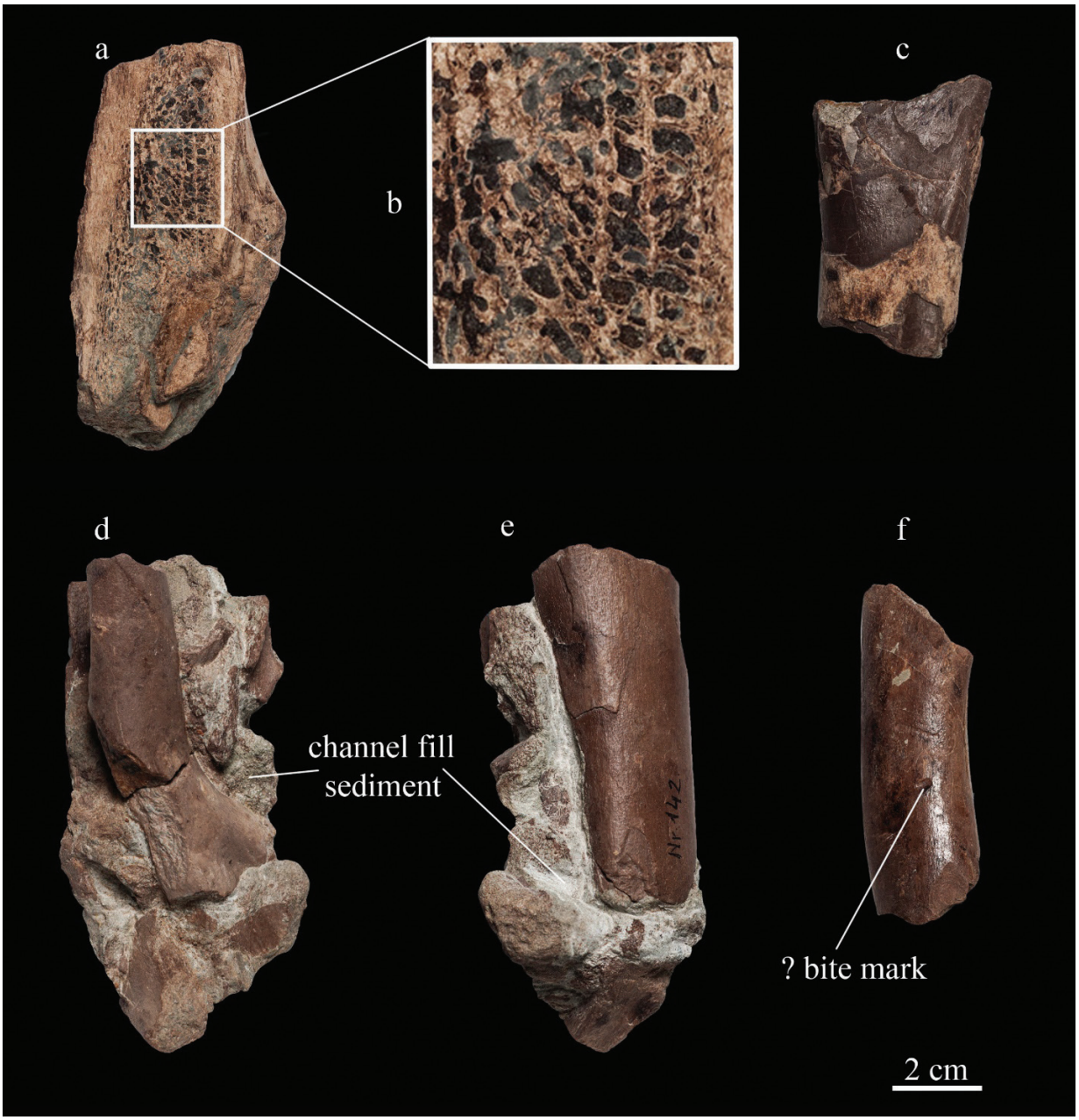

Fig. 8: Fragmentary dinosaur remains. a. ?sauropod limb bone fragment, TMMNSP 142/3; b. details of the well-developed osteons in the middle cortex of TMMNSP 142/3; c. ?ornithopod limb bone fragment, TMMNSP 142/11; d-e. bone breccia with different bones lying on each other, TMMNSP 142/8; f. indeterminate dinosaur bone fragment (?ornithopod), TMMNSP 142/5.

Some other bone fragments are originating also from various dinosaurs, but they are either too fragmentary, or preserve too scarce diagnostic features in order to give a precise taxonomical identity. TMMNSP 142/3 (Fig. 8a) is probably a limb bone fragment of an indeterminate sauropod (possible from the same specimen as TMMNSP 142/2 and TMMNSP 142/4) and its fossilization suggests that it originates from Sânpetru. The internal structure shows that there are very well developed osteons in the middle cortex (Fig. 8b). A similar pattern was observed by Stein et al. [63] in sauropod remains originating from the 'Haţeg Island'. TMMNSP 142/11 (Fig. 8c) is a limb bone fragment (possible a humerus fragment) of an (?)ornithopod. TMMNSP 142/8 (Fig. 8d-e) represents a bone breccia with a limb bone fragment broken along of an indeterminate dinosaur and a proximal fragment of (?)humerus of an ornithopod, possibly

Zalmoxes. TMMNSP 142/5 (Fig. 8f) is a bone fragment of an indeterminate dinosaur (possibly, a femur fragment of *Zalmoxes*) with two possible bite-marks. TMMNSP 142/12 is a very small bone fragment, whereas TMMNSP 142/16 is a very bad preserved fragment.

Last but not least, we have to notice that TMMNSP 142/7 and TMMNSP/18 are not bones as registered in the inventory, but probably, root-mark limonite fillings. Their origin from Pui is very doubtful.

Discussions

Since the first discoveries of the Transylvanian paleontologist baron Nopcsa [39] as well as the Kadic's ones, the latest Cretaceous (Maastrichtian) terrestrial ecosystems from Transylvania were of large interest for the scientific community. After, Nopcsa published several successive papers on various dinosaurs pointing out for some of them dwarfing tendencies. He explained this trend by an endemic, restricted evolution occurred in an island realm later called the 'Haţeg Island' [e.g. 49, 50, 51, 52]. The majority of his finds originated from the Haţeg sedimentary basin, for many decades after, this basin being of large – sometimes, the only one – interest for paleontologists, both professionals and amateurs too. Probably the collector of the Maastrichtian reptiles from Tîrgu Mureş, József Fikk, was such an amateur attracted by the fame of Nopcsa's discoveries. Now, he is almost forgotten. In spite of our insistences we were not able to find details about his biography.

But, József Fikk was not the only forgotten "dinosaur hunter" in Transylvania. Recently, Brustur [4] brought to attention Ştefan I. Mateescu's work on some dinosaur remains collected Interwar from Pui. Initially he was Professor's Ion Popescu-Voiteşti assistant at the Geological Institute of the University of Cluj-Napoca, then senior lecturer at same university. He collected samples from Pui ("on Strei Valley"), and then went in 1927 (January 1-April 15) to Vienna [62] for studying them, at the Paleontological Institute with the famous Professor Othenio Abel, the same who was Ferenc Nopcsa's teacher. But the dinosaur teeth studied in Vienna were never published by Mateescu, who soon after leaved Cluj-Napoca for a professor position in the Polytechnic School in Timişoara. Probably there, he had priorities other than paleontology. Even if his study on the Pui dinosaur teeth was never achieved, it is important because it priors far in time such studies at the geological school from Cluj-Napoca. Surprisingly (or perhaps, not), his tentative was completely ignored by the ones who focused their attention on the history of the vertebrate paleontology in our country, more precisely on the studies concerning dinosaurs [e.g. 29, 31]. Also, now we may consider that the two blocks with dinosaur bones embedded into a grey-greenish sandstone labeled as originating from Pui (PSMUBB V508 and V509; Fig. 9) from the university museum of Cluj-Napoca reached this collection due to Ştefan Mateescu. Sadly, now we have not at our disposal any photo to portray this geologist. Other colleagues interested about his work could not get such one (Dr. Titus Brustur, *written communication* to VAC). One may only to presume that he appears near I.P. Voiteşti in a photo group of students and professors in a field trip, hosted in the Voiteşti's Museum (Gorj District). At least, his name remains written on one brick of the Thanksgiving Wall of the Lyceum "George Barițiu" from Cluj-Napoca, where he was also professor for a period (Fig. 10).

The Maastrichtian reptile teeth and bones housed in the Tîrgu Mureş Museum collections document common vertebrates for the assemblages already described from Haţeg Basin. As we already mentioned, it is doubtful for few of these fossils to originate from Pui. Their type of fossilization recalls the features recorded the ones of Sânpetru Formation, on Sibişel Valley. This is the case of some of the femur fragments of sauropod already described above. Other ones are

Fig. 9: Block of Maastrichtian sandstone embedding dinosaur bones (PSMUBB V508) illustrating fluvial channel fills originating from Pui, probably collected by the geologist Ștefan Mateescu.

Fig. 10: The name of the geologist Ștefan Mateescu on the brick of the Thanksgiving Wall of the Lyceum "George Barițiu" from Cluj-Napoca, honoring his activity in this institution.

typical for the channel fillings described from Pui [59]. Such samples represented by big sized blocks of rocks bearing bone breccia could be collected in Pui locality, 150–200 m upstream on Bărbat River from the bridge on the route 66. We observed this kind of blocks extracted from the foundation of one building of the sawmill that gave a lieu name for a Maastrichtian oxbow level we named "Pui Gater" [9].

The crocodile *Allodaposuchus precedens* is weak documented, only by a couple of teeth. This is a scarce sample, but these teeth are indicative for this species. This crocodile was among the top predators of the 'Haţeg Island' latest Cretaceous ecosystem. By far, a richer sample was extracted from the block we published few years ago [59], including numerous complete or fragmentary teeth, clearly documenting this species and indeterminate crocodile cranial and postcranial elements or osteoderms.

The basal euornithopod *Zalmoxes* is the most common herbivore dinosaur in the 'Haţeg Island'. Since Nopcsa's first publications about this dinosaur [39, 40, 43, 44, 46, 51] some other discoveries, which all have occurred in this century, complete its knowledge. The most important is the revision of the species included into this genus, i.e. *Z. robustus* and *Z. shqiperorum* [74]. After, the find of a fragmentary skeleton in the fossil-bearing locality Nălaţ-Vad [57] there were added some more details about the teeth and bone anatomy [26]. Recently, a 'catalogue' of *Zalmoxes* from Nălaţ-Vad issued [3], and descriptions of additional pieces are available. But, we wonder how such a 'catalogue' that claims to include the fossils housed at the Babeş-Bolyai University of Cluj-Napoca too could be done as long as none of the authors had ever full access to the whole inventory of the Laboratory of Paleotheriology and Quaternary Geology. Obviously, the 'catalogue' is far to be complete, at least for that collection. *Zalmoxes* was found also outside Haţeg Basin, both on the southwestern side of the Transylvanian Basin, in the Metaliferi sedimentary area, in Şard Formation [7, 12, 13, 14] and on its northwestern side, at Someş-Odorhei [8]. It is reported also from Rusca Montană sedimentary basin, in rocks of same age [11, 15, 67, 68]. The sample from Tîrgu Mureş Museum includes too fragmentary bones, but based on the few preserved anatomical details we assigned them to this euornithopod.

The hadrosaur *Telmatosaurus transsylvanicus* [45] is rarer in the repertory of discoveries not only in the Haţeg Basin, but also elsewhere in Transylvania. Apart Haţeg Basin, it is known also from Metaliferi sedimentary area, in Şard Formation [7, 10, 14] and from Rusca Montană Basin [60]. The vertebrae here assigned to this hadrosaur have a clear origin from the typical fluvial channel fillings from Pui [59]. This dinosaur preferred the vicinity of water streams and probably was not as frequent as *Zalmoxes*, as our own finds seem to demonstrate.

The sauropod remains originated, except TMMNSP 142/1, most probably from Sibişel Valley at Sânpetru and are fragmentary and valueless for a species assignation. Anyway, the sauropod systematics of the 'Haţeg Island' representatives is far to be clear. For instance, two valid species can be noticed, Nopcsa's *Magyarosaurus dacus* and *Paludititan nalatzensis* [20, 34]. If the first species is documented only by scattered bones, the second concerns a fragmentary skeleton unearthed at Nălaţ-Vad near Haţeg borough. Probably soon, fossils still unstudied could give some more details about of these Transylvanian dinosaurs. Sauropods are common also in Metaliferi area and probably at Iara, near Cluj, in the basin of Transylvania [14].

Conclusions

Through this József Fikk's small collection here described, Mureş County Museum (Natural Science Branch) is another Romanian museum hosting Maastrichtian reptile remains. For many years, this collection was completely ignored by all paleontologists working on these

kinds of vertebrates. It was collected probably during a field trip, and afterwards, sold by Laszlo Fikk (probably, a József's relative) to the museum. It is mostly illustrative for the fluvial channel fills from Pui, but does not reveal unknown details about the Maastrichtian reptiles from the Hațeg Basin. However, it is important for the museum, because the local public can have an image about the terrestrial life at the end of the Mesozoic Era, as long as in Mureș County rocks of this geological age and facies are completely missing.

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CROCODILIENI ȘI DINOZAURI MAASTRICHTIENI DIN COLECȚIA MUZEULUI JUDEȚEAN MUREȘ
(Rezumat)

O colecție mică, dar ilustrativă, care cuprinde dinți și oase de reptile maastrichtiene, este găzduită la Secția de Științe ale Naturii a Muzeului Județean Mureș. Fosilele au fost colectate de către József Fikk în 1943 și probabil vândute muzeului de către Laszlo Fikk în 1962. Acestea au rămas practic uitate, niciodată menționate în vreo lucrare. Resturile se referă la crocodilianul *Allodaposuchus precedens* și la diverșii dinozauri: sauropode indeterminabile și ornitopozi (probabil, dinozaurul cu „cioc de rață" ?*Telmatosaurus transsylvanicus* și *Zalmoxes* sp.). Pentru fosilele originare din localitatea Pui, tafonomia este indicativă pentru o rocă de tip umplutură de canal fluvial, unde resturile de vertebrate au fost supuse unei hidrotafonomii dinamice, înainte de îngroparea lor definitivă. Însă, nu toate fosilele provin de la Pui: fosilizarea unora dintre resturile de sauropod este indicativă pentru localitatea Sânpetru, nu pentru Pui, cum este indicat pe etichetă. Prin urmare, acest muzeu este un altul din România care deține în colecțiile sale reptile din Cretacicul terminal, provenite din vechi misiuni de colectare pe teren.

MUSEOLOGY

DONATION OF DR. HILARIUS MITREA FROM THE COLLECTIONS OF MUSEUM OF NATURAL HISTORY FROM BUCHAREST

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Abstract: Several papers were written about the life and prodigious activity of Hilarius Mitrea, physician in the Dutch colonial army from Indonesia for about 25 years. Other 11 papers are dedicated to different aspects of his donation made to the Museum of Natural History from Bucharest in 1882 and 1895. Some materials from Mitrea also exist in Naturhistorisches Museum from Vienna where items were initially identified and in Ethnographic and Folklore Museum from Tîrgu Mureş, Romania. It is the greatest collection ever donated to Museum of Natural History from Bucharest (about 1,500 specimens). Numerous negative events (earthquakes, bombing during the war, fires and human negligence) affected them. Even more problems are with original documents connected with those donations. At this moment we could inventorize about 540 pieces in our Museum collections.

Keywords: Mitrea, Indonesia, donation, animals, ethnography.

Introduction

Hilarius Mitrea was probably the most fabulous figure of the Romanian explorers from the end of the XIXth century. Extremely numerous papers and TV documentaries were realized around his prodigious, highly adventurous life spent as military physician in Mexico and Indonesia. He was born on 1842 in Răşinari, Sibiu, but he spent most of his life abroad, mainly in Indonesia as physician in the Dutch Colonial Army (1869–1893). Animated by a huge and absolutely disinterested patriotic feeling he collected different animals for the museum from Bucharest for the very beginning of his staying in East Indies and he continued up to the last moment of staying there in 1893, doing in parallel with his military duties. He made the first donation in 1882 (Fig. 1) and the second one in 1895. His personality was revealed to public due to the tremendous and highly meticulous work of Emil Pop [13]. Marinescu and Rojancovski [6], [7] published the first catalogues of collections. Marinescu [3] and Petrescu and Petrescu [11] mentioned the pieces from Museum of Natural History from Vienna donated by Mitrea as a sign of gratitude for identification of zoological material. More recently, Angela Petrescu and Iorgu Petrescu published the catalogue of birds [9] and crustaceans [10]. Marinescu [4] and Petrescu and Petrescu [12] made the first catalogues of ethnographic donation of Mitrea. Several exhibitions were dedicated to Mitrea's donation, in "Grigore Antipa" Museum of Natural History, in 1980, organized by Marinescu and Andrei [5], in "Franz Binder Museum of Universal Ethnography" from Sibiu and in National Military Museum "Ferdinand I" from Bucharest (2009) during the

project "Romanian personalities stated worldwide in the XIXth century: Hilarie (Bucur) Mitrea from Sibiu Rășinari, doctor, naturalist and ethnographer" [1].

Material and methods

Up to this moment none of original cataloges of donations sent by Hilarius Mitrea still exist. So, we could reconstitute those acts only based on different adjacent documents that still exist in different archives, old museum inventory registers and also in some newspapers of that time.

The first mention of Mitrea's donation was made in the journal "*Transilvania*" from Sibiu (15th November 1882) that contains the list of donated animals.

In the Archive of Romanian Academy from Cluj-Napoca, fund Emil Pop, there are two photocopies of first and last pages of the original act of donation made by Dr. Hilarius Mitrea in 8th September 1882. The original act was deposited in the archive of the "Grigore Antipa" National Museum of Natural History from Bucharest, according to the notice of Emil Pop (found in the same archive from Cluj), but no longer exists (Fig. 1).

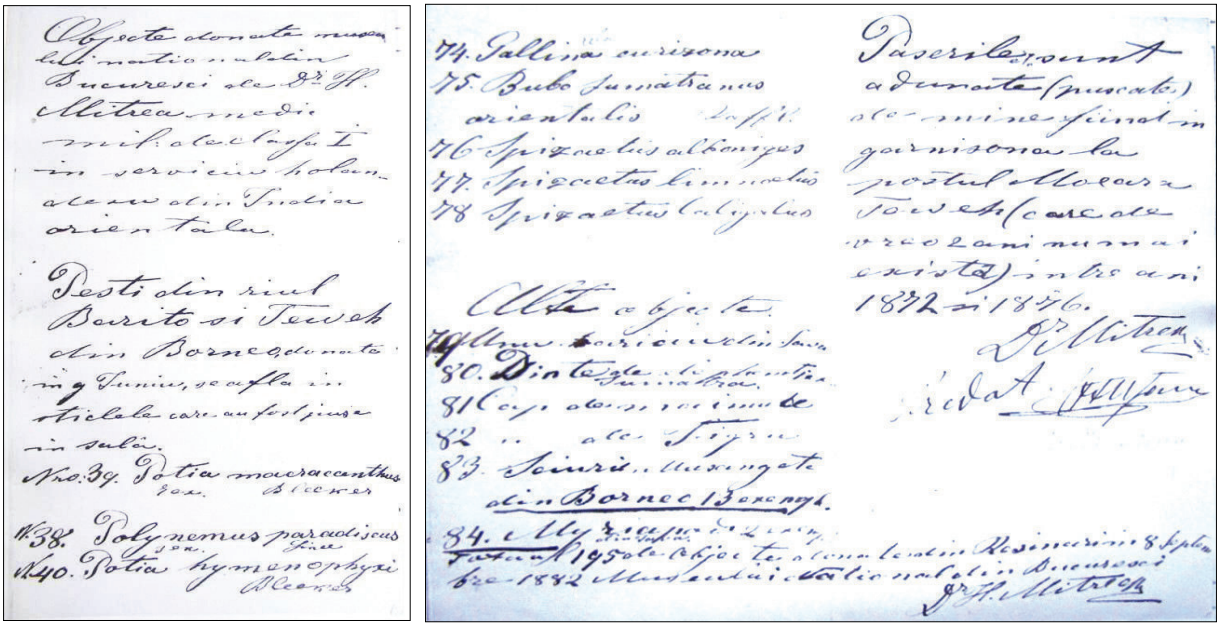

Fig. 1: First and last page of act of donation from 1882 (Romanian Academy Cluj-Napoca)

"Objects donated to the National Museum from Bucharest by Dr. H. Mitrea physician of 1st class in Dutch service from Oriental India.
Fishes from Barito and Teweh rivers from Borneo, donated on June 9, are in the jars that were available in the hall.
Nro. 39. *Potia macracanthus* Bleeker 9 spec.
N. 38. *Polynemus paradiseus* Linee 3 spec.
N. 40. *Potia hymenophyxi* Bleeker ...
74. *Gallina eurizona*
75. *Bubo sumatranus orientalis*
76. *Spizaetus alboniges*
77. *Spizaetus limnaetus*
78. *Spizaetus Caligalus*

Other objects
79. one mouse
80. tooth of Sumatra elephant
81. head of monkeys
82. head of a tiger
83. Musang squirrels etc
from Borneo 13 specimens
84. Miriapods 2 specimens
Birds are gathered (shot) by me being in garrison from Moeara Teweh (for two years no longer exist) between 1872 and 1876.

Dr. Mitrea

Received Ștefănescu
Total of 195 objects donated from Rășinari in September 8th 1882 to the National Museum from Bucharest

Dr. H. Mitrea"

Other mention exists in a notice made by V. A. Urechia, a close friend of Dr. Hilarius Mitrea, in Secolul XX newspaper:

"Here is the letter that dr. Mitrea sent me on 22nd of July 1881 from Rășinari (Transylvania) where he spent a time in his native village: "I left Romania with a great sorrow without thanking you once again for your hospitality and good will with whom you received me in Bucharest. Here, in Rășinari, I am occupied among others with the new collection that I want to send you for the museum from Buchraest that consists in ± 190 of objects (with about 176 birds from Borneo). Being in Bucharest I forgot that between those cases that there are now at the national museum from where the bottles with reptiles where extracted there is on the bottom also a piece of rinoceros skin that I shot it being in Anjer (Java) and that might have ± ¾ m. Have the mercy to look for it and put it together with the rest of objects donated by me to the museum. It would be a nice thing to hear that skin was found ... Dr. Mitrea".

In the archive of "Grigore Antipa" National Museum of Natural History from Bucharest is kept the inventory register of Ștefănescu where is mentioned only the porcupine, donated in 1878 [7] and the act of transferring the patrimony of the museum between the directors Gregoriu Ștefănescu and Grigore Antipa from July 15th 1894; also the 1932 inventory register of Grigore Antipa, with a lot of missing data.

"Inventory of collections, furniture, library and laboratory of National Museum of Zoology from Bucharest, received from Mr. Gr. Ștefănescu, Director of Museum of Natural History.
11. Collection donated by Dr.Haralamb Mitrea in 1882 composed of mammals, birds, reptiles, fishes and invertebrates specified in those two joined collection catalogues.
From Mitrea collection, more monkies without hair and snakes with fallen scales. From bird skins one box with completely broken skins and from rest of boxes, some broken skins.
Received today in July 15th 1894"

In the same archive are stored three letters from Wilhelm Hausmann, preparator from Türkös, Brașov from December 29, 1894, January 30 and March 11, 1895. All those letters were received before the act of donation made by Mitrea in July 3, 1895, so, we presume that the missing catalogue could contain some of the animals mentioned in Hausmann's letters, including the birds of paradise. Pop (1994) strengthens our assumption about a second donation made by Mitrea citing an article from "Timpul" (10/22nd of March 1894) about that and with more details in "Dreptatea" from 13/25th of March 1894.

Letter from Wilhelm Hausmann, December 29, 1894

GouraVictoriae Franks	8
Epimachus magnus	6
Apoda papaea	6
Parotia risopennis	6
Seleucides alba	6
Lophorina superba	4
Cincinnurus regia	4
Diphilodes speciosa	4
Schlegelia Wilsoni	3
Halcyon atricapilla	3
Nyctiornis amictus	3

„You have received the above amounts.
Wilh. Hausmann
Türkös 29 Dec. 1894
Birds from Dr. Mitrea Prepared by Hausmann

Dr. (Antipa?)"

Letter from Wilhelm Hausmann, January 30, 1895

Funumbulus /Frank	8
Cetupa javanensis	8
Apoda aroe	6
Caloaenas nicobaria	6
Carophaga rufigastra	6
Pitta?	4
Eulabes Dumonti	4
Semioptera Wallasi	4
Diphilodes speciosa	4
Trichoglossus	4
Tanisiptera dea I	3
Tanisiptera dea II	3
Calornis metallica	2
Nycticorax	7
Centropus eurivens	6
Halcyon javana	4
Irena turcosa	3
Megalaima	3
Harpactes Duvaucelli	3
Pitta atricapila	3

Smaragdgrün I	2
Smaragdgrün II	2
Banile roth (?)	2
Tchitrea paradisea	2
Alcedo meninting I	2
Alcedo meninting II	2
Picus martius ♀ Inventory by R. de Dy	8

Total 111

"Invoice
From W. Hausmann, Türkös Transylvania
For the Zoological Museum Bucharest over:

Above amount confirmed
Wilh. Hausmann Preparator

Türkös 30th of Jan. 1895
Birds donated by Dr. H. Mitrea and prepared by W. Hausmann (in pencil)"

Letter from Wilhelm Hausmann, March 11, 1895

Centropus eurycercus /Fr. (francs)	5
Centropus lepidus	3
Phaenicophaeus	4
Gracula Javana	3
Halcyon Javana	3
Buceros pica	6
Buceros convexus	6
Buceros anthrac. (*anthracicus*)	6
Eurilaimus orient. I(*Eurylaimus orientalis*)	3
Eury. orient. II	3
Rhinorta chlorf. (*Rhinortha chlorophaea*)	3
Rh. Chl.	3
Pitta atrica. (*atricapilla*)	2
Timalia gris. (*Timalia grisea*)	3
Chloropicus min. (*miniatus*)	3
Phaiop. tristis (*Phaiopicus tristis*)	2
Irena turcosa	3
Copsychus (*Copsichus macrouros*)	2
Phylloris mal. (*Phyllornis malabaricus*)	2
Calornis calb. I (*chalibea*)	2
Cal. calb. II (*Calornis chalibea*)	2
Zanclostomus Dairdii	3
Sciur. Bicol. (*Sciurus bicolor*)	6
Herpestes Javan. (javanica)	6

"From Wilh. Hausmann, Türkös.
For the Zoological Section over listed animals from Museum in Bucharest
Supposed to have received the above-mentioned betray.

Wilh. Hausmann Preparator

Türkös – Transylvania, March 11, 1895.
Inventory R. de Dy (Robert de Dombrovski) (in pencil)

Birds donated by Dr. H. Mitrea and Theo Bray, and mounted by ..." (in pencil)

Several newspapers articles from Romania and Transylvania reported Mitrea's gift, like "Dreptatea" from Timișoara, year I, no. 59, 13/25 March 1894:

> "An unexpected visit. Under this title, we read in „Timpul" from Bucharest, that Physician Ilarion Mitrea, originally from the Răşinari Commune (Transylvania) and now a primary physician at Macasar, the capital of the island of Celebes, Oceania, will arrive shortly in Bucharest to make to the Ministry of Public Instruction an important gift; more animals and ocean plants. And then Dr. Mitrea is on his way to Vienna where he stays at the imperial museum for the classification of the animals and plants he brings with him. When in 1882, Dr. Mitrea first came to Ardeal to see his relatives – this time he came from the island of Ceylon – he made such a gift to the museum in Bucharest as well as to Giurgiu's gymnasium, through his cousin N. Droc Barcian, the director of this gymnasium".

Unfortunately the museum of the "Ioan Maiorescu" gymnasium from Giurgiu, founded by Nicolae Droc Barcian, Mitrea's cousin, was destroyed during the First World War, in 1916 confrontations. No photo or documents of that museum still exist from that period. We found just an empty envelope of a letter received by Mitrea from Giurgiu on December 30 1895, in the archive of Emil Pop.

At the "Grigore Antipa" Museum is kept the official letter that Mitrea sent to the Ministry of Education on June 3, 1895 presenting a summary list of last donation [7] and another one addressed to young director Grigore Antipa in June 18, 1895 from Vienna announcing his gift for the museum (± 200 items), including fishes, snakes etc. and some unidentified mollusks [11].

Other empty envelopes of letters sent by Grigore Antipa on 1895 and 1902 addressed Dr. H. Mitrea in Vienna and Răşinari could be found in "Grigore Antipa" Museum and in archive of the same fund from Cluj.

Results and disscussion

Several catalogues of Mitrea collection were published along time, on fishes [6], general catalogue of donation (crustacea, amphibians, reptilia, birds and mammals [7], more complete catalogues of birds [9] and crustaceans [10], ethnography [4], [14]. Other two papers offered a complete image of Mitrea items from Naturhistorishes Museum from Vienna [3], [11].

Marinescu and Rojancovski published two catalogues of Mitrea collection, including fishes (128 specimens) and crustaceans, amphibians, reptiles, birds and mammals with 184 specimens. Angela Petrescu in her published list of birds from Borneo found 32 species with 44 specimens still prezent from initially 75 species with 146 specimens. Later, Iorgu Petrescu made a list of crustaceans (decapods), with 11 species and 42 specimens. Most complete catalogue of ethnographic pieces, containing 143 objects was made by Petrescu and Petrescu [12].

As regarding the specimens from Naturhistorisches Museum from Vienna, eight specimens of molluscs, three specimens of crustceans and four fishes were reported in 1971 and 2009.

There is also a small private collection of ethnographic objects belonging to Aurelia Veronica Filimon [2], collection remained from her father, Aurel Filimon, founder of actual Museum of Ethnography and Popular Art from Tîrgu Mureș. Part of this collection was exhibited in Sibiu in 2009 and Bucharest (National Military Museum "Ferdinand I") in 2010. It

contains several Indonesian, Japanese, ethnographic objects and some piano scores with original signature of Maria Mitrea, donor's daughter. All of them were bought by Aurel Filimon from Octavian Goga to whom he was a life friend; Goga in turn purchased them from Maria Mitrea Isdrăilă.

Transilvania list contains 283 species with 387 specimens of invertebrates and vertebrates from Borneo (Moeara Teweh), Java, Sumatra, between 1870 and 1881 (including 18 species with 26 specimens from Adriatica, Napoli, North America, Rio de Janeiro, Bahia and Egypt).

In "Grigore Antipa" inventory register we found 467 pieces (with 117 from those cited in *Transilvania* and 350 from the other donations, only 1 specimen of *Cicada imperatorium* mentioned from the large amount of insects) donated by Mitrea between 1882 to 1895 (Pl.1). In Marinescu and Rojancovski [6], [7], are mentioned 283 items (without scorpions, miriapods, insects and ethnographic pieces). Marinescu and Andrei [5] cited only 56 pieces in their short catalogue; in present census we found 400 specimens from 206 species of animals and 143 ethnographic pieces. Most of the species are very rare, endemic ones, being mentioned in Red List and in CITES documents, Mitrea has often collected from remote and unexplored areas from Indonesia. A total of about brilliant 1,500 specimens of animals and ethnographic Japanese and Indonesian artefacts were donated to our museum through Mitrea's generous donation.

Conclusions

Large cataclysms have passed over the buildings where these donations were exposed: fires, earthquakes, two world wars, bombings, but by miracle, Hilarius Mitrea's donations have largely survived to this day. Though hard-pressed by the passage of time, they continue to shine silently and deeply, recalling an unparalleled adventure.

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DONAȚIA DR. HILARIUS MITREA DIN DOLECȚIILE MUZEULUI DE ISTORIE NATURALĂ DIN BUCUREȘTI

(Rezumat)

Numeroase lucrări s-au scris despre viaţa tumultoasă şi activitatea prodigioasă a lui Hilarius Mitrea, medic în armata colonială olandeză din Indonezia pentru aproximativ 25 de ani. Alte 11 lucrări au fost dedicate diferitelor aspect legate de donaţiile făcute Muzeului de Istorie Naturală din Bucureşti în 1882 şi 1895. Câteva piese dăruite de Mitrea se mai găsesc la Muzeul de Istorie Naturală din Viena, acolo unde au fost iniţial determinate şi în Muzeul de Etnografie şi Artă Populară din Tîrgu Mureş, România. Este cea mai mare şi valoroasă colecţie care a fost primită vreodată de Muzeul de Istorie Naturală din Bucureşti (aproape 1500 piese). Numeroasele dezastre care au afectat de-a lungul timpului clădirile în care a fost adăpostit muzeul (cutremure, bomardamente în timpul războiului, incendii şi neglijenţa umană) nu au ocolit nici această splendidă donaţie. Probleme mult mai numeroase sunt cu identificarea documentelor originale de arhivă care au însoţit aceste donaţii. În acest moment am putut inventaria aproximativ 540 de piese aflate în colecţiile Muzeului „Grigore Antipa".

ANNEX 1.

List of species and objects donated by dr. Hilarius Mitrea to the Museum of Natural History from Bucharest

Abbreviations: A = Antipa collection inventory, 1932, "Grigore Antipa" Museum; AP = Angela Petrescu; ML = Mitrea, letter for Ministry, donation 1895, Cluj Academy Library; MA= Marinescu & Andrei, catalogue of exhibition "Dr. Hilarie Mitrea, un mare donator al Muzeului", 1980; MR = Marinescu & Rojancovschi, 1971, 1972; M = Mitrea, donation act, 1882, Cluj Academy Library; T = Transilvania, 1882; * identified by Michael Türkay (Germany).

No crt.	Species donated	Species from actual collections	Collecting places, donation data	Actual no spec.	Coll. no	Bibliographic source and the number of specimens
1	MOLLUSCA Unidentified mollusks		Maluku Islands, 1895			ML 5 boxes
1	CRUSTACEA *Alpheus* sp.	*Alpheus* sp.	Palembang, Sumatra, 1895	5	8855	A 5 spec., MR 5 spec.
2	Unidentified crab	*Carcinus aestuarii**	Adriatica? 1895	2	9490/305	A 2 spec.
3	*Coenobita violascens* (with *Balanus* and *Amphitrite darwini*)	*Coenobita cavipes* Stimpson, 1855	Palembang, Sumatra, 1895	1	9490/294	A 1 spec., MR 1 spec.
4	*Coenobita clypeatus*	*Coenobita clypeatus* (Herbst, 1755)	Borneo, 1895	1	9490/263	MR 1 spec.
	Coenobita clypeatus	*Coenobita clypeatus* (Herbst, 1755)	Java, 1895	1	9490/295	
5	*Palaemon carcinus*	*Macrobrachium rosenbergii* (de Man, 1879)	Palembang, 1895	7	9490/141, 9490/166, 9490/168	A 7 spec., MR 3 spec.
	Palaemon carcinus	*Macrobrachium rosenbergii* (de Man, 1879)	Borneo, 1895	6	9490/164	A 6 spec.
	Palaemon carcinus	*Macrobrachium rosenbergii* (de Man, 1879)	Sumatra, 1895	1	9490/167	A 1 spec.
	Palaemon carcinus	*Macrobrachium rosenbergii* (de Man, 1879)	Makassar¸ 1895	2	9490/142	A 2 spec.
6	*Palaemonidae*	*Macrobrachium idea* (Heller, 1862)	Palembang, 1895	3	8856	A 3 spec.
7	*Matuta banksii*	*Matuta banksia* Leach, 1817	Sumatra, Palembang River, 1895	1	9490/176	A 1 spec.
8	*Matuta victrix*	*Matuta victor* (Fabricius, 1781)	Palembang R., Sumatra, 1895	1	9490/260	A 1 spec.
9	*Neptunus pelagicus*	*Portunus pelagicus* L., 1758)	Makassar, 1895	4	9490/215, 9490/252	A 4 spec., MR 2 spec.
	Neptunus pelagicus	*Portunus pelagicus* L., 1758)	Palembang, 1895	7	9490/216, 9490/251, 9490/252, 9490/257	A 7 spec., MR 4 spec.
10	*Palinurus ornatus*, dried	*Panulirus ornatus* (Fabricius, 1798)	Celebes, 1895	1	8868	A 1 spec., MR 1 spec.

No crt.	Species donated	Species from actual collections	Collecting places, donation data	Actual no spec.	Coll. no	Bibliographic source and the number of specimens
	Palinurus ornatus	*Panulirus ornatus* (Fabricius, 1798)	Makassar, Celebes, 1895	1	9490/155	A 1 spec.
11	*Scylla serrata*	*Scylla serrata* (Forskål, 1755)	Sumatra, 1895	1	9490/250	A 1 spec., MR 1 spec.
1	MIRIAPODA *Heterostoma sulcidens*		Java, 1882			T 1 spec.
2	*Scolopendra morsitans*	*Scolopendra morsitans* L., 1758	Java, 1882	1	8798	
	Scolopendra morsitans	*Scolopendra morsitans* L., 1758	Sumatra, 1882	4	8799	T 1 spec.
3	*Scolopendra de Haanii*		Java, 1882			T 1 spec.
4	*Scolopendra sp.*		Java, 1882			T 1 spec.
5	*Sphaeropoeus bicollis*		Java, 1882			T 1 spec.
6	*Stagmadoptera imaculata*		Java, 1882			T 1 spec.
1	ARACHNIDA *Isometrus maculatus*		1882			T 1 spec.
2	*Palamnaeus costimanus* var. *borneensis* C. L. Koch		Borneo, 1882			T 1 spec.
3	*Pandinus indicus*	*Heterometrus cyaneus* (C. L. Koch, 1859)	Sumatra, 1882	2	8724	
	Pandinus indicus	*Heterometrus cyaneus* (C. L. Koch, 1859)	Java, 1882	1	9491/152	T 1 spec.
	Pandinus indicus	*Heterometrus cyaneus* (C. L. Koch, 1859)	Java, 1882	1	8725	
1	INSECTA *Acridium melanocorne*		Borneo, Java, Sumatra, 1882			T 1 spec.
2	*Acridium*?		Borneo, Java, Sumatra, 1882			T 1 spec.
3	*Adoretus umbrosus* Fab.		Borneo, Java, Sumatra, 1882			T 1 spec.
4	*Aegus acuminatus*		Borneo, Java, Sumatra, 1882			T 1 spec.
5	*Aigosoma javanicum*		Borneo, Java, Sumatra, 1882			T 1 spec.
6	*Amarygmus splendidus*		Borneo, Java, Sumatra, 1882			T 1 spec.
7	*Amarygmus*?		Borneo, Java, Sumatra, 1882			T 1 spec.
8	*Anomala bicolor*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
9	*Anomala communis*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
10	*Anomala*?	*Anomala* sp.	Borneo, Java, Sumatra, 1882	84		T 1 spec.
11	*Antilochus coqueberti*		Borneo, Java, Sumatra, 1882			T 1 spec.
12	*Aplosonyx albicornis*		Borneo, Java, Sumatra, 1882			T 1 spec.
13	*Apogonia*		Borneo, Java, Sumatra, 1882			T 1 spec.

No crt.	Species donated	Species from actual collections	Collecting places, donation data	Actual no spec.	Coll. no	Bibliographic source and the number of specimens
14	*Aspidomorpha amabilis*		Borneo, Java, Sumatra, 1882			T 1 spec.
15	*Aspidomorpha miliaris*		Borneo, Java, Sumatra, 1882			T 1 spec.
16	*Batocera alba fascsiata*		Borneo, Java, Sumatra, 1882			T 1 spec.
17	*Belonota*?		Borneo, Java, Sumatra, 1882			T 1 spec.
18	*Camaria* spec.?		Borneo, Java, Sumatra, 1882			T 1 spec.
19	*Catarsius sabaeus*	*Catharsius satyrus* Kolbe, 1893	Borneo, Java, Sumatra, 1882	1		T 1 spec.
20	*Chalenius jumbatus*		Borneo, Java, Sumatra, 1882			T 1 spec.
21	*Chalenius* sp.??		Borneo, Java, Sumatra, 1882			T 1 spec.
22	*Chlaenius bimaculatus*		Borneo, Java, Sumatra, 1882			T 1 spec.
23	*Chlaenius javanus*		Borneo, Java, Sumatra, 1882			T 1 spec.
24	*Chlaenius limbatus*		Borneo, Java, Sumatra, 1882			T 1 spec.
25	*Chlaenius* sp.		Borneo, Java, Sumatra, 1882			T 1 spec.
26	*Chrysocoris stockerus*		Borneo, Java, Sumatra, 1882			T 1 spec.
27	*Cicindela aurulenta*		Borneo, Java, Sumatra, 1882			T 1 spec.
28	*Cicindela superba*		Borneo, Java, Sumatra, 1882			T 1 spec.
29	*Cicindela triguttata*		Borneo, Java, Sumatra, 1882			T 1 spec.
30	*Cissitis testaceus*		Borneo, Java, Sumatra, 1882			T 1 spec.
31	*Clytus annularis*		Borneo, Java, Sumatra, 1882			T 1 spec.
32	*Conocephalus differens*		Borneo, Java, Sumatra, 1882			T 1 spec.
33	*Conocephalus*?		Borneo, Java, Sumatra, 1882			T 1 spec.
34	*Copris bucephalus*	*Copris tullius* Olivier, 1789	Borneo, Java, Sumatra, 1882	1		T 1 spec.
35	*Coptocycla scalaris*		Borneo, Java, Sumatra, 1882			T 1 spec.
36	*Coptocycla*?		Borneo, Java, Sumatra, 1882			T 1 spec.
37	*Cuchomena moluccarum*		Borneo, Java, Sumatra, 1882			T 1 spec.
38	*Cybister*?		Borneo, Java, Sumatra, 1882			T 1 spec.
39	*Cyclophthalmus tarandus*		Borneo, Java, Sumatra, 1882			T 1 spec.

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40	*Diatomocephala maculicollis*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
41	*Diatomocephala simplex*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
42	_	*Dundubia* sp.	Borneo, Java, Sumatra, 1882	3	Identified by Duffels	
43	*Epeotes luscus*		Borneo, Java, Sumatra, 1882			T 1 spec.
44	*Epilampra lurida*		Borneo, Java, Sumatra, 1882			T 1 spec.
45	*Episcapha*?		Borneo, Java, Sumatra, 1882			T 1 spec.
46	*Euagoras sannio*		Borneo, Java, Sumatra, 1882			T 1 spec.
47	*Eumorphus convescicollis*		Borneo, Java, Sumatra, 1882			T 1 spec.
48	*Eunectes*?		Borneo, Java, Sumatra, 1882			T 1 spec.
49	*Eumorphus convescicollis*		Borneo, Java, Sumatra, 1882			T 1 spec.
50	*Eunectes*?		Borneo, Java, Sumatra, 1882			T 1 spec.
51	*Figulus?*		Borneo, Java, Sumatra, 1882			T 1 spec.
52	*Glycyphana conspersa*		Borneo, Java, Sumatra, 1882			T 1 spec.
53	*Gryllotalpa africana*		Borneo, Java, Sumatra, 1882			T 1 spec.
54	*Gymnochila*		Borneo, Java, Sumatra, 1882			T 1 spec.
55	_	*Hamza ciliaris* (Linnaeus, 1758)	Borneo, Java, Sumatra, 1882	3	Identified by Duffels	
56	*Hurodula stagmatoptera unimaculata*		Borneo, Java, Sumatra, 1882			T 1 spec.
57	*Languria*?		Borneo, Java, Sumatra, 1882			T 1 spec.
58	*Lepidiota bimaculata*	*Lepidiota maculate* Brencke, 1900	Borneo, Java, Sumatra, 1882	1		T 1 spec.
59	*Lepidiota stigma*	*Lepidiota stigma* (Fabricius, 1798)	Borneo, Java, Sumatra, 1882	1		T 1 spec.
60	*Leucopopholis alba*		Borneo, Java, Sumatra, 1882			T 1 spec.
61	*Luciola testacea*		Borneo, Java, Sumatra, 1882			T 1 spec.
62	*Lygistopterus melanurus*		Borneo, Java, Sumatra, 1882 M&R			T 1 spec.
63	*Macronota monacha*		Borneo, Java, Sumatra, 1882			T 1 spec.
64	*Mantis religiosa*		Borneo, Java, Sumatra, 1882			T 1 spec.

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65	*Mastohilus polyphylus*		Borneo, Java, Sumatra, 1882			T 1 spec.
66	*Mecopodae longata*		Borneo, Java, Sumatra, 1882			T 1 spec.
67	*Melolonta sulcipenis*		Borneo, Java, Sumatra, 1882			T 1 spec.
68	*Myronides pfeifferae*		Borneo, Java, Sumatra, 1882			T 1 spec.
69	*Neocerambyx aurifaber*		Borneo, Java, Sumatra, 1882			T 1 spec.
70	*Nyctobatus impressus*		Borneo, Java, Sumatra, 1882			T 1 spec.
71	*Onthophagus bubalus*		Borneo, Java, Sumatra, 1882			T 1 spec.
72	_	*Orientopsaltria* sp.	Borneo, Java, Sumatra, 1882	3	Identified by Duffels	
73	*Oryctes rhinoceros*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
74	*Orychodes serirostris*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
75	*Panesthia javanica*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
76	*Panesthia morio*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
77	*Parryrhynchus latirostris*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
78	*Passalus bicolor*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
79	*Passalus emarginatus*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
80	*Passalus*?		Borneo, Java, Sumatra, 1882	1		T 1 spec.
81	*Periplaneta rhombifolia*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
82	*Plocaederus fulvicornis*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
83	*Plocaederus fulvicornis*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
84	*Pharopsophus javanus*		Borneo, Java, Sumatra, 1882	1		T 1 spec.
85	*Phloeoborus*?		Borneo, Java, Sumatra, 1882	1		T 1 spec.
86	_	*Platylomia viridimaculata* Distant, 1889	Borneo, Java, Sumatra, 1882	2	Identified by Duffels	
87	_	*Platypleura* sp.	Borneo, Java, Sumatra, 1882	3	Identified by Duffels	
88	_	*Platypleura* sp.	Borneo, Java, Sumatra, 1882	3	Identified by Duffels	
89	*Cicada imperatorium*	*Megapomponia imperatoria* (Westwood, 1842)	Borneo, Java, Sumatra, 1882	2	Identified by Duffels	T 1 spec.

No crt.	Species donated	Species from actual collections	Collecting places, donation data	Actual no spec.	Coll. no	Bibliographic source and the number of specimens
90	*Prionocerus coeruleipennis*		Borneo, Java, Sumatra, 1882			T 1 spec.
91	*Pseudophylus uninotatus*		Borneo, Java, Sumatra, 1882			T 1 spec.
92	*Pussalus emarginatus*		Borneo, Java, Sumatra, 1882			T 1 spec.
93	*Pyrrhocoris coqueberti*		Borneo, Java, Sumatra, 1882			T 1 spec.
94	*Scotaeus corallipes*		Borneo, Java, Sumatra, 1882			T 1 spec.
95	*Serica pruinosa*		Borneo, Java, Sumatra, 1882			T 1 spec.
96	*Serica*?		Borneo, Java, Sumatra, 1882			T 1 spec.
97	*Telephorus*?		Borneo, Java, Sumatra, 1882			T 1 spec.
98	*Temno rhynchus*?		Borneo, Java, Sumatra, 1882			T 1 spec.
99	*Tenodera superstitiosa*		Borneo, Java, Sumatra, 1882			T 1 spec.
100	*Toxicum quadricorne*		Borneo, Java, Sumatra, 1882			T 1 spec.
101	*Triplaloma sexnotata*		Borneo, Java, Sumatra, 1882			T 1 spec.
102	*Trogosita maritanica*		Borneo, Java, Sumatra, 1882			T 1 spec.
103	*Truxalis nasuta*		Borneo, Java, Sumatra, 1882			T 1 spec.
104	*Uloma impressa*		Borneo, Java, Sumatra, 1882			T 1 spec.
105	*Valgus*?		Borneo, Java, Sumatra, 1882			T 1 spec.
106	*Xilotrupes Gideon*	*Xilotrupes gideon* L., 1767	Borneo, Java, Sumatra, 1882	1		T 1 spec.
1	PISCES *Acanthurus bipunctatus*	*Acanthurus nigroris* Vallenciennes, 1835	1895	1	6746/473, ihtio, 33	A 1 spec.
2	*Acanthurus lineatus*	*Acanthurus lineatus* (L., 1758)	Makassar, 1895	1	6746/472, ihtio 2787	A 1 spec.
3	*Aenopterus naritus*		Palembang, 1895			A 1 spec., MR 1 spec.
4	*Amiurus catus*		1882			T 1 spec., A 1 spec., MR spec.
5	*Amphaenthus doliatus*		1895			A 1 spec., MR spec.
6	*Anabas scandens*		Celebes, 1895			A 5 spec.
7	*Anguilla sidat*	*Anguilla sidat* Bleeker, 1852	Muntock, 1895	1	6746/294, ihtio 917	A 1 spec.
8	*Apogon frenatus*	*Apogon frenatus* Valenciennes, 1832	Muntock, 1895	1	6746/294, ihtio 917	A 1 spec.
9	*Ariodes leiocephalus*	*Ariodes leiocephalus* Bleeker, 1858	Oriental Indies, 1882	1	6323, ihtio 2116	A 1 spec.

No crt.	Species donated	Species from actual collections	Collecting places, donation data	Actual no spec.	Coll. no	Bibliographic source and the number of specimens
10	*Bagsarius Buchanani*	*Bagsarius buchanani*	Borneo, 1882	1	6746/152, ihtio 3066	T 1 spec., A 1 spec.
11	*Bagroides melanopterus*	*Bagroides melanopterus* Bleeker, 1852	Borneo, 1882	2	6746/150, ihtio 3047	T 2 spec., A 3 spec.
12	*Balistes lineatus*		Muntock, 1895			A 2 spec.
13	*Balistes verrucosus*	*Rhinecanthus verrucosus*	Muntock, 1895	1	6746/596, ihtio 3075	A 1 spec.
14	*Barbus* sp.		Borneo, Moeara Teweh, 1882			T 1 spec.
15	*Barbus armatus*		Celebes, 1895			MR 1 spec.
16	*Belodonthis maiorchir*	*Belodonthis maiorchir*	Celebes, 1882	2	6746/135, ihtio 2723	A 1 spec.
17	*Belone leiurus*	*Belone leiurus* Bleeker, 1850	Celebes, 1882	1	6746/171, ihtio 1640	A 1 spec., MA 1 spec.
18	*Belone strongylurus*		Muntock, 1882			A 1 spec., MR 1 spec.
19	*Blennius gattorugine*	*Parablennius gattorugine* (L., 1758)	Adriatica, 1882	1	6746/448, ihtio 2907	T 1 spec., A 1 spec.
20	*Blennius ocellaris*		Adriatica, 1882			T 1 spec., A 2 spec.
21	*Boleophthalmus boddaerti*	*Boleophthalmus boddaerti* (Pallas, 1770)	Palembang, 1895	3	6746/522, ihtio 2825	A 3 spec.
22	*Branchiostoma lubricum*		Borneo, Moeara Teweh, 1882			T 6 spec.
23	*Brachiurus panoides*		Palembang, 1895			A 1 spec., MA 1 spec.
24	*Carani carangus*	*Caranx hippos* (L., 1767)	Rio de Janeiro, 1882	1	6746/299, ihtio 3139	T 1 spec., A 1 spec., MA 1 spec.
25	*Carassius auratus*		Neusiedlersee, 1882			A 2 spec.
26	*Chaetodon miliaris*					A 1 spec., MR 1 spec.
27	*Charanx melanopygus*	*Caranx melampygus* Cuvier, 1833	Makassar, 1895	1	6746/296, ihtio 3115	A 1 spec.
28	*Chela macrocheir*		Palembang, 1895			MR 1 spec.
29	*Chelmo rostratus*	*Chelmon rostratus* (Linnaeus, 1758)	Indian Ocean, 1895	1	6477, ihtio 2225	
30	*Cheilinus fasciatus*		Celebes, 1895			A 2 spec., MR 2 spec.
31	*Cheilinus mentalis*	*Cheilinus mentalis* Rüppell, 1828	Red Sea	1	6746/424	
32	*Chirocentrus dorab*	*Chirocentrus dorab* (Forsskål, 1775)	Muntock, 1895	2	6308, ihtio 2126	MR 2 spec.
33	*Chonerhinus modestus*	*Chonerhinos modestus* (Bleeker, 1850)	Borneo, Barito River, Teweh River, 1882	6	6746/614, ihtio 1775, 6746/621, ihtio 2732	T 1 spec., A 6 spec.

No crt.	Species donated	Species from actual collections	Collecting places, donation data	Actual no spec.	Coll. no	Bibliographic source and the number of specimens
34	*Chorinemus sancti*		Palembang, 1882			A 1 spec.
35	*Clarias teysmanni*	*Clarias teysmanni* Bleeker, 1857	Java, 1882	4	6746/156, ihtio 3114	A 4 spec.
36	*Cobitis taenia*		Adriatica, 1882			T 3 spec.
37	*Cryptopterus palembangensis*	*Kryptopterus palembangensis* (Bleeker, 1852)	Borneo, Barito River, Teweh River, 1882	3	6746/136, ihtio 928	T 1 spec., A 3 spec.
38	*Dactyloperus orientalis*	*Dactyloperus orientalis* Cuvier, 1829	Celebes, 1895	1	6746/556, ihtio 747	A 1 spec.
39	*Dangila fasciata*	*Labiobarbus fasciatus* (Bleeker, 1853)	Borneo Barito River, Teweh River, 1882	2	6746/116, ihtio 929	T 1 spec., A 2 spec.
40	*Datnioides quadrifasciatus*	*Datnioides quadrifasciatus* (Sevastianof, 1809)	Palembang, 1895	1	6746/316, ihtio 3082	A 1 spec., MA 1 spec.
41	*Dorosoma nasus*	*Dorosoma nasus* (Bloch, 1795)	Celebes, 1895	1	6746/83, ihtio 2840	A 1 spec.
42	*Drepane punctata*	*Drepane punctata* (L., 1758)	Muntock, 1895	1	6746/367, ihtio 2904	A 2 spec.
	Drepane punctata	*Drepane punctata* (L., 1758)	Makassar, 1895	2	6746/368, ihtio 2833	A 2 spec.
43	*Echeneis remora*	*Remora remora* (Linnaeus, 1758)	Muntock, 1895	1	6746/591	MR 1 spec.
44	*Eleotris melanosoma*	*Eleotris melanosoma* Bleeker, 1852	Muntock, 1895	1	6385	A 1 spec., MR 1 spec.
45	*Epalzeorhynchus callopterus*		Borneo, Barito River, Teweh River, 1882			T 1 spec., A 1 spec.
46	*Fistularia serrata*		Sumatra, 1895			A 1 spec., MR 1 spec.
47	*Gastrotokeus biaculeatus*		Sumatra, 1895			A 14 spec., MR 14 spec.
48	*Gerres rhombeus*	*Gerres rhombeus* Cuvier, 1829	Bahia, 1882	2	6746/319, ihtio 823	A 2 spec.
49	*Glyphiodon* sp.	*Glyphiodon* sp.	Palembang, 1895	2	6746/400, ihtio 2799	A 1 spec.
50	*Gobius exanthematosus*		Adriatica, 1882			T 1 spec.
51	*Gobius giuris*	*Gobius giuris* Hamilton, 1822	Celebes, 1895	2	6746/512, ihtio 3097, 91, 6746/514, ihtio 753	A 2 spec.
	Gobius giuris	*Gobius giuris* Hamilton, 1822	Makassar, 1895	1	6746/515, ihtio 3138	A 1 spec.
52	*Gobius ophiocephalus*	*Zosterisess orophiocephalus* (Pallas, 1814)	Adriatica, 1882	1	6746/505, ihtio 757	T 1 spec., A1 spec.

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53	*Grammistes orientalis*	*Grammistes orientalis* Bloch & Schneider, 1801	Muntock, 1895	1	6746/287, ihtio 3099	A 1 spec.
54	*Haplochilus panchax*	*Haplochilus panchax* (Hamilton, 1822)	Indonesia, 1895?	2	6746/220, ihtio 2846	
55	*Helostoma temmincki*	*Helostoma temmincki* Cuvier, 1829	Palembang, 1895	1	6411	A 3 spec.
	Helostoma temmincki		Celebes, 1895			A 4 spec., MR 4 spec.
	Helostoma temmincki		Palembang, 1895			MR 4 spec.
56	*Hemibagrusnemurus*		Borneo, Barito River, Teweh River, 1882			T 1 spec., A 1 spec.
57	*Hemigymnus melapterus*	*Hemigymnus melapterus* (Bloch, 1791)	Indonesia, 1895	1	6746/428, ihtio 1972	A 1 spec.
58	*Hemiramphus commersoni*	*Hemiramphus far* (Forsskål, 1775)	Makassar, 1895	2	6362	A 2 spec.
	Hemiramphus commersoni		Palembang, 1895			A 1 spec.
59	*Hemiramphus unifasciatus*		Muntock, 1895			A 1 spec., MR 1 spec.
60	*Holocentrum rubrum*		Makassar, 1895			A 2 spec., MR 2 spec.
61	*Johnius fulviflamma*		Palembang, 1895			A 1 spec., MR 1 spec.
62	*Julis dupereyi*	*Coris julis* (Linnaeus, 1758)	Mediterrana, 1882	2	6746/412, ihtio 3158	A 2 spec., MR 1 spec.
63	*Lais hexanema*	*Lais hexanema* (Bleeker, 1852)	Borneo, Moeara Teweh, 1882	1	6746/154, ihtio 2976	T 1 spec.
64	*Leptobarbus hoevenii*		Celebes			A 1 spec.
	Leptoscarus coeruleopunctatus		Makassar			MR 1 spec.
65	*Lutianus chrysotaenia*		Indo-Malayan Archipelago			A 1 spec., MR 1 spec.
66	*Lutjanus fulvitanna*		Makassar, 1895			A 1 spec.
67	*Macrones nigriceps*	*Macrones nigriceps* Peters, 1868	Palembang, 1895	1	6746/142, ihtio 1794	A 2 spec., MR 1 spec.
	Macrones nigriceps	*Macrones nigriceps,* Peters, 1868	Sumatra, 1895	3	6746/141, ihtio 3117	A 1 spec.
68	*Mandus marmoratus*		1895?			A 2 spec., MR 1 spec.
69	*Mastacembelus erythrotenia*		Palembang, 1895			A 1 spec., MR 1 spec.
70	*Mastacembalus pancalus*		1895			A 1 spec.,
71	*Mastacembalus unicolor*	*Mastacembalus unicolor* Cuvier in Cuvier and Valenciennes, 1832	Palembang, 1895	1	6746/586, ihtio 2666	A 1 spec., MR 1 spec.
72	*Mecopterus modestus*		Muntock, 1895			A 1 spec.,

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73	*Megalops cyprinoides*		Palembang, 1895			A 1 spec.,
74	*Mesoprion erythropterus*	*Lutjanus erythropterus* Bloch, 1790	Makassar, 1895	1	6746, ihtio 2174	T 1 spec.,
75	*Mesoprion uninotatus*		Bahia, 1882			T 1 spec.,
76	*Monopteros javanensis*		Sumatra, 1895			MR 1 spec.
	Monopteros javanensis		Java, 1895			MR 1 spec.
77	*Moronopsis ciliatus*		Muntock, 1895			A 1 spec.,
78	*Muraenesox cinereus*	*Muraenesox cinerius* (Forskål, 1775)	Muntock, 1895	1	6333, ihtio 2136	A 1 spec., MR 1 spec.
79	*Nardus marmoratus*	*Nandus marmoratus* Valenciennes, 1831	Indonesia, Palembang, 1895	2	6746/377, ihtio 2667	MR 1 spec.
80	*Notopterus kopirat*		Palembang, 1895			A 4 spec., MR 1 spec.
81	*Oblata melanura*	*Oblata melanura* (Linnaeus, 1758)	Adriatica, 1882	1	6746/347, ihtio 3073	T 1 spec.
82	*Ophiocephalus gachua*	*Ophiocephalus gachua* Hamilton, 1822	Palembang, 1895	1	6746/258	A 1 spec.
	Ophiocephalus gachua	*Ophiocephalus gachua* Hamilton, 1822	Celebes	1	6746/257, ihtio 3093	MR 1 spec.
	Ophiocephalus gachua	*Ophiocephalus gachua* Hamilton, 1822	Makassar, 1895	2	6746/630, ihtio 2662	MR 1 spec.
83	*Ophiocephalus micropeltis*		Sumatra, 1895			A 4 spec., MR 4 spec.
84	*Ophiocephalus pleurophthalmus*		Palembang, 1895			A 1 spec., MR 1 spec.
85	*Ophiocephalus punctatus*		1895			A 2 spec.
86	*Ophiocephalus striatus*	*Channa striata* (Bloch, 1793)	1895			A 2 spec.
	Ophiocephalus striatus		Sunda Islands, 1895			A 1 spec.
	Ophiocephalus striatus		Palembang, 1895			A 1 spec., MR 1 spec.
87	*Osphronemus olfax*		Celebes, 1895			A 1 spec., MR 1 spec.
	Osphronemus olfax	*Osphronemus goramy* Lacepède, 1801	Muntock, 1895	3	6746/492, ihtio 767	A 3 spec.
	Osphronemus olfax		Palembang, 1895			A 1 spec., MR 1 spec.
88	*Osphronemus trichopterus*		Java, 1895			A 6 spec., MR 6 spec.
	Osphronemus trichopterus	*Trichopodus trichopterus* (Pallas, 1770)	Palembang, 1895	2	6746/496, 497	A 6 spec., MR 2 spec.
89	*Osteochilus sp.*		Borneo, Barito River, Teweh River, 1882			T 1 spec.
90	*Oxycheilinus mentalis*	*Oxycheilinus mentalis* (Rüppell, 1828).	Red Sea, 1882	1	6746/42, ihtio 2795	
91	*Plataxteira*	*Plataxteira* (Forsskål, 1775)	Makassar, 1895	1	6442	A 1 spec.

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92	*Platax vespertilio*	*Platax vespertilio* (Bloch, 1787)	Makassar, 1895	3	6746/366, ihtio 2607	A 3 spec.
93	*Platycephalus insidiator*	*Platycephalus insidiator* (Forsskål, 1775)	Palembang, 1882	2	6422	A 2 spec.
94	*Plotosus arab*	*Plotosus lineatus* (Thunberg, 1787)	Celebes, 1895	5	6746/129, ihtio 3167	MR 2 spec., MA 2 spec.
	Plotosus arab	*Plotosus lineatus* (Thunberg, 1787)	Celebes, 1895	1	6746/128, ihtio 2992	A 1 spec., MR 2 spec.
	Plotosus arab		Muntock, 1895			A 5 spec.
95	*Plotosus canius*		Muntock, 1882			MR 1 spec.
96	*Pneumatophorus colias*		Adriatica			MR 1 spec.
97	*Polynemus paradiseus*	*Polynemus paradiseus* L., 1758	Borneo, Barito River, Teweh River, 1882	3	6746/249, ihtio 3145	T 3 spec., M 1 spec., A 4 spec., MA 1 spec.
98	*Polynemus sextarius*		Sumatra, 1895			A 2 spec., MR 1 spec.
99	*Polypterus senegal*		Nil, 1895			T 1 spec., A 1 spec.
100	*Potia hymenophyxi*	*Botia hymenophyxi*	Borneo, Barito River, Teweh River, 1882			T 7 spec., M 1 spec., A 6 spec.
101	*Potia macracanthus*	*Botia macracanthus*	Palembang, 1895			M 1 spec., A 7 spec.
	Potiama cracanthus	*Botia macracanthus*	Borneo, 1882			T 7 spec., M 9 spec., A 1 spec.
102	*Protopterus aethiopicus*	*Protopterus aethiopicus* Heckel, 1851	Nil, 1882	1	6746/65, ihtio 2827	A 1 spec., MR 1 spec.
103	*Protopterus annectens*	*Protopterus annectens* (Owen, 1839)	Nil, 1882	1	6746/64, ihtio 758	T 1 spec., A 1 spec.
104	*Psettodes erumei*		Muntock, 1895			A 1 spec.
105	*Pseudocarus aeruginosus*		Muntock, 1895			A 1 spec.
106	*Saurus bicolor*		Borneo, Moeara Teweh, 1882			T 1 spec.
107	*Scarichthys ceruleopunctata*		Celebes, 1895			A 1 spec.
108	*Scatophagus argus*		China Sea, 1882			A 1 spec.
	Scatophagus argus	*Scatophagus argus* L., 1776	Muntock, 1895	1	6746/369, ihtio 2870	A 1 spec.
109	*Serranus scriba*		Adriatica, 1882			T 1 spec., MR 1 spec.
110	*Serranus taurina*		Makassar, 1895			A 1 spec., MR 1 spec.
111	*Scomber colias*		Adriatica, 1882			T 1 spec., A 1 spec.
112	*Taeniura lymna*	*Taeniura lymna* (Forsskål, 1775)	Palembang, 1895	1	6746/49, ihtio 2565	A 2 spec.

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113	*Tetrodon fluviatilis*	*Dichotomyctere fluviatilis* (Hamilton, 1822)	Muntock, 1895	1	6746/610, ihtio 2744	MR 1 spec.
114	*Tetrodonhispidus*		Makassar, 1895			A 1 spec., MR 1 spec.
115	*Tetrodon lunaris*	*Tetrodon lunaris* Bloch & Schneider, 1801	Boenlel-Pasang, 1895	1	6746/601, ihtio 810	A 1 spec., MA 1 spec.
116	*Tetrodon oblongus*	*Tetraodon oblongus* (Bloch, 1786)	Palembang, 1895	1	6746/605, ihtio 2562	A 1 spec.,
	Tetrodon oblongus	*Tetraodon oblongus* (Bloch, 1786)	Palembang, 1895	1	6746/604, ihtio 2783	MR 2 spec.
117	*Tetrodon palembangensis*	*Tetraodon palembangensis* Bleeker, 1852	Borneo, Barito River, Teweh River, 1882	1	6746/611, ihtio 2896	T 1 spec., A 1 spec.
118	*Tetrodon patoca*	*Tetrodon patoca* Hamilton, 1822	Indonesia, 1895	1	6746/609, ihtio 839	A 1 spec.,
119	*Therapon theraps*	*Therapon theraps* Cuvier, 1829	Indonesia, 1895 A,	2	6746/290, ihtio 916	A 2 spec.
120	*Toxotes microlepis*		Palembang, 1895			A 1 spec.,
121	*Triacanthus biaculeatus*		Celebes, 1895			MR 1 spec.
	Triacanthus biaculeatus		Malayan Archipelago, 1895			MR 1 spec.
122	*Trichogaster fasciatus*		Java, 1895			A 1 spec.,
123	*Trichopus trichopterus*		Java, 1895			A 1 spec., MR 1 spec.
124	*Upeneus multifasciatus*	*Mullus multifasciatus* Quoy & Gaimard, 1825	Sumatra, 1895	1	6746/359, ihtio 3009	MR 1 spec.
125	*Upeneus tragula*	*Upeneus tragula* Richardson, 1846	Makassar, 1895	1	6746/360, ihtio 2895	A 1 spec., MR 1 spec.
126	*Zamenis florulentus*		Egypt, 1882			T 1 spec., A 1 spec., MR 1 spec.
127	*Zeus faber*	*Zeus faber* Linnaeus, 1758	Adriatica, 1882	1	6746/230, ihtio 2664	T 1 spec., A 1 spec., MR 1 spec.
1	AMPHIBIA *Bufo melanostictus*	*Duttaphrynus melanostictus* (Schneider, 1799)	Borneo, 1882	1	7280/30	T 1 spec., A 1 spec., MR 1 spec.
	Bufo melanostictus		Java, Sumatra, 1882			A 1 spec., MR 20 spec.
	Bufo melanostictus	*Duttaphrynus melanostictus* (Schneider, 1799)	Makassar, 1895	2	7280/32	A 2 spec., MR 2 spec.
2	*Bufo viridis*	*Bufo viridis* Laurenti, 1768	Travic, Bosnia, 1895?	1	7282	MR 2 spec.
1	REPTILIA *Ameiurus catus*		Massachusetts, 1882			A 2 spec.
2	*Amphierma flavipes*		Borneo, 1882			A 1 spec.,
3	*Amphierma subminiatum*		Java, 1882			A 2 spec.

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4	*Bronchocela cristatella*	*Bronchocela cristatella* (Kuhl, 1820)	Borneo, Moeara Teweh, Java, 1882	1	6834	T 2 spec., MR 1 spec., MA 1 spec.
5	*Bronchocela sp.*		Palembang, 1882			T 1 spec.
6	*Bronchocela jubatus*		Java, 1895			MR 1 spec.
	Bronchocela jubatus		Makassar, 1895			MR 1 spec., MA 2 spec.
	Bronchocela jubatus		Palembang, 1895			
7	*Bungarus semifasciatus*		Borneo, Moeara Teweh, Java, 1882			T 1 spec., MR 1 spec.
	Bungarus semifasciatus		Java, Sumatra, 1882 A,			T 3 spec.
	Bungarus semifasciatus		Palembang, 1895			MR 1 spec.
8	*Calamaria Gervaisii*		Java, Sumatra, 1882			T 1 spec., MR 1 spec.
9	*Callophis intestinalis*	*Calliophis intestinalis* (Laurenti, 1768)	Borneo, Moeara Teweh, 1882	1	7004	
10	*Cerberus rhynchops*		Celebes, 1895			T 1 spec., MR 2 spec.
11	*Coluber florulentus*	*Platyceps florulentus* (Geoffroy-St-Hilaire, 1827)	Egypt, 1882	1	69M	
12	*Compsosoma melanurum*		Borneo, Moeara Teweh, 1882			T 5 spec., MR 1 spec.
13	*Crysopelea ornate* var. *fasciata*	*Chrysopelea ornata* (Shaw, 1802)	Borneo, Moeara Teweh, 1882	3	7280/334, 6924	T 4 spec., MA 1 spec.
14	*Cylindrophis rufa*		Borneo, Moeara Teweh, 1882			T 1 spec., A 1 spec., MR 1 spec.
15	*Dendrophis caudolineata*	*Dendrelaphis caudolineatus* Gray, 1834	Borneo, 1882	1	6933	T 5 spec., A 5 spec., MR 5 spec.
16	*Dendrophis formosa*		Borneo, Moeara Teweh, 1882			T 1 spec., MR 1 spec.
17	*Dendrophis pictus*		Celebes, 1895			MR 4 spec.
18	*Dendrophis pictus*		Makassar, 1895			A 1 spec., MR 1 spec.
	Dendrophis pictus		Java, 1882			A 1 spec., MR 1 spec., MA 1 spec.
	Dendrophis pictus		Borneo, 1882			T 6 spec., MR 3 spec.
	Dendrophis pictus		Sumatra, 1882			A 1 spec., MR 1 spec.

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19	*Dipsas dendrophila*		Borneo, Moeara Teweh, 1882			T 1 spec., A 1 spec., MR 1 spec.
20	*Dipsas multimaculata*		Java, Sumatra			MR 2 spec.
21	*Draco volans*		Java, 1882			T 1 spec., A 6 spec.
22	*Draco prasinus*		Borneo, Moeara Teweh, Java, 1882			T 6 spec., A 6 spec.
23	*Gavialis schlegeli*	*Tomistoma schlegelii* (Müller, 1838)	Borneo, Moeara Teweh, 1882	1	7093	T 2 spec., A 1 spec., MR 1 spec.
24	*Geko guttatus*	*Ptyodactylus guttatus* Heyden, 1827	Java	1	6812	T 4 spec., A 3 spec.
	Geko guttatus	*Ptyodactylus guttatus* Heyden, 1827	Borneo, Java	2	7280/106	T 4 spec.
25	*Geko monarchus*		Borneo, Java			T 4 spec., MR 1 spec.
26	*Gecko stentor*	*Gekko smithii* Gray, 1842	Borneo	1	7280/113	T 2 spec., MR 1 spec.
27	*Gecko verticilatus*		Palembang, 1882			MR 1 spec.
	Gecko verticilatus		Borneo			MR 2 spec.
	Gecko verticilatus		Java			MA 1 spec.
28	*Gecko vittatus*	*Gecko vittatus* Houttuyn, 1782	Palembang, 1882	1	7280/217	MR 1 spec.
29	*Goniosoma oxycephalum*		Java, 1882			T 1 spec., MR 1 spec.
	Goniosoma oxycephalum		Palembang, 1882			MR 1 spec.
	Goniosoma oxycephalum		Borneo, Moeara Teweh, 1882			T 2 spec.
30	*Hemidactylus cocteai*	*Chioninia coctei* (Duméril & Bibron, 1839)	Java, 1882	1	6818	T 1 spec., MR 1 spec.
31	*Hemidactylus frenatus*		Java, 1882			T 2 spec., A 2 spec., MR 2 spec.
32	*Homalopsis buccatus*		Borneo, Moeara Teweh, 1882			A 1 spec., MR 1 spec.
	Homalopsis buccatus		Sumatra, 1882			T 2 spec., A 3 spec., MR 1 spec.
33	*Hydrosaurus salvator*		Borneo, 1882			T 10 spec., A 4 spec., MR 4 spec.
34	*Hypsyrhin aenhydris*	*Enhydris enhydris* (Schneider, 1799)	Borneo, Moeara Teweh, 1882		6999	T 1 spec., MR 1 spec.
	Hypsyrhina enhydris		Java, 1882			A 1 spec.

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35	*Langaha nasuta*	*Langaha madagascariensis* Bonnaterre, 1790	Borneo, 1895	1	6987	MA 1 spec.
36	*Lycodonaulicum* sp.		Borneo, Moeara Teweh, 1882			T 1 spec., MR 1 spec.
37	*Naja tripudians*		Palembang, 1882			MR 1 spec.
	Naja tripudians		Borneo, Moeara Teweh, Java, 1882			T 1 spec.
38	*Ptyas korros*		Java, Sumatra			MR 1 spec.
39	*Python reticulatus*		Borneo, Moeara Teweh, 1882			T 1 spec., A 1 spec., MR 1 spec.
40	*Tachydromus sexlineatus*		Java, 1895			T 1 spec., MR 1 spec.
41	*Tiliqua rufesiens*		Java, 1882			T 1 spec., MR 1 spec.
42	*Tragops prasinus*		Borneo, 1882			A 5 spec.
	Tragops prasinus		Sumatra, 1882			A 2 spec., MR 1 spec.
43	*Tropidonotus flaviceps*		Borneo, Moeara Teweh, 1882			T 1 spec., MR 1 spec.
44	*Tropidonotus piscator*		Java, 1882			MR 1 spec.
45	*Tropidonotus quincunciatus*	*Xenochrophis piscator* (Schneider, 1799)	Java, Sumatra, 1882	1	6944	A 1 spec.
46	*Tropidonotus subminiatus*		Borneo, Moeara Teweh, Java, 1882			T 1 spec.
	Tropidonotus subminiatus		Java, 1882			T 1 spec., A 1 spec.
47	*Tropidonotus trianguligerus*		Java, Sumatra, 1882			A 1 spec., MR 1 spec.
48	*Tropidonotus vittatus*		Java, Sumatra, 1882			A 3 spec., MR 3 spec.
49	*Tysiphone rhodostoma*		Java, 1882			A 1 spec., MR 1 spec.
50	*Varanus indicus*		Sumatra, 1882			A 1 spec., MR 1 spec., MA 1 spec.
51	*Xenopeltis unicolor*	*Xenopeltis unicolor* Reinwardt, 1827	Sumatra, 1882	1	6895	T 1 spec.
52	*Zoacys fuscus*		Borneo, Moeara Teweh, Java, 1882			T 6 spec., A 1 spec., MR 1 spec.
1	AVES *Aethopyga flavirostrata*		Borneo, 1895			T 1 spec.
2	*Alcedo meninting*	*Alcedo meninting* Horsfield, 1821	Borneo, 1882	1	3989	T 1 spec., A 1 spec., MR 1 spec.

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3	*Alophonerpe sguturalis*		Borneo, 1882			T 1 spec.
4	*Amauroronis phoenicurus*	*Amauroronis phoenicurus* (Pennant, 1769)	Borneo, 1882	1	3772	T 1 spec.
5	*Calornis chalybea*	*Aplonis panayensis* (Scopoli, 1786)	Borneo, 1882	3	4514, 4515, 4125	T 1 spec.
	Calornis chalybea	*Aplonis panayensis* (Scopoli, 1786)	Sumatra, 1882	3	4514, 4515, 4125	T 1 spec.
6	*Arachnothera longirostris*		Borneo, 1882			T 1 spec.
7	*Ardea macesis*		Borneo, 1882			T 1 spec.
8	*Ardea ruficapilla*		Borneo, 1882			T 1 spec.
9	*Bubo sumatranus orientalis*		Borneo, 1882			T 1 spec., M 1 spec.
10	*Buceros anthracicus*	*Anthracoceros malayanus* (Raffles, 1822)	Borneo, 1882	1	6128	T 1 spec., A 1 spec.
11	*Buceros convexus*	*Anthracoceros albirostris* (Shaw, 1808)	Borneo, 1882	1	4000	T 1 spec., A 1 spec., MA 1 spec.
12	*Buceros pica*	*Anthracoceros albirostris* (Shaw, 1808)	Borneo, 1882	1	3998	T 1 spec., A 1 spec., MR 1 spec. MA 1 spec.
13	*Caloenas nicobarica* Gray	*Caloenas nicobarica* (Linnaeus, 1758)	New Guinea	1	3763	
14	*Calyptonema viridis*	*Calyptonema viridis* Raffles, 1822	Borneo, 1882	2	4175/1–2	MR 2 spec.
15	*Centropus bengalensis*	*Centropus bengalensis* (Gmelin, 1788)	Borneo, 1882	1	4507	T 1 spec.
16	*Centropus lepidus*	*Centropus bengalensis* (Gmelin, 1788)	Borneo, 1882	1	4507	T 1 spec., A 1 spec., MR 1 spec
17	*Centropus eurycercus*	*Centropus sinensis* (Stephens, 1815)	Borneo, 1882	2	4031/1–2	T 1 spec.
18	*Chloropicus miniatus*	*Picus mineaceus* Pennant, 1769	Borneo, 1882	1	3904	T 1 spec., A 1 spec., MR 1 spec
19	*Charadrius pluvialis*		Borneo, 1882			T 1 spec.
20	*Chloropsis sonnerati*	*Chloropsis sonnerati* Jardine & Selby, 1827	Borneo, 1882	1	4154	T 1 spec.
21	*Copsichus macrouros*		Borneo, 1882			T 1 spec.
22	*Cincinnurus regius*	*Cicinnurus regius* (Linnaeus, 1758)	New Guinea, 1894?	1	4271 ♂ad	A 1 spec., MR 1 spec, MA 1 spec.
23	*Copsichus* sp.		Borneo, 1882			T 1 spec.
24	*Coturnix coturnix*		Borneo, 1882			T 1 spec.
25	*Cuculus fugax*		Borneo, 1882			T 1 spec.
26	*Cyornis tickelliae*	*Cyornis tickelliae* Blyth, 1843	Borneo, 1882	1	4227	T 1 spec.
27	*Cymbirhynchus macrorhynchos*	*Cymbirhynchus macrorhynchos* (Gmelin, 1788)	Borneo, 1882	1	4174	T 1 spec.
28	*Diphyllodes magnificus*	*Cicinnurus magnificus* (Pennant, 1781)	Dewata, Elok -New Guinea, New Guinea, 1894?	2	4273, 4274	A 2 spec., MR 1 spec, MA 1 spec.
29	*Dicaeum percussum*		Borneo, 1882			T 1 spec.
30	*Dissemurus brachyphorus*		Borneo, 1882			T 1 spec.

No crt.	Species donated	Species from actual collections	Collecting places, donation data	Actual no spec.	Coll. no	Bibliographic source and the number of specimens
31	*Dicrurus pectoralis*		Borneo, 1882			T 1 spec.
32	*Dicruru shottentottus*	*Dicrurus hottentottus* (Linnaeus, 1766)	Borneo, 1882	1	4157	T 1 spec.
33	*Drepanornis magnifica*					MA 1 spec.
34	*Ducula rubricera*		New Guinea, 1894?			MR 1 spec.
35	*Epimachus magnus*	*Epimachus meyeri* Finsch, 1885	New Guinea, 1894?	1	4292 ♂ad	
36	*Eudynamis scolopacea*	*Eudynamis scolopacea* (Linnaeus, 1758)	Borneo, 1882	1	4942	T 1 spec.
37	*Eulabes dumonti*	*Mino dumontii* Lesson 1827	New Guinea, 1894?	1	4118	A 1 spec., MR 1 spec., MA 1 spec.
38	*Eurylaimus ochromalus*		Borneo, 1882			T 1 spec.
39	*Eurylaimus javanicus*		Borneo, 1882			T 1 spec.
40	*Eurystomus orientalis*	*Eurystomus orientalis* (Linnaeus, 1766)	Borneo, 1882	2	3977/1–2	T 1 spec., A 1 spec., MR 1 spec., MA 1 spec.
41	*Falcinellus magnus*	*Epimachus meyeri* Finsch, 1885	New Guinea, 1894?	2	4290 ♂ad, 4292 ♂ad	T 1 spec.
42	*Gallinula phoenicura*		Borneo, 1882			T 1 spec.
43	*Gallinago megala*		Borneo, 1882			T 1 spec.
44	*Gallinula euryzona*		Borneo, 1882			T 1 spec., M 1 spec.
45	*Geronticus papillatus*		Borneo, 1882			T 1 spec.
46	*Glareola orientalis*		Borneo, 1882			T 1 spec.
47	*Goura coronata*	*Goura victoria* (Fraser, 1844)	New Guinea, 1894?	2	3762 ♂ ♀	A 2 spec., MR 2 spec., MA 1 spec.
48	*Gracula javana*	*Gracula religiosa* Linnaeus, 1758	Borneo, 1882	3	4118 ♂ad	T 1 spec., A 1 spec., MR 1 spec.
49	*Halcyon atricapilla*		Borneo, 1882			T 1 spec.
50	*Halcyon javana*	*Pelargopsis capensis* (L., 1766)	Borneo, 1882	2	4023, 4024	T 1 spec., A 2 spec., MR 2 spec., MA 1 spec.
51	*Harpactes duvaucelli*	*Harpactes duvaucelli* (Temminck, 1824)	Borneo, 1882	1	6133	T 1 spec., A 1 spec., MR 1 spec.
52	*Irena turcosa*	*Irena puella* (Latham, 1790)	Borneo, 1882	1	4209	T 1 spec., A 1 spec., MR 1 spec.
53	*Ketupa javanensis*	*Ketupa ketupu* (Horsfield, 1821)	Borneo, 1882	2	4086	T 1 spec., A 1 spec., MR 1 spec., MA 1 spec.
54	*Lophorina superba*	*Lophorina superba* (Pennant) 1781	New Guinea, 1894?	1	4284 ♀, ♂ad., 4285 ♂ad	A 1 spec., MR 1 spec., MA 1 spec.

No crt.	Species donated	Species from actual collections	Collecting places, donation data	Actual no spec.	Coll. no	Bibliographic source and the number of specimens
55	*Lophura ignita*	*Lophura ignita* (Shaw, 1798)	Borneo, 1882	1	3703/1	T 1 spec.
56	*Megalaima versicolor*	*Megalaima rafflesii* (Lesson, 1839)	Borneo, 1882	1	3964	T 1 spec., A 1 spec., MR 1 spec.
57	*Megalaima mystacophanes*	*Megalaima mystacophanos* (Temminck, 1824)	Borneo, 1882	1	3960	T 1 spec.
58	*Merops viridis*	*Merops viridis* Linnaeus, 1758	Borneo, 1882	1	3980	T 1 spec.
59	*Micronysus soloensis*		Borneo, 1882			T 1 spec.
60	*Megalorhynchus fuliginosus*		Borneo, 1882			T 1 spec.
61	*Meiglyptes tristis*	Meiglyptes tristis	Borneo, 1882	1	3897	T 1 spec.
62	*Meiglyptes brunneus*		Borneo, 1882			T 1 spec.
63	*Nycticorax caledonicus*	*Egretta sacra* (Gmelin, 1789)	New Guinea, 1894?	1	3656	A 1 spec., MR 1 spec.
64	*Nyctiornis amictus*		Borneo, 1882			T 1 spec.,
65	*Nyctiornis athertonii*		Borneo, 1882			T 1 spec.,
66	*Palaeornis malaccensis*		Borneo, 1882			T 1 spec.,
67	*Paradisea apoda*	*Paradisaea minor* Shaw 1809	New Guinea, 1894?	1	4291	A 1 spec., MR 1 spec., MA 1 spec.
68	*Paradisea apoda* L.	*Paradisaea apoda* Linnaeus, 1758	New Guinea, 1894?	1	4288 ♂ad	A 1 spec., MR 1 spec.
69	*Paradisea apoda novaeguinee* Alt. et Shw.	*Philemon buceroides* (Swainson, 1838)	New Guinea, 1894?	1	4289 ♀ ad	
70	*Paradisea augustaevictoriae*	*Paradisaea raggiana augustaevictoriae*	New Guinea, 1894?	1	4286	MR 1 spec., MA 1 spec.
71	*Parotia risopennis*	*Parotia sefilata* (Pennant, 1781)	New Guinea, 1894?	1		
72	*Parotia sefilata*	*Parotia sefilata* (Pennant, 1781)	New Guinea, Mt. Arfak, 1895?	1	4269, 4270	A 1 spec., MR 1 spec., MA 1 spec.
73	*Phaenicophaeus chlorophaeus*	*Phaenicophaeus chlorophaeus* (Raffles, 1822)	Borneo, 1882	1	3945	A 1 spec., MR 1 spec.
74	*Phaenicophaeus diardi*	*Phaenicophaeus diardi* (Lesson, 1830)	Borneo, 1882	1	3939	A 1 spec., MR 1 spec.
75	*Phaenicophaeus viridirufus*	*Phaenicophaeus curvirostris* (Shaw, 1810)	Borneo, 1882	1	3932	A 1 spec., MR 1 spec.
76	*Phaiopicus badius*		Borneo, 1882			T 1 spec.,
77	*Phaiopicus miniatus*		Borneo, 1882			T 1 spec.,
78	*Phyllornis malabaricus*	*Copsychus malabaricus* (Scopoli, 1786)	Borneo, 1882	1	4508	T 1 spec.
79	*Phaiopicus tristis*	*Meiglyptes tristis* (Horsfield, 1821)	Borneo, 1882	1	3897	T 1 spec., A 1 spec., MR 1 spec.
80	*Picu smineaceus*	*Picus mineaceus* Pennant, 1769	Borneo, 1882	1	3904	T 1 spec.
81	*Picus mentalis*		Borneo, 1882			T 1 spec.

No crt.	Species donated	Species from actual collections	Collecting places, donation data	Actual no spec.	Coll. no	Bibliographic source and the number of specimens
82	*Pitta atricapilla*	*Pitta sordida* (Muller, PLS, 1776)	Borneo, 1882	1	4113/1–3	T 1 spec., A 2 spec., MR 3 spec.
83	*Pitta sordida*	*Pitta sordida* (Muller, PLS, 1776)	Borneo, 1882	3	4133/1–3	T 1 spec.
84	*Ptilonotus jambu*		Borneo, 1882			T 1 spec.
85	*Ptilorchis magnifica*					MA 1 spec.
86	*Rhynorta chlorophea*	*Phaenicophaeus chlorophaeus* (Raffles, 1822)	Borneo, 1882	1	3945	T 1 spec.
87	*Rollulus coronatus*		Borneo, 1882			T 1 spec.
88	*Schlegelia wilsoni*	*Cicinnurus respublica* (Bonaparte, 1850)	New Guinea, 1894?	1	4278 ♂ ad	A 2 spec., MR 3 spec., MA 1 spec.
89	*Seleucides ignotus*	*Seleucidis melanoleuca* (Daudin,1800)	New Guinea, 1894?	1	4267	A 1 spec., MR 1 spec.
90	*Semioptera wallacei* Gray	*Semioptera wallacii* Gould, 1859	New Guinea, Batjan Isl., 1894?	2	4282, 4283	A 2 spec., MR 1 spec.
91	*Spizaetus alboniger*		Borneo, 1882			T 1 spec., M 1 spec.
92	*Spizaetus caligatus*		Borneo, 1882			T 1 spec., M 1 spec.
93	*Spizaetus limnaetus*		Borneo, 1882			T 1 spec., M 1 spec.
94	*Tanysiptera dea*	*Tanysiptera dea*	Borneo, 1882	2	3994, 3995	T 1 spec., A 1 spec., MR 2 spec., MA 1 spec.
95	*Tchitra paradisi*	*Terpsiphone paradisi* (L., 1758)	Borneo, 1882	2	4231, 4232	T 1 spec., A 1 spec., MR 2 spec., MA 1 spec.
96	*Tetanus glareola*		Borneo, 1882			T 1 spec.
97	*Timalia grisea*	*Stachyris nigricollis* (Temminck, 1836)	Borneo, 1882	1	4131	T 1 spec., A 1 spec., MR 2 spec., MA 1 spec.
98	*Treron aromatica*		Borneo, 1882			T 1 spec.
99	*Treron chloroptera*		Borneo, 1882			T 1 spec.
100	*Treron capellei*		Borneo, 1882			T 1 spec.
101	*Tringa brevirostris*		Borneo, 1882			T 1 spec.
102	*Xylolepes validus*		Borneo, 1882			T 1 spec.
103	*Zanclostomus diardii*	*Zanclostomus javanicus* (Horsfield, 1821)	Borneo, 1882	1	3939	T 1 spec., A 1 spec., MR 1 spec.,
1	MAMMALIA *Cheiromeles torquatus*		Borneo, Moeara Teweh, 1882			T 1 spec.
2	*Echinosorex gymnurus*	*Echinosorex gymnura* (Raffles, 1822)	Borneo, 1882	1	MAM 158/2146	M 1 spec., MR 1 spec.,
3	*Elephas indicus* tooth		Borneo, 1882			M 1 spec.

No crt.	Species donated	Species from actual collections	Collecting places, donation data	Actual no spec.	Coll. no	Bibliographic source and the number of specimens
4	*Funambulus ephippium*		Borneo, Moeara Teweh, 1882			T 1 spec., A 1 spec., MR 1 spec.,
5	*Funambulus nigrovittatus*?		Borneo, Moeara Teweh, 1882			T 1 spec.
6	*Funambulus plantanis*		Borneo, Moeara Teweh, 1882			T 1 spec.
7	*Funambulus Rafflesii*?		Borneo, Moeara Teweh, 1882			T 1 spec.
8	*Galeopithecus volans*	*Cynocephalus volans* (L., 1758)	Borneo, Moeara Teweh, 1882	1	MAM 148/2136	T 3 spec., MR 1 spec.
9	*Gymnura Rafflesi*		Borneo, Moeara Teweh, 1882			T 1 spec., A 3 spec.
10	*Heilobates agilis*		Borneo			MA 1 spec.
11	*Heilobates Mulleri*, v. Martin		Borneo, Moeara Teweh, 1882			T 3 spec., MR 3 spec.
	Hylobates muelleri, skul		Borneo, Moeara Teweh, 1882			M 1 spec., MR 1 spec.
12	*Hystrix* sp.	*Hystrix javanica* (F. Cuvier, 1823)	Java, 1878	1	MAM 820/3049	MR 1 spec.
13	*Herpestes javanicus*	*Herpestes javanicus* (Geoffroy Saint-Hilaire, 1818)	Borneo, 1882	1	MAM 304/2273, 135	T 1 spec., A 1 spec.
14	*Macacus cynomolgus*	*Macaca fascicularis* Raffles, 1821	Celebes, 1895	1	MAM 200/2183	T 1 spec., MR 1 spec., MA 1 spec.
15	*Nasalis larvatus*	*Nasalis larvatus* Wurmb, 1787	Borneo, 1882	1	MAM 215/2198	T 1 spec., A 1 spec., MR 1 spec., MA 1 spec.
16	*Tiger* skul	*Prionailurus bengalensis sumatranus* (Horsfield, 1821)	Sumatra, 1882	1	AC 423/ 11.783, No. 539 Anat.	MR 1 spec.
17	*Paradoxurus musanga*		Borneo, 1882			T 2 spec., M 1 spec.
18	*Petaurista petaurista* (Pallas, 1766)	*Petaurista petaurista* (Pallas, 1766)	Borneo, 1882	1	MAM 76/2066	MR 1 spec., MA 1 spec.
19	*Pteromys nitidus*	*Pteromys nitidus* Geoffroy	Borneo, Moeara Teweh, 1882	1	MAM 76/2066	T 2 spec., A 1 spec., MR 1 spec.
20	*Pteropus edulis*		Borneo, Moeara Teweh, 1882			T 2 spec.
21	*Ratufa affinis*	*Ratufa affinis* (Raffles, 1821)	Borneo, 1882	1	MAM 71/2061	T 1 spec.

No crt.	Species donated	Species from actual collections	Collecting places, donation data	Actual no spec.	Coll. no	Bibliographic source and the number of specimens
22	*Sciurus bicolor*		Java, 1882			T 2 spec., M 1 spec., A 1 spec., MR 1 spec.
23	*Semnopithecus frontatus*		Borneo, Moeara Teweh, 1882			T 2 spec.
24	*Semnopithecus rubicundus*		Borneo, Moeara Teweh, 1882			T 1 spec., A 1 spec
25	*Tarsius spectrum*		Borneo, Moeara Teweh, 1882			T 1 spec.
26	*Tragulus canehil*	*Tragulus napu* (F. Cuvier, 1822)	Borneo, Moeara Teweh, 1882			T 1 spec. MAM 348/2323, MAM 349/2326
1	ETNOGRAPHY Coat shirt		Celebes, 1895	1	11201/189	LM 1 spec., A 1 spec., MR 1 spec., MA 1 spec.
2	Shields		Halmahera, Molucca, 1895	3	11201/190	A 3 spec., MR 3 spec.
3	Drum		Celebes, 1895	1	11201/67	A 1 spec., MR 1 spec.
4	Arch		Celebes, 1895	2	11201/364, 11201/365	A 2 spec
5	Spear with bone tip		1895	1	11201/	A 1 spec.
6	Sword Japan		1895	1	11201/70	A 1 spec.
7	Spear head		1895	1	11201/193?	A 1 spec.
8	Lances, spears and arrows		1895	42	11201/	A 42 spec.
9	Link poisoned arrows		Celebes, 1895	69	11201/238	A 45 spec.
10	Spears		1895	2	11201/	A 2 spec.
11	Tobacco box and 10 pieces in watermark		Celebes, 1895	11	11201/97	LM 1 spec., A 11 spec., MR 12 spec., MA 10 spec.
12	Mandau sword		Borneo, 1895	1	11201/414	A 1 spec., MR 1 spec., MA 1 spec.
13	Klevang tjojang		Sumatra, 1895	1	11201/157	A 1 spec., MA 1 spec.
14	Various woven fabrics of Lontar palm fiber		Celebes, 1895	7	11201/88	A 7 spec., MR 1 spec., MA 1 spec.
15	Palm kelp hat			1		MA 1 spec.
16	Papuan skul, relic of ancestor		Borneo, 1882	1		MR 1 spec., MA 1 spec.
17	Daiakskul, war trophy		Borneo, 1882	1		MR 1 spec., MA 1 spec.

Pl. 1: Objects donated by Hilarius Mitrea from "Grigore Antipa" National Museum of Natural History. 1. Curculionid, Indonesia; 2. *Catharsius satyrus*, Java; 3. *Xylotrupes gedeon*, Java; 4. *Pomponia imperatorial*, Java; 5. *Hystrix javanica*, Java; 6. *Langaha nasuta*, Kalimantan; 7. *Cicinnurus republica*, New Guinea; 8. *Chelmon rostratus*, Indian Ocean; 9. *Osphronemus gurami*, Muntock; 10. *Nasalis larvatus*, Java; 11. *Tomistoma schlegeli*, Kalimantan.

REVISION OF THE CARYOPHYLLACEAE COLLECTION FROM THE HERBARIUM OF MUREŞ COUNTY MUSEUM, NATURAL SCIENCES DEPARTMENT

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Abstract. This paper is a contribution to the study of species of Caryophyllaceae family in Romania, highlighting their distribution in the past. The collections of the botanical material, which is part of Mureş County Museum's Herbarium, was gathered over time from 1872–2000 from across the country. The study analyzed 351 herbarium sheets. This review recorded 83 species and 6 subspecies belonging to 18 genera. The nomenclature of species is updated according to accepted references; the documentary value results from the presentation of the geographical areas from where these species were collected. Also a valuable aspect is the specification of the IUCN degree of endangerment of each species.

Keywords: Caryophyllaceae, collection, flora, herbarium.

Introduction

Herbarium collections are a crucial subset of systematic data that can be used for a variety of biological research. Each herbarium specimen contains a suite of information such as name, rank, collecting places, data that provide important information about the distribution of individual species, genera and families by region, country and habitat. [6]

Although maintaining its core contribution to taxonomic knowledge, herbarium use has diversified with the passage of time. Specimens are now appreciated as temporally and spatially extensive sources of genotypic, phenotypic, and biogeographic data. [7]

The Herbarium of Natural Sciences Department of Mureş County Museum comprises about 20,000 individual samples and consists of two main parts, the "lower plants" and "higher plants" collections, coming from field research, donations and purchases. The "lower plants" collection includes bryophytes (mosses, liverworts, and hornworts), lichens, algae and a rich collection of fungi. The majority of the vascular plants or "higher plants" collection consists of more than 12,000 herbarium sheets, seeds and fruits of wild and cultivated plants and woods. The Museum's Herbarium data base of species is of such an outstanding scientific value because of the vast diversity in the age and variety of species found.

In this study, we aimed to analyze the species belonging to Caryophyllaceae family in the collection of Natural Sciences Department of the Mureş County Museum.

Materials and methods

The study processed 351 herbarium sheets with plants belonging to the family Caryophyllaceae. Plant nomenclature was revised in accordance with the International Code of Botanical Nomenclature [8], Flora Europaea [13, 14], Sârbu et al. 2013 [12] and The Euro+Med Plantbase [15]. Within the family, the plants have been listed in alphabetical order of genera and species.

Information from the labels was exactly noted for each species such as: the date of collecting, place of collecting, data about habitat or elevation (where is known), the name of whom collected and determined the plant. In addition, it is mentioned the conservation status of specimens and the record numbers of the herbarium sheets in Inventory Registries "Higher Plants (I, II and III)" of the Natural Sciences Department.

In determining endangered, rare or vulnerable species, Red Book of vascular plants from Romania [4] and National Red Lists [2, 5, 10] were consulted, as well as the latest version of sozological categories published in the European red list of vascular plants [1]. Additionally, for determining endangered, rare or vulnerable species "The critical list of vascular plants in Romania" was considered. [11].

Results and discussions

Analyzing the checklist of the Caryophyllaceae collection, 83 species and 6 subspecies belonging to 18 genera were recorded.

Considering the place of collecting, most specimens come from all parts of Romania (Fig. 1); a few herbarium sheets were found to contain plants collected from abroad (Bulgaria, Republic of Moldova). The largest concentration of plants in Herbarium comes from Mureş County (180 herbarium sheets) and Harghita County (52 herbarium sheets). The collecting place with the highest elevation is Omu Peak of 2500 altitude, while the lowest elevation is the Black Sea shore.

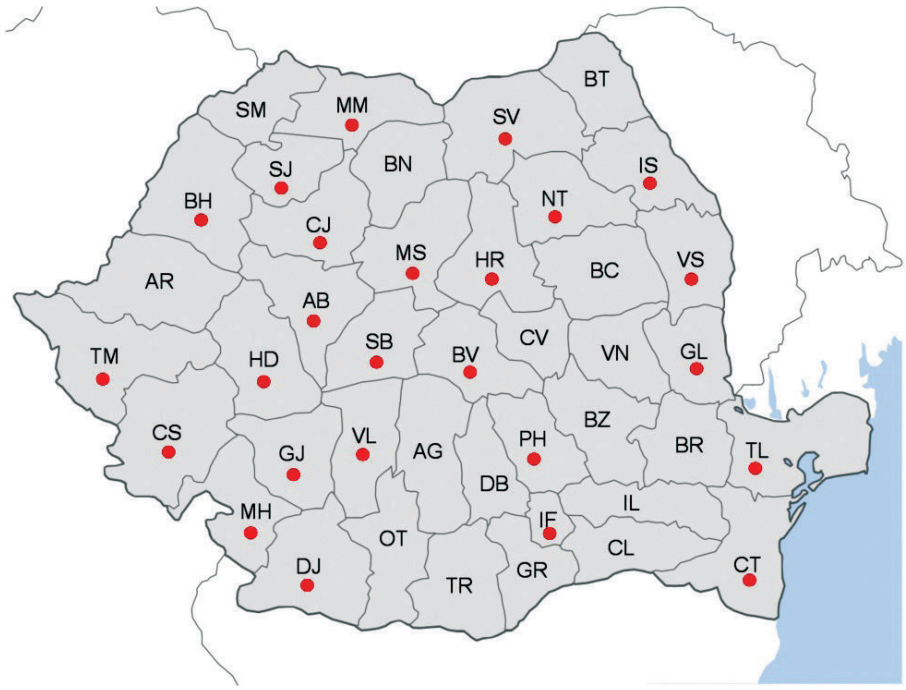

Fig. 1: Map of collecting places by counties

The dynamics of species gathered in the herbarium shows that the most part of the herbarium material was collected during 1941 – 1960 (36.75%) and 1921–1940 (27.92%). For 0.85% of the herbarium's material the collection date is unknown (Fig. 2).

The oldest herbarium sheets date from 1872 and they belong to "Ierbarul de la Băgaciu" collection, donated to the museum in the 1980s.

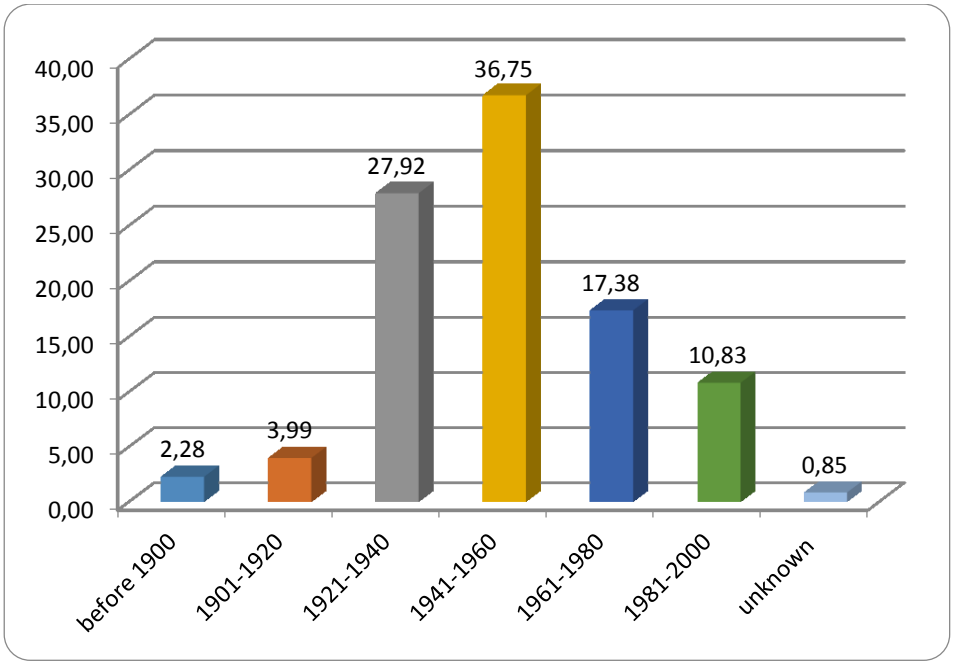

Fig. 2: The dynamics of species gathered in the herbarium of Mureș County Museum

According to the Romanian red lists of plants, the museum collection host 28 taxa included in different sozological categories. Also 12 of the recorded taxa are listed in The Red Book of vascular plants from Romania. Knowing the distribution area of these species during the past allows researchers to compare the historical data with recent findings which contributes to a better understanding of the need for conservation.

The checklist of Caryophyllaceae collection

Ord. CARYOPHYLLALES
Fam. CARYOPHYLLACEAE

***Agrostemma githago* L.**
Sozological category: V [2]

06.06.1939, MS, Tîrgu Mureș, leg et det. Nagy Ödön, B, (2924)
08.06.1939, MS, Tîrgu Mureș, Mureș riverside, leg et det. Nagy Ödön, B, (2925)
07.1964, HR, Sf. Ana Lake, leg. Konya Istvan, det. Silvia Oroian, B, (7183)

***Arenaria biflora* L.**

16.07.1930, BV, Făgăraș Mt., Moșu Peak near Breaza village, leg. & det. E. I. Nyárády, B, (10100)
06.08.1930, Bucegi Mt., Omu Peak, 2450 m altitude, leg. & det. E. I. Nyárády, B, (10101)

***Arenaria serpyllifolia* L.**

12.05.1937, MS, Tîrgu Mureș, Mureş River side, leg et det. Nagy Ödön, B, (2941)
17.05.1938, MS, Tîrgu Mureș, Trebely, leg et det. Nagy Ödön, B, (2942)
09.06.1944, MS, Tîrgu Mureș, leg et det. Nagy Ödön, B, (2943)
02.06.1941, MS, Tîrgu Mureș, "Platoul Cornești", leg et det. Nagy Ödön, B, (2944)
07.06.1943, MS, Tîrgu Mureș, near airport, leg et det. Nagy Ödön, B, (2945)
25.05.1948, MS, Tîrgu Mureș, leg et det. Nagy Ödön, B, (2946)
23.06.1943, MS, Tîrgu Mureș, "Dealul Mare", leg et det. Nagy Ödön, B, (2947)
07.07.1937, HR, Lacul Roșu, on the base of Suhardu Mic Mountain, leg et det. Nagy Ödön, B, (3492)

***Arenaria tenella* Kit.**

06.08.1930, Bucegi Mt., Omu Peak, 2500 m altitude, leg. & det. E. I. Nyárády, B, (10102)

***Cerastium alpinum* L.**

18.05.1900, leg et det. Nagy Ödön, B, (8041)
01.08.1937, NT, Ceahlău Mt., leg et det. Nagy Ödön, B, (3494 as *Cerastium alpinum* subsp. *lanatum* (Lam.) Asch. & Graebn.)
25.07.1911, HR, Hășmasul Mare Mt., leg. & det. Heinrich Höhr, B, (5297 – as *Cerastium lanatum* L.)
28.07.1911, leg. & det. Heinrich Höhr, B, (5334 as *Cerastium alpinum* subsp. *lanatum* (Lam.) Asch. & Graebn.)

***Cerastium arvense* L.**

TM, Timișoara, leg et det. Nagy Ödön, S, (4717)
1925–1926, AB, Blaj, leg. & det. Nicolae Chețianu, (5527)
23.06.1978, BV, Prejmer, leg. & det. I. Gergely, B, (8660)
18.06.1923, AB (former district Turda-Arieș), Colții Trascăului Mt., 1120 m altitude, leg. & det. Al. Borza, B, (9855 as *Cerastium arvense* L. subsp. *calcicolum* (Schur) Borza nov. comb.)

***Cerastium arvense* L. subsp. *lerchenfeldianum* (Schur) Asch. & Graebn.**

Sozological category: NT [11], R [10]

20.07.1925, PH, Bucegi Mt., Bătrâna Mt. and Râșniții Valley, leg. & det. Al. Borza, B, (9119 as. *Cerastium lerchenfeldianum* Schur)
28.08.1922, PH, Bucegi Mt.,. Furnica Mt, leg. & det. Al. Borza, B, (9120 as. *Cerastium lerchenfeldianum* Schur)

***Cerastium brachypetalum* Pers.**

23.05.1938, MS, Tîrgu Mureș, Stejăriș Forest fringe, leg et det. Nagy Ödön, S, (2935)
03.06.1951, MS, Tîrgu Mureș, Beșa, leg et det. Nagy Ödön, S, (2936)
20.05.1941, MS, Tîrgu Mureș, Greek-Catholic cemetery, leg et det. Nagy Ödön, B, (2937)
06.06.1943, MS, Tîrgu Mureș, leg et det. Nagy Ödön, S, (2938)
18.05.1938, MS, Tîrgu Mureș, Trebely, leg et det. Nagy Ödön, S, (2939)
27.05.1951, MS, Tîrgu Mureș, "Platoul Cornești", leg et det. Nagy Ödön, S, (2940)

29.05.1941, TM, Timișoara, Viile Giarmata, leg. I. Todor and P. Pteancu, det. Al. Borza, B, (9125)
27.04.1948, TM, Liebling, leg. V. Soran, det. Al. Borza, B, (9126)

***Cerastium cerastoides* (L.) Britton**

29.08.1922, PH, Bucegi Mt., Caraiman Mt., Sinaia, 2000 m altitude, leg. & det. Al. Borza, (9854)

***Cerastium dubium* (Bastard) Guépin**

06.05.1923, CJ, Apahida, 310 m altitude, leg. & det. E.I. Nyárády, E. Pop, Gh. Bujorean (9856 as *Cerastium anomalum* Waldst. & Kit)

***Cerastium fontanum* Baumg.**

21.06.1942, CS, Semenic Mt., Piatra Goznei Peak, leg. Al. Borza and I. Todor, det. Al. Borza, B, (9122)

***Cerastium fontanum* Baumg. subsp. *vulgare* (Hartm.) Greuter & Burdet**

23.05.1938, MS, Tîrgu Mureș, "Substejăriș", leg et det. Nagy Ödön, B, (2927 as *Cerastium fontanum* Baumg. subsp. *triviale* (Link) Jalas)
31.05.1944, MS, Beșa, leg et det. Nagy Ödön, S, (2928 as *Cerastium fontanum* Baumg. subsp. *triviale* (Link) Jalas)
20.05.1941, MS, Tîrgu Mureș, Greek-Catholic cemetery, leg et det. Nagy Ödön, B, (2929 as *Cerastium fontanum* Baumg. subsp. *triviale* (Link) Jalas)
03.06.1938, MS, Tîrgu Mureș, Mureș River Valley, at "Râtul cu Scoici", leg et det. Nagy Ödön, B, (2930 as *Cerastium fontanum* Baumg. subsp. *triviale* (Link) Jalas)
14.05.1937, MS, Tîrgu Mureș, Cocoșd Forest, leg et det. Nagy Ödön, S, (2931 as *Cerastium fontanum* Baumg. subsp. *triviale* (Link) Jalas)
17.05.1946, MS, Tîrgu Mureș, Mureş riverside, leg et det. Nagy Ödön, B, (2932 as *Cerastium fontanum* Baumg. subsp. *triviale* (Link) Jalas)
14.05.1951, MS, Tîrgu Mureș, "Platoul Cornești", leg et det. Nagy Ödön, S, (2933 as *Cerastium fontanum* Baumg. subsp. *triviale* (Link) Jalas)
11.08.1982, BV, Sînpetru, leg. & det. I. Gergely, B, (9387 as *Cerastium fontanum* Baumg. subsp. *triviale* (Link) Jalas)
31.07.1960, BV, "Poiana Stalin", leg. & det. Rezi Julia, B, (7184 as *Cerastium caespitosum* Asch.)
19.06.1942, TM, near Timișoara, leg. Gh. Bujoreanu, det. Al. Borza, B, (9123 as *Cerastium caespitosum* Asch.)
21.06.1942, CS, Semenic Mt., Piatra Goznei Peak, leg. Al. Borza and I. Todor, det. Al. Borza, B, (9124 as *Cerastium caespitosum* Asch.)

***Cerastium glomeratum* Thuill.**

14.05.1951, MS, Tîrgu Mureș, "Platoul Cornești", leg. & det. leg et det. Nagy Ödön, S, (2934)
23.05.1938, MS, Tîrgu Mureș, "Substejăriș", leg. & det. Nagy Ödön, S, (2948)
23.05.1938, MS, Tîrgu Mureș, Stejăriș Forest fringe, leg. & det. Nagy Ödön, B, (2949)
14.05.1941, TM, Timișoara, leg. & det. I. Todor, revised Al. Borza, B, (9127)

***Cerastium pumilum* Curtis**

06.07.1943, MS, Tîrgu Mureș, near airport on Mureș riverside, leg. & det. Nagy Ödön, B, (2950)

25.05.1948, TM, near Liebling, in grassland, leg. V. Soran, det. Al. Borza, B, (9152)

***Cerastium sylvaticum* Waldst. & Kit.**

10.08.1937, BH, Stâna de Vale, leg. & det. Al. Borza, B, (10103)

***Cerastium tomentosum* L.**

12.05.1937, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, B, (2926)

***Cerastium transsilvanicum* Schur**

Sozological category: NT, End. [11], A R [10], R [5]

15.07.1930, BV, Făgăraș Mt., Trăsnita, Breaza, leg. & det. E.I. Nyárády, revised Al. Borza, B, (9121)

***Dianthus armeria* L.**

25.08.1939, MS, Acățari, leg. & det. Nagy Ödön, S, (2956)

21.07.1948, MS, Tîrgu Mureș, "Dl. 1 Mai", leg. & det. Nagy Ödön, B, (2961)

11.06.1946, MS, Tîrgu Mureș, Stejăriș forest fringe, leg. & det. Nagy Ödön, S, (2962)

03.08.1968, MS, Porumbeni, leg. & det. Nagy Ödön, S, (2963)

12.07.1946, MS, Porumbeni, leg. & det. Nagy Ödön, S, (2964)

18.08.1947, MS, Porumbeni, leg. & det. Nagy Ödön, B, (2965)

26.06.1948, MS, Tîrgu Mureș, "Platoul Cornești", leg. & det. Nagy Ödön, B (2966)

02.07.1992, MS, Narcissus Glade Gurghiu natural reserve, leg. & det. Silvia Oroian, B, (7630)

03-04.07.1959, MM, Petrova, leg. & det. A. Coman, B, (8860)

09.07.1923, VL, Govora, 400 m altitude, leg. & det. G.P. Grințescu, B, (10114 as *Dianthus armeria* L. var. *armeriastrum* (Wolfen) Velen)

***Dianthus armeria* L. f. *glaber* Scholtz**

15.06.1967, CS, between Măcești and Pojejena, leg. & det. I. Gergely, B, (8674)

***Dianthus barbatus* L.**

28.05.1939, MS, Tîrgu Mureș, crop fields, leg. Szokacs E. det. Nagy Ödön, S (2960)

***Dianthus barbatus* subsp. *compactus* (Kit.) Heuff.**

Sozological category: NT [11], R [10]

18.08.1959, MS, Lunca Bradului, leg. & det. Ion Patachi, B, (8042)

20.08.1959, HR, Piatra Vitosa Mt., leg. & det. Ion Patachi, B, (8044)

***Dianthus carthusianorum* L.**

29.06.1946, MS, Tîrgu Mureș, Cocoșd forest, leg et det. Nagy Ödön, B, (2957)

24.09.1938, MS, Tîrgu Mureș, Mureșeni forest, leg et det. Nagy Ödön, B, (2958)

23.06.1943, MS, Tîrgu Mureș, "Dl. Mare", leg et det. Nagy Ödön, B, (2959)

1872, MS, Băgaciu, (5436)

09.07.1982, MS, Zau de Câmpie, leg. & det. Silvia Oroian, B, (5701)

05.1953, MS, Tîrgu Mureș, Beșa forest, leg. & det. Konya Istvan, B, (7194)

06.08.1985, MS, Crăiești, leg. & det. Silvia Oroian, B, (7196)

18.08.1980, MS, Săbed, Corhan Hill, leg. & det. Silvia Oroian, B, (7197)
01.07.1981, MS, Săbed, Corhan Hill, leg. & det. Silvia Oroian, B, (7198)
20.05.1980, MS, Porumbeni, Răzoare Hill, leg. & det. Silvia Oroian, B,(7199)
08.05.1967, MS, Gurghiu, leg. Konya Istvan, det. Silvia Oroian, B, (7200)
02.08.1984, MS, Sînpaul, leg. & det. Silvia Oroian, B, (7201)
11.06.1984, MS, Daneș, leg. & det. Silvia Oroian, B, (7202)
29.07.1982, MS, Zau de Câmpie, leg. & det. Eftenie Ioan, B, (7206)
05.06.1990, MS, Sântana de Mureș, Beșa Hill, leg. & det. Silvia Oroian, B, (7242)
02.07.1992, MS, Narcissus Glade Gurghiu natural reserve, leg. & det. Silvia Oroian, B, (7629)
11.07.1991, MS, Vidrasău, leg. & det. Silvia Oroian, B, (7945)
20.08.1959, HR, Tulgheș Pântec, leg. & det. Ion Patachi, B, (8043)
16.08.1964, CJ, Borzești, leg. & det. Viorica Chiș, B, (9066)
11.08.1982, BV, near Satul Nou, leg. & det. I. Gergely, B, (9402)
10.07.1956, HD, Cheile Madei, leg. & det. I. Hodișan, B, (9466)
07.07.1981, BH, near Leșu, leg. & det. I. Gergely, B, (9565)
17.06.1964, CS, Borlova, leg. & det. Nicolae Boșcaiu, B, (10247)

***Dianthus carthusianorum* L. var. *saxigenus* Schur**

17.04.1923, CJ, near Borzești, leg. & det. Al. Borza, B, (8938)

***Dianthus deltoides* L.**

25.07.1943, leg. & det. Heinrich Höhr, B, (5162)

***Dianthus giganteiformis* Borbás**

09.05.1948, TM, Banloc, leg. & det. Al. Borza, B, (10578)

***Dianthus giganteiformis* Borbás var. *craiovensis* Prodan**

03.06.1951, DJ, Craiova, in public garden, leg. & det. I. Prodan, B, (8863)

***Dianthus giganteiformis* subsp. *kladovanus* (Degen) Soó**

Sozological category: CR [4], NT [11], V [5], R [2]

12.05.1939, GL, Dundenii Noi, Hanu Conachi, leg. C.C. Georgescu, det. I. Prodan, B, (8672)
21.05.1973, VS, "Dl. Lohanu" near Mânjești, leg. & det. Gh. Vițalariu, B, (8865 as *Dianthus kladovanus* Degen var. *rigidus* Prodan)

***Dianthus giganteus* d'Urv.**

24.06.1963, AB, Vălișoara, Cheile Aiudului, leg. & det. I.Gergely, B, (8668)
10.05.1968, MH, Cazanele Mari, leg. & det. Nicolae Boșcaiu, B (10246)

***Dianthus giganteus* subsp. *banaticus* (Heuff.) Tutin**

Sozological category: NT, End [11], R [10], V [5],

15.06.1967, CS, between Măcești and Pojejena, leg. & det. I. Gergely, B, (8675 as *Dianthus banaticus* (Heuff.) Borb.)

***Dianthus glacialis* subsp. *gelidus* (Schott, Nyman & Kotschy) Tutin**

Sozological category: NT, End [11], R [10], R [5]

SB, Făgăraș Mt., Bâlea Lake, 2000–2100 m altitude, leg. & det. E. I. Nyárády, B, (10112 as *Dianthus gelidus* Schott, Nyman & Kotschy)

***Dianthus guttatus* M. Bieb.**
Sozological category: V/R [10], E [5]
30.06.1956, CS, Băile Herculane, Domogled Mt., B, (8671)

***Dianthus henteri* Griseb. & Schenk**
Sozological category: NT, End [11], NT [10], NT [5]
28.06.1924, GJ, between Livezeni and The Lainici Monastery, Surduc, leg. & det. E. Pop, G. Bujoreanu, B, (10113)

***Dianthus membranaceus* Borbás**
18.06.1923, PH, near Speteni on the Ialomița Riverside, leg. & det. G.P. Grințescu, revised I. Prodan, B, (8864 as *Dianthus rehmannii* Blłocki)

***Dianthus monadelphus* subsp. *pallens* (Sm.) Greuter & Burdet**
Sozological category: NT [11], R [10], R [5], R [2]
17.07.1927, CT, Mangalia, 5–8 m altitude, leg. & det. Al. Borza, B, (10116 as *Dianthus pallens* Sibht. & Sm.)

***Dianthus nardiformis* Janka**
Sozological category: VU [4], VU [11], V/R [10], V [5]
25.07.1956, TL, Cerna, leg. & det. I. Gergely, B, (8673)

Dianthus petraeus* Waldst. & Kit. subsp. *petraeus
29.08.1967, HR, Hăghimașul Mare Mt., leg. & det. Konya Istvan, B, (7188 as *Dianthus kitaibelii* Janka)
20.07.1964, HR, Bilbor, leg. & det. Konya Istvan, B, (7189 as *Dianthus kitaibelii* Janka)
05.07.1964, HR, Harghita Mt., leg. & det. Konya Istvan, B, (7190 as *Dianthus kitaibelii* Janka)

***Dianthus petraeus* subsp. *orbelicus* (Velen.) Greuter & Burdet**
Sozological category: CR [4], NT [11], R [10], R [5]
14.07.1938, Hăghimaș Mt., Suhardu Mic, leg et det. Nagy Ödön, B, (3497 as *Dianthus kitaibelii* Janka subsp. *simonkaianus* (Peterfi))
14.07.1937, HR, Lacul Roșu, leg et det. Nagy Ödön, B, (3498 as *Dianthus kitaibelii* Janka subsp. *simonkaianus* (Peterfi))
1967, CJ, Cluj Napoca, Botanical Garden of University, leg. & det. I. Gergely (8669 as *Dianthus simonkaianus* Pét. var. *vulcanensis* Prodan)
15.08.1916, AB, Runc, Mt. Cheile Runcului, 450 m altitude, leg. & det. Al. Borza, B, (10684 as *Dianthus simonkaianus* Pét.)

***Dianthus pinifolius* subsp. *serbicus* Wettst.**
Sozological category: CR [4], NT [11], R [10], R [5], R [2]
30.05.1923, MH, between Vârciorova and Gura Văii, 60 m altitude, leg. & det. Al. Borza, E. I. Nyárády, B, (10117)

***Dianthus pseudarmeria* M. Bieb. var. *dobrogensis* Borza et. Nyár.**
Sozological category: LR [4], NT [11], R [10], R [5]
17.06.1971, CT, Murfatlar, Fântânița, leg. & det. I.Gergely, B, (8667)

17.06.1971, CT, Fântânița Murfatlar natural reserve, leg. & det. I. Gergely and A. Fărcaș, B, (8946)
21.06.1926, TL, Priopcea Mt. (256 m s. m.), between Greci and Cerna leg. & det. E. I. Nyárády, (10115)

***Dianthus puberulus* (Simonk.) A. Kern.**

16.07.1970, SJ, Cheud, on forest edge, leg. & det. I Gergely, B, (8670)
BH, Remeți, leg. & det. I. Gergely, B, (9562)
16.07.1970, SJ, Cheud, leg. & det. I. Gergely, V. Fati, B, (10432)

***Dianthus puberulus* (Simonk.) A. Kern. var. *laevigatus* (Simk.) Hand.-Mazz.**

19.08.1967, AB, Aiud, Herja, in forest, leg. & det. I.Gergely, B, (8667)

***Dianthus spiculifolius* Schur**

Sozological category: NT, End [11], R [10], V [5]

14.06.1957, HD, Cheile Ardeu "Pleașa Ardeului", leg. & det. I. Hodișan, B, (10652)
25.07.1911, Heinrich Höhr, B, (5312 as *Dianthus kitaibelii* Janka subsp. *spiculifolius* Schur.)
04.06.1984, MS, Crăiești-Herepea, leg. & det. Silvia Oroian, B, (5516)
09.07.1982, MS, Zau de Câmpie, leg. & det. Silvia Oroian, B, (5700)
31.07.1960, BV, Poiana Brașov, leg. & det. Rezi Julia, B, (7185 as *Dianthus kitaibelii* Janka subsp. *spiculifolius* Schur.)
09.07.1982, MS, Zau de Câmpie, leg. & det. Eftenie Ioan, B, (7186 as *Dianthus kitaibelii* Janka subsp. *spiculifolius* Schur.)
02.05.1972, AB, Scărișoara Belioara, leg. & det. Florentina Togănel, B, (7187 as *Dianthus kitaibelii* Janka subsp. *spiculifolius* Schur.)

***Dianthus superbus* L.**

03.08.1916, Galitia, leg et det. Nagy Ödön, B, (4640)
30.07.1980, MS, Săcădat, leg. & det. Konya Istvan, B, (7195)
20.07.1964, MS, Bilbor, leg. & det. Konya Istvan, B, (7209)
10.09.1959, HR, Bilbor, leg. & det. Ion Patachi, B, (8045)
12.08.1982, BV, near Satul Nou, leg. & det. I. Gergely, B, (9401)

***Dianthus tenuifolius* Schur**

Sozological category: LC, Sub-end [11], NT [10], NT [5]

14.07.1937, HR, Lacul Roșu, leg et det. Nagy Ödön, B, (3495)
12.08.1936, HR, Lacul Roșu, leg et det. Nagy Ödön, B, (3496)
30.06.1911, HR, Fratele Mt., leg. & det. Heinrich Höhr, B, (5326)
04.06.1984, MS, Crăiești-Herepea, leg. & det. Silvia Oroian, B, (5515)
10.07.1968, HR, Hășmasul Mare Mt., leg. & det. Konya Istvan (7191)
04.07.1968, HR, Hășmasul Mare Mt., leg. & det. Konya Istvan (7192)
15.06.1960, MS, Deda-Bistra, Scaunul Domnului, leg. & det. Konya Istvan, (7193)
16.05.1988, MS, between Răstolița and Bistra Mureșului, leg. & det. Silvia Oroian, B, (7207)
12.07.1968, HR, Hășmașu Mare Mt., leg. Konya Istvan, det. Silvia Oroian, B, (7203)

***Dianthus trifasciculatus* subsp. *parviflorus* Stoj. & Acht.**
Sozological category: CR [4], R [10], R [5]

03.06.1951, DJ, Craiova, in public garden, leg. & det. I. Prodan, B, (8861 as *Dianthus deserti* Prodan)

12–18.06.1932, IF, near Comana, in forest, leg. G.P. Grințescu det. I. Prodan (8862 as *Dianthus deserti* Prodan)

Gypsophila altissima L.

13.09.1985, MS, Tîrgu Mureș, Botanical Garden of University of Medicine and Pharmacy, leg. & det. Silvia Oroian, B, (7210)

***Gypsophila muralis* L.**

31.08.1936, MS, Tîrgu Mureș, Stejăriș, leg et det. Nagy Ödön, B (2967)
10.08.1959, HR, Bilbor-Borsec, leg. Ion Patachi, det. Mihaela Sămărghiţan, B, (8046)
10.09.1959, HR, Bilbor-Pântec, leg. & det. Ion Patachi, B, (8050)

***Gypsophila paniculata* L.**
Sozological category: V [2]

29.06.1946, MS, Tîrgu Mureș, leg et det. Nagy Ödön, B (2968)

16.06.1952, MS, Tîrgu Mureș, Botanical Garden of IMF, leg et det. Nagy Ödön, B, (2969)

24.07.1939, Basarabia, district Cetatea Albă, Black Sea, near Bugaz, 2 m altitude, leg. & det. G. Bujorean, Al. Borza, B, (9875)

***Gypsophila muralis* L.**

22.07.1948, MS, Tîrgu Mureș, "Dl. 1 Mai", leg et det. Nagy Ödön, B, (2970)
11.08.1947, MS, Tîrgu Mureș, "Pădurea Mare", leg et det. Nagy Ödön, B, (2971)
04.09.1938, MS, Tîrgu Mureș, Stejăriș forest, leg et det. Nagy Ödön, S, (2972)
21.07.1946, MS, Porumbeni, leg et det. Nagy Ödön, S, (2973)
05.07.1964, HR, Harghita Mt., leg. & det. Konya Istvan, B, (7238)
04.07.1964, HR, Harghita Mt., leg. & det. Konya Istvan, B, (7239)

***Gypsophila perfoliata* L.**
Sozological category: VU [4], R(V) [5]

04.09.1969, CT, Agigea, leg. & det. Cl. Horeanu, B, (10333 as *Gypsophila trichotoma* Wender.)

***Gypsophila petraea* (Baumg.) Rchb.**
Sozological category: NT [11], R [10]

21.07.1938, HR, Hăghimaș Mt., Ecem Peak, leg et det. Nagy Ödön, B, (3499)
10.07.1937, HR, Lacul Roșu, "Făgetul Ciucului", leg et det. Nagy Ödön, B (3500)
25.07.1911, HR, Hășmașul Mare Mt., Fratele Peak, leg. & det. Heinrich Höhr, S, (5305 as *Banffya petraea* Baumg.)

***Holosteum umbellatum* L.**

17.04.1948, MS, Tîrgu Mureș, "Dl. Mare" in vineyard, leg et det. Nagy Ödön, B (2974)
17.04.1918, MS, Tîrgu Mureș, "Dl. Mare" in vineyard, leg et det. Nagy Ödön, B, (2975)

15.04.1938, MS, Tîrgu Mureș, leg et det. Nagy Ödön, B, (2976)
18.04.1939, MS, Tîrgu Mureș, Halmok Hill, leg. & det. Nagy Ödön, S, (2977)
09.04.1939, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, S, (2978)
12.06.1984, MS, Saschiz-Cloașterf, leg. & det. Silvia Oroian, B, (7211)
14.04.1900, CJ, Cluj-Napoca, leg. & det. Nagy Ödön, B, (8051)
10.05.1936, IS, near Aroneanu forest, 150 m altitude, leg. & det. C. Petrescu (9990)

***Holosteum umbellatum* L. var. *glutinosum* (M.-B.) Gürke**

20.04.1924, Șerpilor Island, Black Sea, 18 m altitude, leg. & det. Al. Borza, B, (9853)

Minuartia graminifolia* (Ard.) Ják. subsp. *graminifolia

Sozological category: LR [4], R [10], E [5]

11.08.1943, CS, Arjana Mt., between Plugova and Mehadia, 1450 m altitude, leg. & det. Al. Borza (9986 as *Minuartia graminifolia* (Ard.) Ják. subsp. *hungarica* Ják.)

***Minuartia viscosa* (Schreb.) Schinz & Thell.**

Sozological category: NE [4], NT [11], R [10], R [5], NT [2]

17.05.1967, GL, Bucești, leg. & det. D. Mititelu, V. Gheorghiu, B, (10577)

***Moenchia mantica* (L.) Bartl.**

Sozological category: NT [11], R [10]

13.06.1943, CS, Poiana Mărului Mt., 760 m altitude and Zăvoi, 400 m altitude, leg. & det. Al. Borza & son, B, (10012)

***Myosoton aquaticum* (L.) Moench**

10.06.1936, MS, Tîrgu Mureș, Mureş riverside, leg. & det. Nagy Ödön, S, (3001)
06.07.1950, MS, Tîrgu Mureș, Mureş riverside, leg. & det. Nagy Ödön, S, (3002)
27.08.1956, MS, Tîrgu Mureș, Reformed cemetery, leg. & det. Nagy Ödön, B, (3003)
30.06.1943, MS, Tîrgu Mureș, Mureş riverside, leg. & det. Nagy Ödön, S, (3004)
1872, MS, Băgaciu, S, (5447 as *Stellaria aquatica* (L.) Scop.)
15.06.1960, MS, Deda-Bistra, Scaunul Domnului, leg. Konya Istvan, det. Silvia Oroian, B, (6011)
08.1954, HR, Borsec, leg. Konya Istvan, det. Silvia Oroian, B, (6012)
16.08.1960, MS, Tîrgu Mureș, The isle on Mureş River, leg. & det. Konya Istvan, B, (7240)
17.09.1960, MS, Tîrgu Mureș, leg. & det. Ion Patachi, B, (8056)

***Paronychia cephalotes* (M. Bieb.) Besser**

Sozological category: NT [11], R [10], R [2]

06.1922, leg. & det. Heinrich Höhr, (5330)

***Petrorhagia saxifraga* (L.) Link**

Sozological category: NT [11], R [10], R [5]

10.07.1966, CS, near Moldova Veche on Ostrov Isle, leg. & det. I. Morariu and M. Danciu, B, (8859 as *Tunica saxifraga* (L.) Scop.)

***Sagina procumbens* L.**

1955, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, B (2953)

24.06.1956, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, B (2954)
29.08.1956, MS, Târgu-Mureș, leg. & det. Nagy Ödön, B (2955)
29.05.1946 leg. & det. Heinrich Höhr, (5244)
18.07.1938, CJ, near Cluj-Napoca, 410 m altitude, leg. & det. E. I. Nyárády, B, (9876)

***Saponaria officinalis* L.**

06.1952, MS, Tîrgu Mureș, Mureş riverside, leg. & det. Nagy Ödön, B, (2991)
29.09.1951, MS, Tîrgu Mureș, Mureş riverside, leg. & det. Nagy Ödön, S, (2992)
16.08.1960, MS, Tîrgu Mureș, "Insula", leg. & det. Konya Istvan, B, (7218)
15.06.1959, MS, Tîrgu Mureș, leg. & det. Ion Patachi, B, (8052)
10.09.1960, MS, Tîrgu Mureș, leg. & det. Ion Patachi, B, (8053)

***Saponaria bellidifolia* Sm.**

Sozological category: NT [11], R [10], R [5], R [2]

08.07.1960, AB, Piatra Urdașului near Colțești, leg. & det. I. Gergely, B, (8781)

***Scleranthus annuus* L.**

14.05.1939, MS, Tîrgu Mureș, "Dl. Mare", leg. & det. Nagy Ödön, S, (2989)
07.06.1943, MS, Tîrgu Mureș, airport, leg. & det. Nagy Ödön, S, (2990)
17.06.1953, MS, Reghin, leg. Konya, det. Silvia Oroian, B (6001)
21.05.1956, CJ, Cluj-Napoca at Someșeni, leg. & det. I. Hodișan, B, (9468)

***Scleranthus perennis* L.**

31.07.1960, BV, "Poiana Brașov", leg. Konya Istvan, det. Silvia Oroian, B, (6002)
04.07.1968, MS,. Hășmașul Mare Mt, leg. & det. Konya Istvan, B, (7220)
12.07.1968, MS, Hășmașul Mare Mt., leg. & det. Konya Istvan, B, (7221)

***Silene armeria* L.**

23.07.1937, HR, Lacul Roșu, leg. et det. Nagy Ödön, B, (3502)

***Silene baccifera* (L.) Roth**

04.09.1938, MS, Tîrgu Mureș, Stejăriș forest, leg. & det. Nagy Ödön, B (2951 as *Cucubalus baccifer* L.)
29.07.1946, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, B, (2952 as *Cucubalus baccifer* L.)
11.08.1982, BV, near Satu Nou, leg. & det. I. Gergely, B, (9395 as *Cucubalus baccifer* L.)
15.08.1936, SV (as distr. Cîmpulung), Iacobeni, 850 m altitude, leg. & det. S. Forstner, (10104 as *Cucubalus baccifer* L.)
04.08.1937, CJ, Someș valley near Cluj Napoca, 350 m altitude, leg. & det. G. Bujoreanu, B, (10105 as *Cucubalus baccifer* L.)

***Silene borysthenica* (Gruner) Walters**

Sozological category: EN [4], NT [11], R [10], E [5]

05.1953, MS, Tîrgu Mureș, Beșa forest, leg. & det. Konya Istvan, B, (5618)

***Silene bupleuroides* L.**

16.06.1924, IL, Dîlgos, 70 m altitude, leg. & det. G.P. Grințescu, B, (9676 as *Silene longiflora* Ehrh.)

***Silene compacta* Fisch. f. *elatior* Gușul.**
Sozological category: EN [4], NT [11], R [10], V [5]
23.06.1956, Dobrogea, TL, Luncavița, leg. & det. I. Gergely, B, (8734)
23.06.1956, Dobrogea, TL, Luncavița, leg. & det. I. Gergely, B, (8735)

***Silene conica* L.**
04.06.1929, DJ, Bistrețu, "Grindul Baba Opriții", 35 m altitude, leg. & det. E. I. Nyárády, B, (10107)
04.06.1930, CT, near Agigea, 2–3 m altitude, leg. & det. G. P. Grințescu, B, (10108)

***Silene coronaria* (L.) Clairv.**
10.06.1901, CS, Sasca Montană, "Pinciu", leg. & det. Nagy Ödön, B, (4715 as *Lychnis coronaria* (L.) Clairv.)

***Silene densiflora* d'Urv.**
08.1924, SV, near Bosanci, 380 m altitude, leg. & det. M. Gușuleac, (9675)
18.06.1956, IS, Valea lui David near Iași, leg. & det. I. Gergely, B, (8762 – as *Silene otites* (L.) Wibel subsp. *densiflora* (d'Urv.) Asch. & Graebn.)
30.06.1937, Rep. Moldova (Basarabia, Lăpușna district), "Valea Diseculuí", near Chișinău, 100 m altitude, leg. & det. G. Bujoreanu, B, (10110)
04.08.1938, Dobrogea, Caliacra district "Acbunar" near Balcic, 5080 m altitude, leg. & det. Al. Borza, P. Pteancu, I. Todor, B, (10111)

***Silene dichotoma* Ehrh.**
23.05.1966, CT, near Cobadin, leg. & det. I. Gergely, B, (8761)

***Silene dinarica* Spreng.**
Sozological category: NT, End [11], R [10], R [5], R [2]
07.1912, Arpaș Mt., 2000 m altitude, leg. & det. C. Gürtler, B, (10106)

***Silene dioica* (L.) Clairv.**
15.06.1960, MS, Deda-Bistra, Scaunul Domnului, leg. Konya Istvan, det. Silvia Oroian, B, (6005)
16.05.1988, MS, between Răstolița and Bistra Mureșului, leg. & det. Silvia Oroian, B, (7725)

***Silene flos-cuculi* (L.) Clairv.** (as *Lychnis flos-cuculi* L.)
25.05.1948, MS, Tîrgu Mureș, "Râtul cu scoici", leg. & det. Nagy Ödön, S, (2979)
18.05.1938, MS, Tîrgu Mureș, Stejăriș forest edge, leg. & det. Nagy Ödön, S, (2980)
17.05.1946, MS, Tîrgu Mureș, Mureș riverside, leg. & det. Nagy Ödön, S, (2981)
15.05.1937, MS, Tîrgu Mureș, Mureșeni forest, leg. & det. Nagy Ödön, B, (2982)
30.05.1948, MS, Tîrgu Mureș, "Corbul", leg. & det. Nagy Ödön, S, (2983)
30.05.1948, MS, Tîrgu Mureș, "Corbul", leg. & det. Nagy Ödön, S, (2984)
23.05.1938, MS, Tîrgu Mureș, "Substejăriș", leg. & det. Nagy Ödön, S, (2985)
08.07.1941, HR, Lacul Roșu, leg et det. Nagy Ödön, leg. & det. S, (3510)
28.05.1901, CS, Sasca Montană, "Valea Morii", leg. & det. Nagy Ödön, S, (4714)
05.1953, MS, Tîrgu Mureș, Beșa forest, leg. Konya Istvan, det. Silvia Oroian, B, (6007)

19.06.1953, HR, Hodoșa, leg. Konya Istvan, det. Silvia Oroian, B, (6008)
26.05.1981, MS, Sângeorgiu de Mureș, near salty ponds, leg. & det. Silvia Oroian, B, (7212)
21.07.1980, MS, Sângeorgiu de Mureș, leg. & det. Silvia Oroian, B, (7213)
05.1979, MS, Orșova, Seci, leg. & det. Sarkany Andrei, B, (7214)
06.1953, MS, Sângeorgiu de Mureș, leg. & det. Konya Istvan, B, (7215)
07.1959, MS, Sângeorgiu de Mureș, leg. & det. Konya Istvan, B, (7216)
02.06.1992, MS, Narcissus Glade Gurghiu natural reserve, leg. & det. Silvia Oroian, B, (7631)
02.07.1992, MS, Narcissus Glade Gurghiu natural reserve, leg. & det. Silvia Oroian, B, (7631)
10.08.1960, HR, Poiana Gyurea, Corund, leg. & det. Ion Patachi, B, (8061)
28.05.1908, MS, Tîrgu Mureș, "la vie", leg. & det. Nagy Ödön, S, (8062)

***Silene flos-cuculi* (L.) Clairv. var. *latifolia* C. Bolle**

24.06.1943, TM, Denta, "Denții" forrest, leg. & det. Al. Borza, E. Ghișa, I. Morariu, B, (9874)

***Silene heuffelii* Soó** (as *Melandrium nemorale* (Heuff.) A. Braun)

30.07.1975, BH, "Valea Sebișelului" near Poienița, in forest, leg. & det. O. Rațiu, F. Lörinczi, V. Codoreanu, I. Gergely, B, (8858)
29.05.1969, CJ, near Someșul Rece cottage, on forest edge, leg. & det. I. Hodișan, B, (10645)

***Silene latifolia* Poir.**

22.06.1935, MS, Tîrgu Mureș, near airport, leg. & det. Nagy Ödön, S, (2986 as *Silene alba* (Mill.) E.H.L. Krause)
25.05.1948, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, S, (2987 as *Silene alba* (Mill.) E.H.L. Krause)
19.06.1936, MS, Tîrgu Mureș, "Dl. 1 Mai", leg. & det. Nagy Ödön, B, (2988 as *Silene alba* (Mill.) E.H.L.Krause)
07.1959, MS, Tîrgu Mureș, leg. Konya Istvan, det. Silvia Oroian, B, (6004 as *Silene alba* (Mill.) E.H.L. Krause)
31.08.1985, MS, Tîrgu Mureș, "Platoul Cornești", leg. & det. Silvia Oroian, B, (7223 as *Silene alba* (Mill.) E.H.L. Krause)
28.05.1989, MS, Vidrasău, leg. & det. Silvia Oroian, B, (7224 as *Silene alba* (Mill.) E.H.L. Krause)
16.06.1960, MS, Tîrgu Mureș, leg. & det. Ion Patachi, S, (8055 as *Silene alba* (Mill.) E.H.L.Krause)
12.09.1973, HR, Sîncrăieni, leg. & det. Nicolae Boșcaiu, B, (10221 as *Silene alba* (Mill.) E.H.L. Krause)
1872, MS, Băgaciu, B, (5412 as *Melandrium album* (Mill.) Garcke)
31.05.1967, IS, Valea lui David, leg. & det. D. Mititelu, Gh. Vițalariu, T. Moțiu and Cr. Vițalariu, B, (9118 as *Melandrium album* (Mill.) Garcke)
30.05.1955, CJ, Cluj-Napoca at Someșeni, leg. & det. I. Hodișan, B, (9467 as *Melandrium album* (Mill.) Garcke)

***Silene nemoralis* Waldst. & Kit.**

16.08.1964, CJ, Borzești, leg. & det. Viorica Chiș, B, (9088)

***Silene noctiflora* L.**

1886, MS, Băgaciu, B, (5495 as *Melandrium noctiflorum* (L.) Fr.)

***Silene nutans* L.**

16.05.1936, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, S, (2993)
23.05.1938, MS, Tîrgu Mureș, Stejăriș forest edge, leg. & det. Nagy Ödön, B, (2994)
22.05.1936, MS, Tîrgu Mureș, "Platoul Cornești", leg. & det. Nagy Ödön, B, (2995)
28.05.1941, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, B, (2996)
05.1953, MS, Tîrgu Mureș, Beșa forest, leg. Konya Istvan, det. Silvia Oroian, B, (6006)
20.05.1980, MS, Porumbeni Răzoare Hill, leg. & det. Silvia Oroian, B, (7228)
09.06.1930, CJ, Măgura Mt., near Sălicea, 820 m altitude, leg. & det. E. I. Nyárády, B, (10109)

***Silene nutans* subsp. *dubia* (Rohrb.) Zapałł.**

Sozological category: NT, End [11], R [10]

28.07.1941, HR, Lacul Roșu, leg. & det. Nagy Ödön, B, (3503 as *Silene dubia* Rohrb.)
08.07.1937, HR, Lacul Roșu, "Făgetul Ciucului", leg. & det. Naghy Ödön (3504 as *Silene dubia* Rohrb.)
28.08.1967, HR, Hășmașul Mare Mt., leg. & det. Konya Istvan, B, (7226 as *Silene dubia* Rohrb.)
05.07.1964, HR, Harghita Mt., leg. & det. Konya Istvan, B, (7227 as *Silene dubia* Rohrb.)
24.07.1942, CS, Mic Mt., 1500 m altitude, leg. & det. Al. Borza & I. Todor, B, (10011 as *Silene dubia* Rohrb.)

***Silene otites* (L.) Wibel**

03.06.1938, MS, Ilieni, leg. & det. Nagy Ödön, S, (2997)
03.06.1951, MS, Beșa, leg. & det. Nagy Ödön, B, (2998)
05.1953, MS, Tîrgu Mureș, Beșa forest, leg. & det. Konya Istvan, B, (5617)
07.07.1960, AB, Tilalmas, leg. & det. I. Gergely, B, (8736)
10.06.1956, HD, Cheile Madei, leg. & det. I. Hodișan, B, (9520)

***Silene thymifolia* Sm.**

Sozological category: VU [4], NT [11], R [10], E [5], V [2]

15.08.1970, CT, Agigea, leg. & det. Nicolae Boșcaiu, B, (10269)

***Silene vulgaris* (Moench) Garcke**

27.09.1938, MS, Tîrgu Mureș, on the base of Halmok hill, leg. & det. Nagy Ödön, S, (2999)
03.06.1939, MS, Corunca, in park, leg. & det. Nagy Ödön, S, (3000)
01.08.1940, HR, Lacul Roșu, on the base of Suhardu Mic Mt., leg. & det. Nagy Ödön, B, (3505)
1886, MS, Băgaciu, B, (5501)
20.06.1989, MS, Săbed, Natural Reserve, leg. & det. Silvia Oroian, B, (7229)
05.06.1990, MS, Sântana de Mureș, Podirei Hill, leg. & det. Silvia Oroian, B, (7241)

05.06.1990, MS, Sântana de Mureș, Beșa Hill, leg. & det. Silvia Oroian, B, (7242)
29.06.1976, BH, near Remeți, leg. & det. I. Gergely, B, (9583)

***Silene viscaria* (L.) Jess.**

14.05.1939, MS, Tîrgu Mureș, "Dl. Uriaș", leg. & det. Nagy Ödön, B, (3018 as *Lychnis viscaria* L.)
16.05.1936, MS, Beșa, leg. & det. Nagy Ödön, S, (3020 as *Lychnis viscaria* L.)
03.06.1930, MS, Tîrgu Mureș, Stejăriș forest, leg. & det. Nagy Ödön, S, (3021 as *Lychnis viscaria* L.)
09.07.1942, HR, Lacul Roșu, leg. & det. Nagy Ödön, B, (3509 as *Lychnis viscaria* L.)
19.05.1901, CS, Sasca Montana "Tilva Samueli", leg. & det. Nagy Ödön, B, (4716 as *Lychnis viscaria* L.)
15.06.1960, MS, Deda-Bistra, Scaunul Domnului, leg. Konya Istvan, det. Silvia Oroian, B, (6003 as *Lychnis viscaria* L.)
15.06.1960, MS, Deda-Bistra, Scaunul Domnului, leg. & det. Konya Istvan, B, (7217 as *Lychnis viscaria* L.)
02.06.1992, MS, Narcissus Glade Gurghiu natural reserve, leg. & det. Silvia Oroian, B, (7627 as *Lychnis viscaria* L.)
08.07.1974, HR, Sîncrăieni, leg. & det. Nicolae Boșcaiu, B, (10267 as *Lychnis viscaria* L.)
1925–1926, AB, Blaj, leg. & det. Nicolae Chețianu, B, (5542 as *Viscaria vulgaris* Röhl.)
15.06.1929, HR, near Suseni, 755 m altitude, leg. & det. E. I. Nyárády, B, (9873 as *Viscaria vulgaris* Röhl.)

***Silene zawadzkii* Herbich**

Sozological category: NT, End [11], R [10], R [5]

21.07.1938, HR, Hăghimaș Mt., Ecem Peak, leg. & det. Nagy Ödön, B, (3501)
07.1911, HR, Fratele Mt., leg. & det. Heinrich Höhr, S, (5310)
12.07.1968, HR, Hășmașul Mare Mt., leg. & det. Konya Istvan, B, (7218)

***Spergularia marina* (L.) Griseb.**

21.07.1980, MS, Sângeorgiu de Mureș, leg. & det. Silvia Oroian, B, (7230)
07.08.1940, CJ, "Slatini" la Cluj, 350 m altitude, leg. & det. I. Morariu, B, (9877)
21.05.1956, CJ, Someșeni-Băi, leg. & det. I. Hodișan, B, (10643 – as *Spergularia salina* Presl)

***Spergularia rubra* (L.) J. Presl & C. Presl**

14.06.43, CS, Nedeia Mt., "Poiana Mărului", leg. & det. Al. Borza & son (9987)

***Stellaria alsine* Grimm**

10.06.1964, BH, Stâna de Vale, leg. & det. Onoriu Rațiu, B, (9255)
23.06.1977, BH, near Remeți, leg. & det. I. Gergely, B, (9581)

***Stellaria graminea* L.**

16.06.1936, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, S, (3005)
1939, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, S, (3006)
23.07.1942, HR, Lacul Roșu, Cupaș Mt., leg. & det. Nagy Ödön, B, (3506)

Collecting data unknown, leg. & det. Heinrich Höhr, B, (5257)
31.07.1960, BV, Poiana Brașov, leg. Konya Istvan, det. Silvia Oroian, B, (6000)
08.08.1960, MS, Tîrgu Mureș, leg. Konya Istvan, det. Silvia Oroian, B, (6009)
02.06.1992, MS, Narcissus Glade Gurghiu natural reserve, leg. & det. Silvia Oroian, B, (7628)
02.07.1992, MS, Narcissus Glade Gurghiu natural reserve, leg. & det. Silvia Oroian, B, (7642)
10.06.1960, MS, Tîrgu Mureș, "Stejăriș", leg. & det. Ion Patachi, B, (8057)
CJ, Fânațele Clujului near Cluj Napoca, leg. & det. Onoriu Rațiu, B, (9256)
06.06.1956, CJ, Cluj-Napoca at Fânețele Clujului, leg. & det. I. Hodișan, B, (9508)
12.09.1973, HR, Sîncrăieni, leg. & det. N. Boșcaiu, B, (10217)

***Stellaria holostea* L.**

19.05.1937, MS, Tîrgu Mureș, Căpîlnița, B, (3007)
01.05.1943, MS, Tîrgu Mureș, Reformed cementery, leg. & det. Nagy Ödön, B, (3008)
03.05.1939, MS, on the base of Halmock hill, leg. & det. Nagy Ödön, B, (3009)
09.04.1937, MS, Beșa forest, leg. & det. Nagy Ödön, B, (3010)
20.05.1939, MS, Tîrgu Mureș, Mureș riverside, leg. & det. Nagy Ödön, B, (3011)
30.05.1941, MS, Tîrgu Mureș, Cornești stream, leg. & det. Nagy Ödön, B, (3012)
21.04.1936, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, B, (3013)
10.05.0958, MS, Sângeorgiu de Mureș, leg. & det. Nagy Ödön, S, (4535)
1872, MS, Băgaciu, B, (5377)
1925–1926, AB, Blaj, leg. & det. Nicolae Cheținanu, B, (5563)
15.04.1981, MS, Tîrgu Mureș "Platoul Cornești", leg. & det. Silvia Oroian, B, (5651)
06.1953, MS, Tîrgu Mureș "Platoul Cornești", leg. Konya Istvan, det. Silvia Oroian, B, (6010)
08.05.1966, MS, Tîrgu Mureș, leg. & det. Konya Istvan, B, (7231)
12.04.1970, MS, Tîrgu Mureș, "Platoul Cornești", leg. & det. Konya Istvan, B, (7232)
28.04.1980, MS, Tîrgu Mureș, "Platoul Cornești", leg. & det. Silvia Oroian, B, (7233)
28.05.1982, MS, Tîrgu Mureș, "Platoul Cornești", leg. & det. Silvia Oroian, B, (7234)
12.05.1988, MS, Valea Izvoarelor, "Pădurea Mare", B, leg. & det. Silvia Oroian, (7235)
04.05.1988, MS, Chimitelnic, leg. & det. Silvia Oroian, B, (7236)
15.05.1959, MS, Tîrgu Mureș, leg. & det. Ion Patachi, B, (8058)
19.07.1959, MS, Tîrgu Mureș, leg. & det. Ion Patachi, B, (8059)

***Stellaria media* (L.) Cirillo**

07.03.1936, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, B, (3014)
25.04.1936, MS, Tîrgu Mureș, "Platoul Cornești", leg. & det. Nagy Ödön, S, (3015)
09.08.1943, HR, Lacul Roșu, Lapoș Peak, leg. & det. Nagy Ödön, B, (3507)
12.09.1973, HR, Sîncrăieni, leg. & det. Nicolae Boțcaiu, B, (10236)

***Stellaria nemorum* L.**

26.06.1974, MS, Sovata, leg. & det. Konya Istvan, B, (7237)
20.06.1955, BH, Stâna de Vale, leg. & det. Onoriu Rațiu, B, (9257)
14.06.1955, BH, Stâna de Vale, leg. & det. I. Hodișan, B, (9505)
28.08.1978, BH, near Remeși on forest edge, leg. & det. I. Gergely, B, (9580)

***Stellaria palustris* Hoffm.**

Sozological category: NT [11], R [10]

24.06.1978, HR, Tușnad Sat, Varsavesz peat bog, leg. & det. I. Gergely, B, (8642)
31.05.1956, HR, near Joseni in marsh, leg. St. Csürös, det. I. Gergely, B, (8775)
25.06.1973, HR, near Miercurea Ciuc, leg. & det. I. Gergely and F. Rațiu, B (8849)

***Vaccaria hispanica* (Mill.) Rauschert**

16.06.1939, MS, Tîrgu Mureș, Stejăriș forest, leg. & det. Nagy Ödön, S, (3016 as *Vaccaria pyramidata* Medik)
10.06.1946, MS, Tîrgu Mureș, leg. & det. Nagy Ödön, S, (3017 as *Vaccaria pyramidata* Medik)
29.07.1937, HR, Lacul Roșu, Suhard Valley, leg. & det. Nagy Ödön, S, (3508 as *Vaccaria pyramidata* Medik)
15.06.1959, MS, Tîrgu Mureș, leg. & det. Ion Patachi, B, (8060 as *Vaccaria pyramidata* Medik)

Abreviations:

leg. = legit (collected by)
det. = determined by
B = Good state of conservation
S = Satisfactorily/average state of conservation
CR = Critically endangered
EN = Endangered
VU/V = Vulnerable
NT = Not threatened
LC = Low concern
LR = Low Risk
NE = Not evaluated
End = Endemic

Conclusions

This paper contributes to the knowledge about species of the Caryophylaceae family's distribution in Romania in the past. The Mureş County Museum collection of Caryophyllaceae consists of 351 herbarium sheets with 83 species and 6 subspecies belonging to 18 genera. The bulk of the herbarium material was collected during 1920–1960. Regarding the chorology of taxa, the specimens were collected from all parts of the country. Among these plants 28 taxa are rare, vulnerable, endangered or endemic and they are recorded in the Romanian red lists. From the Red Book of Romania, 12 species can be met in this checklist.

The collection has a number of important aspects: firstly because it emphasizes a part of the patrimony of our museum. Secondly, an important quality is the fact that it completes the knowledge concerning the ecology and chorology of some plants from Romania. Finally, the last reason why the collection has such importance is because of the antiquity of some species (for more than half a century) and the notoriety of the collectors.

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REVIZUIREA COLECŢIEI DE CARYOPHYLLACEAE DIN IERBARUL MUZEULUI JUDEŢEAN MUREŞ, SECŢIA DE ŞTIINŢELE NATURII

(Rezumat)

Prezenta lucrare reprezintă o contribuţie la cunoaşterea distribuţiei speciilor din familia Caryophyllaceae în trecut, în România. Materialele colectate în perioada 1872–2000 de pe aproape tot teritoriul României aparţin şi sunt conservate în ierbarul Muzeului Judeţean Mureş. Au fost analizate 351 coli de ierbar înregistrând 86 de specii şi 6 subspecii incluse în 18 genuri. Nomenclatura speciilor a fost revizuită conform cu lucrările de specialitate recente. Valoarea documentară a acestei colecţii constă în prezentarea distribuţiei geografice a locurilor de colectare. De asemenea, colecţia este valoroasă din punct de vedere ştiinţific datorită numeroaselor specii endemice, rare, aflate în diverse stadii de periclitare, pe care le conţine.