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Studii și materiale



Științele Naturii

2012

MARISIA

Studii și materiale

XXXII

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MUZEUL JUDEȚEAN MUREȘ

MARISIA

STUDII ȘI MATERIALE

XXXII

ȘTIINȚELE NATURII

Târgu-Mureș
2012

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BOTANY

CATEGORIES OF ENDANGERED PLANTS IN THE CAMPANULACEAE FAMILY, INCLUDING RED LIST OF ARGEŞ COUNTY

Valeriu ALEXIU

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Abstract: This article aims to present categories of endangered plants in the family Campanulaceae in Arges county flora. From studies so far have been identified 9 species, belonging to three zoological categories. Investigations have been made in the project “Chorology study of the zoological categories of Arges county flora to restore endangered by conventional methods of breeding and biotechnology”.

Keywords: zoological, endangered, vulnerable, lower risk, IUCN, Red List, Campanulaceae

Introduction

The **IUCN Red List of Threatened Species** (also known as the **IUCN Red List** or **Red Data List**), founded in 1948, is the world's most comprehensive inventory of the global conservation status of plant and animal species.

Species are classified in nine groups, set through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation.

- Extinct (EX) – Plant species extinct, extinguished.
- Extinct in the Wild (EW) – Species missing spontaneous, but kept in culture.
- Critically Endangered (CR) – Species with extremely high risk of extinction in the near future state spontaneous.
- Endangered (EN) – Species with very high risk of extinction in the near future spontaneous state.
- Vulnerable (VU) – Species with high risk of extinction in the near future state spontaneous.
- Lower Risk (LR) – Low risk of extinction.
- Data Deficient (DD) – Deficient information on species.
- Not Evaluated (NE) – Has not yet been evaluated against the criteria.
- Not Threatened (NT) – Rare species, less threatened, but may enter in one of the categories above in future

Materials and methods

The establishment of the protected plants was made on the basis: *Red List of extinct endangered, vulnerable and rare higher plants of Romania flora* (Boşcaiu N., Coldea Gh., Horeanu

Cl., 1994), *Rare vulnerable and endemic plants of Romania flora – The Red List* (Dihoru Gh., Dihoru Alexandrina, 1994), *The Red List of higher plants of Romania flora* (Oltean M., Negrean G., Popescu A., Roman N., Dihoru G., Sanda V., Mihăilescu S., 1994), *Critical list of vascular plants in Romania*, (Oprea A., 2005), *Argeş county cormoflora* (Alexiu V., 2008), *Red book of vascular plants in Romania* (Dihoru G., Negrean G., 2009).

Abbreviations: Al – Albania, Au – Austria, Be – Belgium, Bu – Bulgaria, Cz – Czech Republic, E.C. – Central-Europe, Ga – France, Ge – Germany, Gr – Greece, He – Switzerland, Ho – Netherlands, Hs – Spain, Hu – Hungary, It – Italy, Ju – Jugoslavia, Po – Poland, Rm – Romania, Rs (W) – Western Russia, Tu – Turkey.

For each species are presented: Synonymies, common name, areal, frequency in Romania, IUCN Category, Location in Argeş county.

Results

In Argeş county have been identified 9 species belonging to different zoological categories: 1 species Vulnerable (VU), 6 species Not Threatened (NT) 2 species Lower Risk (LR)

***Campanula carpatica* Jacq.**

European area: Cz Po Rm Rs (W)

Frequency in Romania: Frequently

IUCN Category: NT, Carpathians endemic

Located in Argeş: Râiosu-Buda Mountains, Buda Valley (STANCU Ileana Daniela, 2005), Piatra Craiului Massif: Dâmbovicioara (HARALAMB AT., 1946; GRECESCU D., 1898; DRĂGHICI Bibica, 1994; SÂRBU Anca (coord.), et al., 2007; SĂVULESCU TR. (coord. pp.), 1952–1976; ALEXIU V., 2008), Great Valley in Grind (DRĂGHICI BIBICA, 1994), Brustureului Gorges, Marele Grohotiş (POP O., 2006; SÂRBU Anca (coord.), et al., 2007), Ghimbav Mountains: Crovului Gorges, Ghimbav Gorges, Dâmboviţa's Large Gorges, Cheia Gorges, Cheiţa Gorges (ALEXIU V., 1998; DIACONESCU Floriţa, 1971; NEBLEA Monica, 2007; UDUDEC R.V., POP O., 2006), Iezer-Păpuşa Mountains: Dâmboviţa's Small Gorges (ALEXIU V., 1998), Leoata Mountains: Bădenilor Valley (NEBLEA Monica, 2007; ALEXIU, 2008), Făgăraş Mountains: Negoiu peak (SĂVULESCU TR. (coord. pp.), 1952–1976).

***Campanula patula* L. subsp. *abietina* (Griseb.) Simonk. (*Campanula abietina* Griseb.)**

European area: E. & S. Carpathians, and mountains of Transylvania and N. part of Balkan peninsula

Frequency in Romania: Frequently

IUCN Category: LR. Subendemic

Located in Argeş: Piatra Craiului Massif: Dâmbovicioara Gorges, Brustureului Gorges (POP O., 2006; SÂRBU Anca (coord.), et al., 2007), Dâmboviţa Valley (DANCIU M., POP O., INDREIA A., 2006), Râiosu-Buda Mountains, toward Buda Lake (STANCU Ileana Daniela, 2005), Ghimbav Mountains: Rudăriţei Gorges, Cheia Gorges, Secări (NEBLEA Monica, 2007), Dâmboviţa's Large Gorges (POP O., 2006; SÂRBU Anca (coord.), et al., 2007), Mateiaş Mountain (SĂVULESCU TR. (coord. pp.), 1952–1976), Iezer-Păpuşa Mountains: Păpuşa, Bahna Rusului, Bătrâna

Valley, Grădişteanu, Cottage Voina, Meadow Sântilii, Iezerului Valley, Colţilor Valley, Colţii lui Andrei Mari (GRECESCU D., 1898; ALEXIU V., 1998; ALEXIU, 2008), Leoata Mountains: Românescu Mountain, Tâncava Mountain, Marginea Domnească, Bădenilor Valley, Leaota Ridge (NEBLEA Monica, 2007; ALEXIU, 2008), Vâlsanului Valley (SANDA V., BARABAŞ N., ŞTEFĂNUŢ S., 2004), Făgăraş Mountains: Zârna, Paltina (SĂVULESCU TR. (coord. pp.), 1952–1976).

***Campanula transsilvanica* Schur**

European area: Bu Rm
Frequency in Romania: Occasionally
IUCN Category: VU
Located in Arges: Râiosu Mountain, Râiosului Ledge, Capra Budei (BUIA AL., TODOR I., 1948; Buia AL., colab., 1946–1947; STANCU Ileana Daniela, 2005), Făgăraş Mountains: Negoiu Peak (Săvulescu Tr. (coord. pp.), 1952–1976).

***Campanula crassipes* Heuffel**

European area: Rm Sb
Frequency in Romania: Rare
IUCN Category: NT
Located in Arges: Ghimbav Mountains: Zacotelor ledge (Diaconescu Floriţa, 1972).

***Campanula serrata* (Kit.) Hendrych (*Campanula pseudolanceolata* Pant.; *Campanula napuligera* Schur)**

European area: Cz Po Rm Rs (W)
Frequency in Romania: Frequently
IUCN Category: LR
Located in Arges: Piatra Craiului Massif: Dâmbovicioara (ALEXIU V., 1998; POP O., 2006), Brustureului Gorges (POP O., 2006; SÂRBU Anca (coord.), et al., 2007), Iezer-Păpuşa Mountains: Tămaşu Mountain, Jupâneasa Mountain, Roşu Mountain, Iezeru Mic Mountain, Iezerului Valley, Piatra Nămăeştilor, Groapele, Mogoş Valley, Comisu Mountain (ALEXIU V., 1998; Săvulescu Tr. (coord. pp.), 1952–1976; ALEXIU, 2008), Ghimbav Mountains: Dâmboviţa's Large Gorges (POP O., 2006; SÂRBU Anca (coord.), et al., 2007), Leoata Mountains: Leaota Ridge, Românescu Mountain, Tâncava Mountain (DIACONESCU Floriţa, 1971; DIACONESCU Floriţa, 1972; NEBLEA Monica, 2007), Bândeia Mountain, Ghiţu Mountain, Făgăraş Mountains: Negoiu Peak (SĂVULESCU Tr. (coord. pp.), 1952–1976).

***Campanula kladniana* (Schur) Witasek (*Campanula rotundifolia* L. subsp. *kladniana* (Schur) Tacik)**

European area: Rm
Frequency in Romania: Occasionally
IUCN Category: NT
Located in Arges: Râiosu-Buda Mountains (BUIA AL., TODOR I., 1948; STANCU Ileana Daniela, 2005), Ghimbav Mountains: Crovului Gorges

(DIACONESCU Florița, 1971), Piatra Craiului Massif: Dâmbovicioara Valley (SĂVULESCU Tr. (coord. pp.), 1952–1976); Iezer-Păpușa Mountains (Alexiu V., 1998).

***Symphandra wanneri* (Rochel) Heuffel**

European area: Bu Ju Rm

Frequency in Romania: Occasionally

IUCN Category: NT

Located in Arges: Râiosu-Buda Mountains: Buda Lake (STANCU Ileana Daniela, 2005; Săvulescu Tr. (coord. pp.), 1952–1976), Piscu Negru (ALEXIU, 2008); Vidraru Lake (STANCU Ileana Daniela, 2003).

***Phyteuma tetramerum* Schur**

European area: Rm Rs (W)

Frequency in Romania: Occasionally

IUCN Category: NT, Carpathians endemic

Located in Arges: Râiosu-Buda Mountains (BUIA AL., TODOR I., 1948; STANCU Ileana Daniela, 2005), Piatra Craiului Massif: Dâmbovicioara (DIACONESCU Florița, 1971; POP O., 2006; SÂRBU Anca (coord.), et al., 2007; Săvulescu Tr. (coord. pp.), 1952–1976; MIHĂILESCU Simona, 2003); Podul Dâmboviței (BORZA AL., 1946), Ghimbav Mountains: Colții lui Dumitru (DIACONESCU Florița, 1970); Crovului Gorges (ALEXIU V., 1998).

***Phyteuma confusum* A. Kerner (*Phyteuma hemisphaericum* L. subsp. *confusum* (A.Kern.)**

Nyman; *Phyteuma nanum* Schur, nom. nud.)

European area: Al Au Bu Ju Rm

Frequency in Romania: Occasionally

IUCN Category: NT

Located in Arges: Iezer-Păpușa Mountains: Bătrâna Mountain, Iezeru Mic Mountain, Iezerului Valley, Colții lui Andrei Mari, (STANCU R., ALEXIU V., BOȘCAIU N., 1993; ALEXIU V., 1998), Păpușa, Oticu (GRECESCU D., 1898), Râiosu-Buda Mountains (BUIA AL., TODOR I., 1948; STANCU Ileana Daniela, 2005; SĂVULESCU Tr. (coord. pp.), 1952–1976); Leoata Mountains: Românescu Mountain, Tâncava (BUIA AL., colab., 1946–1947; POP O., 2006; ALEXIU, 2008), Făgăraș Mountains: Bândeia Peak, Zârna Peak, Podeanu Mountain, Negoiu Peak, Capra Budei (SĂVULESCU Tr. (coord. pp.), 1952–1976); Piatra Craiului Massif (MIHĂILESCU Simona, 2003).

Conclusions

- The 12 species are classified in three zoological categories:

LR	VU	NT
2	1	6

- Vulnerable species is *Campanula transsilvanica* Schur;
- Species with low risk of vulnerability are: *Campanula serrata* (Kit.) Hendrych and *Campanula patula* L. subsp. *abietina* (Griseb.) Simonk.
- The coenotaxonomical classification of the endangered plants in the family Campanulaceae:

I. ASPLENIETEA TRICHOMANIS (Br.-Bl. in Meier et Br.-Bl. 1934) Oberdorfer 1977

TORTULO-CYMBALARIETALIA Segal 1969

Cymbalario-Asplenion Segal 1969 em. Mucina 1993

- *Asplenietum trichomano-rutae-murariae* Kuhn 1937, Tx. 1937
 - *Campanula carpatica* Jacq.

Cystopteridion Richard 1972

- *Asplenio-Cystopteridetum fragilis* Oberd. (1936) 1949
 - *Campanula carpatica* Jacq.
- *Asplenio quadrivalenti* – *Poëtum nemoralis* Soó ex Gergely et al. 1966
 - *Campanula carpatica* Jacq.
- *Asplenio* – *Poëtum nemoralis* Boşcaiu 1971 *veronicetosum bachofenii* (Borza 1959) Boşcaiu 1971
 - *Symphyandra wanneri* (Rochel) Heuffel
- *Thymo pulcherrimi* – *Poëtum rehmanii* Coldea (1986) 1990
 - *Campanula kladniana* (Schur) Witaszek

ANDROSACETALIA VANDELII Br.-Bl. in Meier et Br.-Bl. 1934

Asplenion septentrionalis Oberdorfer 1938

- *Asplenio* – *Poëtum nemoralis* Boşcaiu 1971 *veronicetosum bachofenii* (Borza 1959) Boşcaiu 1971
 - *Symphyandra wanneri* (Rochel) Heuffel

Silenion lerchenfeldianae

- *Senecio glaberrimi* – *Silenetum lerchenfeldianae* Boşcaiu, Täuber, Coldea 1977
 - *Campanula kladniana* (Schur) Witaszek
- *Sileno lerchenfeldianae* – *Potentilletum haynaldianae* (Horvat, Pawl. et Walas 1937) Simon 1958
 - *Symphyandra wanneri* (Rochel) Heuffel

ARTEMISIETALIA PETROSAE Sandaet al. 2001

Gypsophilion petraeae Borhidi et Pócs 1957

- *Saxifraga luteoviridis* – *Silenetum zawadzskii* Pawl. et Walas 1949
 - *Campanula carpatica* Jacq.
 - *Campanula kladniana* (Schur) Witaszek
- *Artemisia petrosae* – *Gypsophiletum petraeae* Puşcaru et al. 1956
 - *Campanula carpatica* Jacq.
 - *Campanula kladniana* (Schur) Witaszek

- *Saxifraga moschatae* – *Drabetum kotschy* Puşcaru *et al.* 1956
 - *Campanula carpatica* Jacq.
- *Saxifraga rocheliana* – *Gypsophiletum petraeae* Boşcaiu, Täuber, Coldea 1977
 - *Campanula kladniana* (Schur) Witasek
- *Saxifraga demissae* – *Gypsophiletum petraeae* Boşcaiu *et* Täuber 1977
 - *Campanula kladniana* (Schur) Witasek

Micromerion pulegii Boşcaiu (1971) 1979

- *Campanuletum crassipedis* Borza ex Schneider-Binder *et al.* 1970
 - *Campanula crassipes* Heuffel

II. THLASPIETEA ROTUNDIFOLII Br.-Bl. 1926

THLASPIETALIA ROTUNDIFOLII Br.-Bl. 1926

Achnatherion calamagrostis Br.-Bl. 1918

- *Thymo comosi* – *Galietum albi* Sanda, Popescu 1999
 - *Campanula carpatica* Jacq.

III. JUNCETEA TRIFIDI Klika *et* Hadač

CARICETALIA CURVULAE Br.-Bl. in Br.-Bl. *et* Jenny 1926

Caricion curvulae Br.-Bl. in Br.-Bl. *et* Jenny 1926

- *Primulo minima* – *Caricetum curvulae* Br.-Bl. 1926 em. Oberdorfer 1957
 - *Phyteuma confusum* A. Kerner
- *Potentillo chrysocraspedae* – *Festucetum airoidis* Boşcaiu 1971
 - *Campanula serrata* (Kit.) Hendrych
 - *Phyteuma confusum* A. Kerner
- *Oreochloa* – *Juncetum trifidi* Szafer *et al.* 1927
 - *Phyteuma confusum* A. Kerner

Loiseleurio-Vaccinon Br.-Bl. 1926

- *Cetrario* – *Loiseleurietum procumbentis* Br.-Bl. *et al.* 1939
 - *Phyteuma confusum* A. Kerner
- *Empetro-Vaccinietum gaultherioidis* Br.-Bl. in Br.-Bl. *et* Jenny 1926 corr. Graebherr in Graebherr *et* Mucina 1993
 - *Phyteuma confusum* A. Kerner

IV. NARDO-CALLUNETEA Preising 1949

NARDETALIA Oberdorfer 1949

Potentillo-Nardion Simon 1959

- *Scorzonero roseae* – *Festucetum nigricantis* (Puşcaru *et al.* 1956) Coldea 1978
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
 - *Campanula serrata* (Kit.) Hendrych
- *Viola declinata* – *Nardetum* Simon 1966
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
 - *Campanula serrata* (Kit.) Hendrych
- *Poëtum mediae* Csürös *et al.* 1956
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai

Genistion pillosae Duvigneaud Bükér 1942

- *Vaccinio* – *Callunetum vulgaris* Bük. 1942
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
 - *Campanula serrata* (Kit.) Hendrych

V. SESLERIETEA ALBICANTIS Br.-Bl. 1948 em. Oberdorfer 1978

SESLERIETALIA ALBICANTIS Br.-Bl. in Br.-Bl. et Jeny 1926

Seslerion rigidae Zólyomi 1939

- *Seslerietum filifoliae* Zólyomi 1939
 - *Campanula crassipes* Heuffel

VI. MULGEDIO-ACONITETEA Hadač et Klika in Klika 1948

ADENOSTYLETALIA ALLIARIAE Br.-Bl. 1931

Adenostylion alliariae Br.-Bl. 1925

- *Cirsio waldsteinii* – *Heracleetum transsilvanici* Pawl. et Walas 1949
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
- *Adenostylo-Doronacetum austriaci* Horvat 1956
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
- *Salici* – *Alnetum viridis* Colic et al. 1962
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai

Calamagrostion villosae Pawlowski et al. 1928

- *Trisetum fuscum* – *Salicetum hastatae* Coldea (1986) 1990
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai

VII. QUERCO-FAGETEA Br.-Bl. et Vlieger in Vlieger 1937 em. Borhidi 1996

QUERCETALIA ROBORIS R. Tüxen 1931

Pino-Quercion Medweka-Kornás et Pawlowski 1959, Ružička 1964 em. Soó 1971

- *Leucobryo* – *Pinetum* Matusz 1962
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai

VIII. ERIKO-PINETEA I. Horvat 1959

ERIKO-PINETALIA I. Horvat 1959

Seslerio rigidae-Pinion Coldea 1991

- *Juniperetum sabinae* Csürös 1958
 - *Campanula serrata* (Kit.) Hendrych
- *Carici humilis-Pinetum banatici* Popescu et Sanda 1999
 - *Campanula kladniana* (Schur) Witasek

IX. VACCINIO-PICEETEA Br.-Bl. in Br.-Bl. et al. 1939

PICEETALIA EXCELSAE Pawlowski in Pawlowski et al. 1928

Piceion excelsae Pawlowski in Pawlowski et al. 1928

Soldanello majori-Picenion Coldea 1991

- *Hieracio transsilvanici-Piceetum* Pawlowski et Br.-Bl. 1939
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
- *Doronico columnae-Piceetum* Coldea 2002
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai

ATHYRIO-PICEETALIA Hadač 1962

Chrysanthemo rotundifolii-Piceion (Krajina 1933) Březina et Hadač in Hadač 1962

- *Leucanthemo waldstenii-Piceetum* Krajina 1933
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai

Rhododendro – Vaccinion Br.-Bl. ex G. Br.-Bl. et Br.-Bl. 1931

- *Rhododendro myrtifolii-Vaccinietum* (Borza 1959) Boşcaiu 1971
 - *Campanula kladniana* (Schur) Witasek
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
 - *Campanula serrata* (Kit.) Hendrych

JUNIPERO – PINETALIA Boşcaiu 1971

Pinion mugi Pawlowski 1928

- *Rhododendro myrtifolii-Piceetum* Coldea et Pânzaru 1986
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
- *Rhododendro myrtifolii-Pinetum mugi* Borza 1959 em. Coldea 1985
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
- *Bruckenthalio-Piceetum* Borhidi 1969
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
- *Saxifraga cuneifoliae-Laricetum* (Beldie 1969) Coldea 1991
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai

Junipero – Bruckenthalion Horvat 1936

- *Junipero – Bruckenthalietum* Horv. 1936 *daphnetosum blagayanae* Onete 2002
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
- *Campanulo abietinae-Juniperetum* Simon 1966
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
 - *Campanula serrata* (Kit.) Hendrych
- *Campanulo abietinae – Vaccinietum* (Buia et al. 1962) Boşcaiu 1971
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai
 - *Campanula serrata* (Kit.) Hendrych

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**CATEGORII DE PLANTE PERICLITATE DIN FAMILIA CAMPANULACEAE,
INCLUSE ÎN LISTA ROȘIE A JUDEȚULUI ARGEȘ
(Rezumat)**

Lucrarea își propune să prezinte speciile de plante din familia Campanulaceae, din Lista Roșie a județului Argeș, aflate în diferite grade de vulnerabilitate. Cele 9 specii identificate sunt încadrate în trei categorii zoologice: vulnerabile (VU), cu risc scăzut de dispariție (LR) și neevaluate (NT). Investigațiile au fost efectuate în cadrul Proiectului „Studiu corologic al categoriilor zoologice din flora județului Argeș pentru refacerea fitopopulațiilor periclitare prin metode convenționale și biotehnologice de înmulțire”.



Fig. 1: *Campanula carpatica* Jacq.



Fig. 2: *Campanula serrata* (Kit.) Hendrych



Fig. 3: *Phyteuma confusum* A. Kerner

THE MEDICINAL FLORA OF MUREȘ COUNTY REFLECTED IN MUREȘ COUNTY MUSEUM, NATURAL SCIENCE DEPARTMENT COLLECTIONS

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Abstract: The patrimony of Mureș County Museum, Natural Science Department contain numerous collections whose documentary and scientific value is undisputed. Botanical collection of the museum comprises approximately 20000 pieces from field researches, donations and purchases. Among these species, medicinal plants have a remarkable share.

The objective of this study is to present the medicinal plants of museum's collection, collected from Mureș County, in order to complete the floristic inventory of this area and thus have a clearer picture of the floristic diversity of the vegetation cover and its evolution.

The inventory of medicinal flora present in the collections of Mureș County Museum, Natural Science Department has led to the identification of 302 taxa containing certain therapeutic chemical compounds. The taxa were enrolled in 69 families. The best represented families are Lamiaceae (31 species), Asteraceae (27 species), Rosaceae (23 species), Apiaceae and Scrophulariaceae (18 species each) and Fabaceae (17 species).

Medicinal plants were grouped by dominant active principles they are used in traditional medicine, namely phytotherapy. Thus, we see that the largest plants contain alkaloids (16.89%), essential oils (13.25%), tannins (11.59%), flavonoids (11.26%), saponins (7.62%), mucilage (6.95%), and coumarin (4.97%).

Keywords: medicinal plants, active principles, Mureș County Museum collections

Introduction

The objective of this study is to present the species of medicinal plants from the museum's collection, collected from Mureș County, in order to complete the floristic inventory of the area and thus have a clearer picture of the floristic diversity of the vegetation cover and its evolution.

Aromatic and medicinal plants are an inexhaustible source of raw materials for food industry, pharmaceutical industry, etc. Mankind has used natural resources since its early history.

Romania's resources in this area are very diverse. 3700 species vegetate in the wild flora, of which 800 species have defined phytotherapeutical properties, and 370 species have well-known attributes with pharmacodynamic effects.

Medicinal plants are an important natural wealth of Mureș County. Establishment of plant gene pool of therapeutic interest can be achieved by plant inventory by location, as it plays the correct territorial spread of medicinal plants, in conjunction with various phytocenosis to which they belong and with ecological factors.

Studies on medicinal spontaneous flora in Mureș county led to the identification of 304 species of medicinal plants [11].

The patrimony of the Division of Natural Sciences at the Mureș County Museum includes many collections, whose scientific and documentary value is undisputed. Botanical collection of the museum comprises approximately 20,000 pieces from field research, donations and purchases. Among these pieces, medicinal species have a remarkable share.

Mureș County is located in north-central Romania, with an area of 6696 km². It has a varied landscape, with differentiated climate on altitude, from the abundance of rainfall in the mountains to the arid steppe of the Transylvanian Plain.

The mountainous area is represented by Călimani and Gurghiului Mountains. Călimanilor mountainous cones are composed of andesite, and volcanic plateaus, formed of agglomerates, are covered with mountain pastures with small marshy areas. In the Gurghiului Mountains, volcanic cones seem intertwined, plateaus are wider and smooth. The narrow Mureș Gorge, with very close slopes, is the largest section through the volcanic chain in Eastern Transylvanian Basin.

The transition from the mountains to Transylvania Plateau is through hilly and lowland regions.

Târnavelor Plateau is a hilly plateau, slightly curled, with cuesta landforms and asymmetrical slopes, affected by landslides, characterized by the presence of gas domes.

Transylvanian Plain, north of Mureș, appears as a geographical region with original features which confers it a touch of distinction. The landscape is characterized by a series of hills at an average altitude of 400 m, with depressions which reach over 200 m from the local base, valleys carved in clay, marl and Sarmatian sands, rare volcanic tuffs with eroded flanks and muddy flows, landslides that sometimes cross rivers, forming lakes that today are arranged in large ponds. Coastal slopes have usually western or southern orientation.

From a climate perspective, Mureș county lies in the temperate continental climate, of interference between the hills and the mountains. Annual average temperatures have values of 8 and 9 ° C in the west and between 2–4 ° C in the east. Term average precipitation ranges from 550 mm / year and 1000 to 1200 mm / year. Prevailing winds are from the west and north-west, with medium intensity and frequency.

From the highest peaks of the mountains and down to the low plains of the rivers, we meet a wide range of regional, intrazonal and azonal soils.

Mountain brown, yellowish brown podzolic or brown acid alpine meadows, acid brown forest and podzolic feriluvial soils are specific to the mountainous areas and young soils of scree and also skeletal soils are specific to the slopes.

In hilly and plateau area, most common are dark brown forest soils, sometimes clay-illuviated, podzolic clay-illuviated pseudogleized, brown chernozem forest soils, erosion and colluvial soils at the slopes base.

In the Transylvanian Plain region, forest brown soils predominate, especially chernozems leachates, wet meadow black soils, yellowish coastal and eroded soils, chernozem levigated wet freatic and groundwater leachate and humic gley [15].

Material and methods

Inventory was done according to the dominant active principles in the species analyzed. 1555 herbarium sheets of plants belonging to 69 families were processed.

Within families, the plants were inventoried in alphabetical order of genres, and within genres, in the alphabetical order of the species.

Plant nomenclature was revised in accordance with Flora Europaea [17,18] and Ciocârlan V. [2].

The specified data are mentioned for each species: date and place of collection, the name of whom collected it and of whom determined the plant. In brackets are also mentioned the inventory numbers of the herbarium sheets included in inventory registries Superior Plants (I, II and III) of the Department of Natural Sciences.

Results and discussions

Botanical collection of the museum comprises about 20,000 pieces from field research, donations and purchases.

Inventory of medicinal flora of Mureş County present in the collections of the Division of Natural Sciences has led to the identification of 302 taxa containing certain therapeutic chemical compounds, grouped in 69 families. The best represented families are: Lamiaceae (31 species), Asteraceae (27 species), Rosaceae (23 species), Apiaceae and Scrophulariaceae (18 species each) and Fabaceae (17 species).

Medicinal plants were grouped according to the dominant active ingredients for which they are used in traditional medicine or in phytotherapy (Table 1). Thus, we see that the numerous plants contain: alkaloids (16.89%), essential oils (13.25%), tannins (11.59%), flavonoids (11.26%), saponins (7.62%), mucilage (6.95%), and coumarin (4.97%). Today's special interest worldwide for herbal medicine, in which phytotherapy occupies a privileged place, can sometimes have negative repercussions for the conservation of plant species of wild flora, species that are included in national or European red lists.

In the museum's collections are found a number of medicine taxa, in various degrees of endangerment, such as: *Aconitum moldavicum*, *Adonis vernalis*, *Alcea pallida*, *Angelica archangelica*, *Dictamnus albus*, *Galanthus nivalis*, *Leucojum vernum*, *Lycopodium clavatum*, *Orchis morio*, *Prunus tenella* etc.

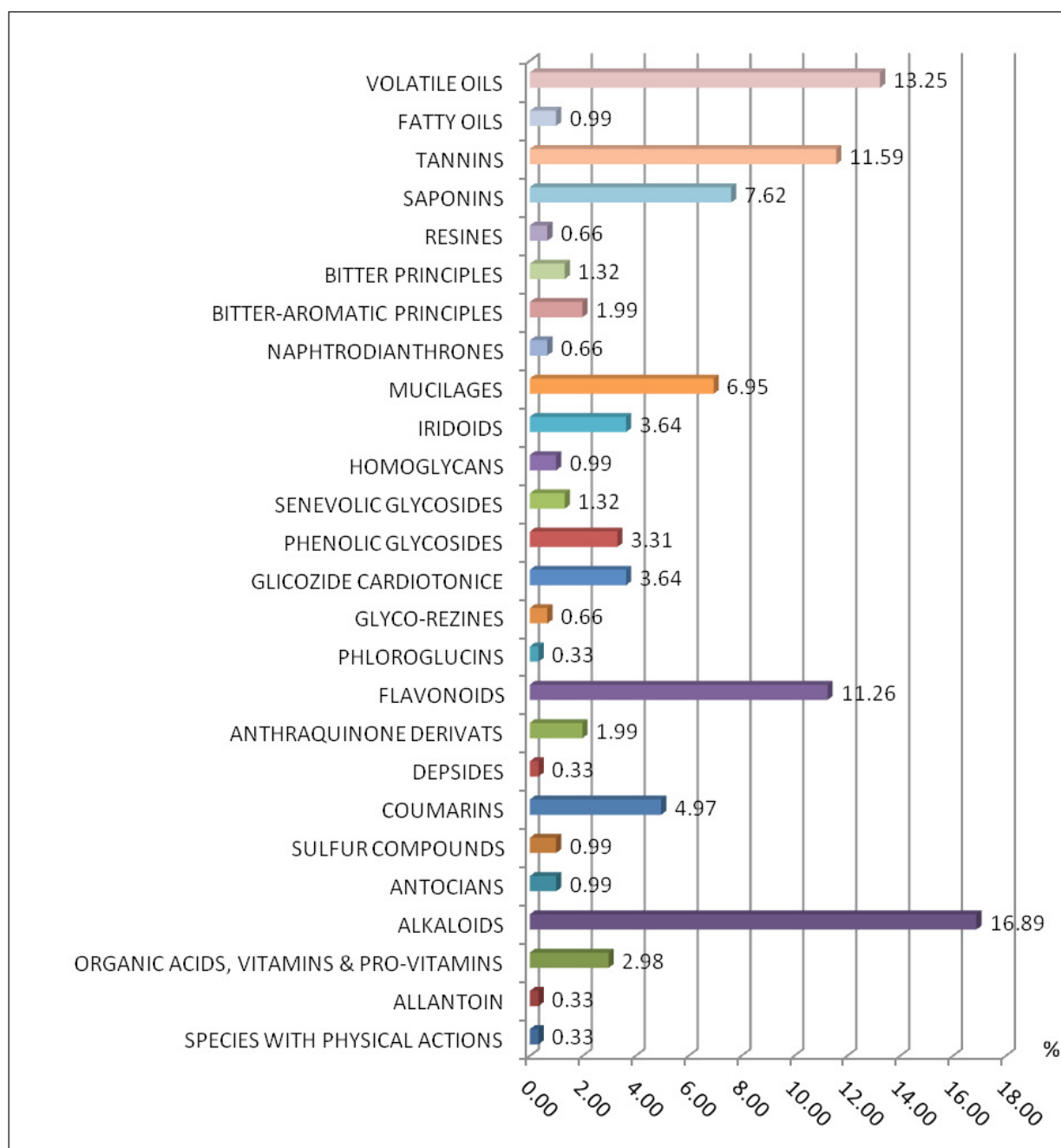


Fig. 1: The analysis of studied taxa by dominant active ingredients

Table 1: The dominant active principles of Mureș county spontaneous medicinal plants identified in museum's collections

THE DOMINANT ACTIVE PRINCIPLES	FAMILY	TAXA	COLLECTING DATA
SPECIES WITH PHYSICAL ACTIONS	LYCOPODIACEAE	<i>Lycopodium clavatum</i> L.	Săcădat, 14.04.1936, Nagy Ödön (7996)
HOMOGLYCANS	ASTERACEAE	<i>Arctium lappa</i> L.	Târgu-Mureș, at the border of Sântana de Mureș, 12.08.1939, Nagy Ödön (2689)
	CUCURBITACEAE	<i>Bryonia alba</i> L.	Sântana de Mureș, 12.08.1939, Nagy Ödön (2690)
	POACEAE	<i>Elymus repens</i> (L.) Gould (<i>Agropyron repens</i> (L.) Beauv.)	Târgu-Mureș, 07.07.1947, Nagy Ödön (2740)
			Târgu-Mureș, 14.06.1944, Nagy Ödön (2741)
			Târgu-Mureș, Mureșeni Forest, 02.06.1943, Nagy Ödön (1808)
			Târgu-Mureș, Beșa, 19.06.1942, Nagy Ödön (1809)
			Târgu-Mureș, 14.06.1942, Nagy Ödön (1810)
			Târgu-Mureș, 15.06.1946, Nagy Ödön (1811)
			Târgu-Mureș, 22.06.1938, Nagy Ödön (1812)
			Târgu-Mureș, Kali spring, 1939, Nagy Ödön (1813)
			Sângeorgiu de Mureș, 21.06.1943, Nagy Ödön (1814)
			Târgu-Mureș, toward Platoul Cornești, 18.06.1944, Nagy Ödön (1815)
MUCILAGES	MALVACEAE	<i>Alcea pallida</i> (Willd.) W. et K. (syn. <i>Althaea pallida</i> Willd.)	Târgu-Mureș, airport, 29.08.1941, Nagy Ödön (697, 698, 699)
	MALVACEAE	<i>Althaea officinalis</i> L.	Târgu-Mureș, Pocloș stream bank, 01.09.1953, Nagy Ödön (700)
			Târgu-Mureș, "Dâmbul cu Comoară", 350 m altit., 27.09.1938, Nagy Ödön (701)
			Târgu-Mureș, toward Sângeorgiu de Mureș, 07.09.1951, Nagy Ödön (702)
			Târgu-Mureș, on the border of Mureșeni, 308 m altit., 13.09.1937, Nagy Ödön (703)
			Târgu-Mureș, "Râul cu scoici", 309 m altit., 21.07.1940, Nagy Ödön (704)
			Târgu-Mureș, Mureș river shore, 06.07.1950, Nagy Ödön (705)
			Târgu-Mureș, Pocloș stream bank, 24.07.1939, Nagy Ödön (706)
			Târgu-Mureș, Corunca park, 340 m altit., 03.06.1939 (707)
			Târgu-Mureș, Mureș river shore, 01.10.1958, Nagy Ödön (4590)
			Vidrasău, Mureș river shore, 19.06.1992, Silvia Oroian (7847)

BORAGINACEAE	<i>Anchusa officinalis</i> L.	Târgu-Mureș, 21.06.1942, Nagy Ödön (359) Târgu-Mureș, Mureș river shore, 31 m altit., 03.06.1938, Nagy Ödön (360) Târgu-Mureș, Platoul Cornești, 480 m altit., 03.05.1935, Nagy Ödön (361) Târgu-Mureș, near Beșa forest, 03.06.1951, Nagy Ödön (362) Târgu-Mureș, Mureș dam, 310 m altit., 24.05.1939, Nagy Ödön (363) Târgu-Mureș, 11.06.1942, Nagy Ödön (364) Băgaciu, 1872 (5442) Reghin, 02.05.2000, Mihaela Sămărghițan (11208)
ASTERACEAE	<i>Antennaria dioica</i> (L.) Gaertner	Târgu-Mureș, 1939, Nagy Ödön (2678, 2687) Băgaciu, 1872 (5421)
BORAGINACEAE	<i>Borago officinalis</i> L.	Sângeorgiu de Mureș, 06.07.1955, Nagy Ödön (367)
MALVACEAE	<i>Hibiscus trionum</i> L.	Târgu-Mureș, Platoul Cornești, 380 m altit., 05.08.1947, Nagy Ödön (693) Târgu-Mureș, Platoul Cornești, 450 m altit., 27.09.1937, Nagy Ödön (694) Târgu-Mureș, Platoul Cornești, 380 m altit., 24.09.1948, Nagy Ödön (695)
MALVACEAE	<i>Lavatera thuringiaca</i> L.	Târgu-Mureș, Budiu Hill, 350 m altit., 01.09.1937, Nagy Ödön (688) Porumbeni, 20.08.1947, Nagy Ödön (689, 690) Târgu-Mureș, Mureș river shore, 26.09.1951, Nagy Ödön (691) Târgu-Mureș, 24.06.1950, Nagy Ödön (692) Săbed, Corhan Hill, 18.08.1980, Silvia Oroian (5793, 5806) Zau de Câmpie, the hill near reserve, 12.07.1991, Silvia Oroian (7849) Reghin, 11.07.2000, Mihaela Sămărghițan (11251)
LINACEAE	<i>Linum catharticum</i> L.	Târgu-Mureș, 1 Mai Hill, 16.06.1936, Nagy Ödön (1626) Băgaciu, 1872 (5441) Săbed, Corhan Hill, northern slope, 29.05.1981, Silvia Oroian (7863) Sântana de Mureș, orchard, 05.06.1990, Silvia Oroian (7864)
LINACEAE	<i>Linum flavum</i> L.	Târgu-Mureș, Platoul Cornești, 10.05.1937, Nagy Ödön (1628) Târgu-Mureș, Platoul Cornești, 12.06.1936, Nagy Ödön (1629) Târgu-Mureș, Platoul Cornești, 17.06.1944, Nagy Ödön (1630) Târgu-Mureș, the base of Halmok Hill, 10.06.1939, Nagy Ödön (1631) Zau de Câmpie, 12.07.1991, Silvia Oroian (7860)
LINACEAE	<i>Linum hirsutum</i> L.	Târgu-Mureș, the base of Halmok Hill, 27.09.1938, Nagy Ödön (1627) Lechința de Mureș, landslides, 02.07.1985, leg. Sarkany Andrei, det. Silvia Oroian (7862)
LINACEAE	<i>Linum usitatissimum</i> L.	Porumbeni, 26.07.1948, Nagy Ödön (1632, 1633) Porumbeni, 25.08.1947, Nagy Ödön (1634)

MALVACEAE	<i>Malva sylvestris</i> L.	Târgu-Mureş, Budiş Hill, 450 m altit., 26.05.1936, Nagy Ödön (686) Târgu-Mureş, plough land, 300 m altit., 28.08.1936, Nagy Ödön (687) Târgu-Mureş, the base of Mare Hill, 12.06.1956, Nagy Ödön (4573) Băgaciu, 1872 (5431) Vidrasău, Mureş river shore, 19.06.1992, Silvia Oroian (7848)
ORCHIDACEAE	<i>Orchis morio</i> L.	Târgu-Mureş, 350 m altit., 18.05.1938, Nagy Ödön (493) Târgu-Mureş, Platoul Corneşti 450 m altit., 14.05.1939, Nagy Ödön (494) Târgu-Mureş, 350 m altit., 11.05.1937, Nagy Ödön (495) Băgaciu, 1886 (5499) Zau de Câmpie, 06.07.1981, leg. Eftenie Ioan, det. Silvia Oroian (5678) Deda Bistra, Scaunul Domnului, 15.06.1960, leg. Konya Isrvan, det. Silvia Oroian (55752) Gurghiu, Poiana Narciselor, 05.05.1992, Silvia Oroian (7520) Gurghiu, the hill near Poiana Narciselor, 06.06.1991, Silvia Oroian (7690) Gurghiu, pasture, 04.05.1991, Silvia Oroian (7700) Răstoliţa, Podirei, 18.05.1995, leg. Silvia Oroian, det. Mihaela Sămărghişan (11134) Răstoliţa, Podirei, 02.06.1995, leg. Silvia Oroian, det. Mihaela Sămărghişan (11135) Târgu-Mureş, Medicinal Plants Garden of UMF, 10.07.1952
PLANTAGINACEAE	<i>Plantago arenaria</i> W. et K. (syn. <i>Plantago psyllium</i> L.)	
PLANTAGINACEAE	<i>Plantago lanceolata</i> L.	Sângeorgiu de Mureş, 03.07.1950, Nagy Ödön (556) Târgu-Mureş, Platoul Corneşti, 16.06.1948, Nagy Ödön (557) Târgu-Mureş, Mare Hill, 03.07.1948, Nagy Ödön (558) Târgu-Mureş, "Râţul cu scoici", 316 m altit., 23.07.1947, Nagy Ödön (559) Târgu-Mureş, "Râţul cu scoici", 316 m altit., 23.06.1947, Nagy Ödön (560) Porumbeni, 21.07.1946, Nagy Ödön (561) Sângeorgiu de Mureş, 21.06.1943, Nagy Ödön (562) Sângeorgiu de Mureş, salty baths, 21.07.1956, Nagy Ödön (563) Fărăgău Lake, 03.06.1976, Sarkany A. (5851) Gurghiu, Poiana Narciselor, 02.06.1992, Silvia Oroian (7676) Răstoliţa, Podirei, 20.06.1993, Silvia Oroian (11153) Răstoliţa, 26.09.1993, Silvia Oroian (11154) Răstoliţa, 01.08.1993, Silvia Oroian (11155) Stănceni, Leu Mountain, 1995, Silvia Oroian (11156) Răstoliţa, 01.08.1993, Silvia Oroian (11157)
PLANTAGINACEAE	<i>Plantago major</i> L.	Bedeni, 30.05.1939, Nagy Ödön (564) Târgu-Mureş, airport, 28.08.1941, Nagy Ödön (565)

PLANTAGINACEAE	<i>Plantago media</i> L.	Târgu-Mureș, 15.05.1937, Nagy Ödön (566) Târgu-Mureș, plough land, 300 m altit., 12.05.1936, Nagy Ödön (567) Sânpaul, 27.05.1939, Nagy Ödön (568) Târgu-Mureș, Platoul Cornești, 05.06.1943, Nagy Ödön (569) Târgu-Mureș, Mare Hill, 380 m altit., 03.07.1948, Nagy Ödön (570) Târgu-Mureș, 250 m altit., 23.05.1939, Nagy Ödön (571) Porumbeni, 22.08.1946, Nagy Ödön (575) Zau de Câmpie, 06.07.1981, leg. Eftenie Ioan, det. Silvia Oroian (5699) Sângeriu de Mureș, 07.1959, Konya Istvan (5881) Răstolița, podirei, 26.09.1993, Silvia Oroian (11158) Bistra Mureșului, 30.05.1993, Silvia Oroian (11159) Stânceni-Meștera, Leu Mountain, 09.06.1996, Silvia Oroian (11160) Meștera, Gurghiu Mountains, 04.06.1995, leg. Florentina Toghănel, det. Silvia Oroian (11161) Stânceni, Ciobotani, 18.05.1995, Silvia Oroian (11162)
BRASSICACEAE	<i>Sinapis alba</i> L.	Târgu-Mureș, Botanical Garden of UMF, 16.06.1952, Nagy Ödön (2516)
ASTERACEAE	<i>Tussilago farfara</i> L.	Târgu-Mureș, Mureș river shore, 1936, Nagy Ödön (2412) Târgu-Mureș, 26.02.1937, Nagy Ödön (2413) Târgu-Mureș, Stejăriș forest, 08.03.1936, Nagy Ödön (2414) Târgu-Mureș, the base of Dealului Halmok, 18.04.1939, Nagy Ödön (2415) Târgu-Mureș, plough land, 08.03.1936, Nagy Ödön (2416) Corunca, 09.05.1939, Nagy Ödön (2417) Târgu-Mureș, Mureș river shore, 16.04.1939, Nagy Ödön (2418) Târgu-Mureș, 1938, Nagy Ödön (2419) Băgaciu, 1872 (5365, 5458)
SCROPHULARIACEAE	<i>Verbascum phlomoides</i> L.	Porumbeni, 03.08.1948, Nagy Ödön (2051) Târgu-Mureș, 28.08.1941, Nagy Ödön (2052)
SCROPHULARIACEAE	<i>Verbascum phoeniceum</i> L.	Târgu-Mureș, Corunca, 03.06.1939, Nagy Ödön (2050)
SENEVOLIC GLYCOSIDES		
BRASSICACEAE	<i>Brassica nigra</i> (L.) Koch	Târgu-Mureș, Medicinal Plants Garden of UMF, 20.06.1952, Nagy Ödön (3162)
BRASSICACEAE	<i>Raphanus raphanistrum</i> L.	Târgu-Mureș, the citadel's wall, 05.06.1942, Nagy Ödön (2446) Târgu-Mureș, near Trebely, 03.07.1943, Nagy Ödön (2447) Târgu-Mureș, 03.06.1942, Nagy Ödön (2451)
BRASSICACEAE	<i>Raphanus sativus</i> L.	Târgu-Mureș, vineyard of Mare Hill, 03.07.1948, Nagy Ödön (2448) Târgu-Mureș, garden, 05.07.1938, Nagy Ödön (2449) Târgu-Mureș, Mureș river dead branch, 10.06.1936, Nagy Ödön (2450)

	BRASSICACEAE	<i>Sisymbrium officinale</i> (L.) Scop.	Târgu-Mureş, Beşa, 19.06.1942, Nagy Ödön (2474) Târgu-Mureş, 06.07.1940, Nagy Ödön (2475) Târgu-Mureş, plough land, 08.06.1936, Nagy Ödön (2476, 2477) Târgu-Mureş, toward Budiu, 26.05.1936, Nagy Ödön (2478) Târgu-Mureş, plough land, 30.05.1937, Nagy Ödön (2479)
PHENOLIC GLYCOSIDES	ROSACEAE	<i>Filipendula ulmaria</i> (L.) Maxim.	Gurghiu, Poiana Narciselor, 05.05.1992, Silvia Oroian (7603) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7610)
	SALICACEAE	<i>Populus nigra</i> L.	Târgu-Mureş, Mureş river shore, 11.05.1937, Nagy Ödön (2313) Târgu-Mureş, hippodrome, 07.1959, leg. Konya Istvan, det. Silvia Oroian (5997) Gurghiu, school, 10.06.1967, Ion Parachi (7139)
	SALICACEA	<i>Populus tremula</i> L.	Sângeorgiu de Mureş, 19.10.1938, Nagy Ödön (986) Târgu-Mureş, 25.10.1938, Nagy Ödön (988) Târgu-Mureş, Platoul Corneşti, 05.10.1937, Nagy Ödön (994) Târgu-Mureş, 28.04.1941, Nagy Ödön (2315) Târgu-Mureş, Cocoşd forest, 26.03.1935, Nagy Ödön (2316) Târgu-Mureş, Platoul Corneşti, 04.04.1938, Nagy Ödön (2317) Târgu-Mureş, Stejăriş forest, 23.05.1938, Nagy Ödön (2318) Târgu-Mureş, Stejăriş forest, 11.05.1936, Nagy Ödön (2319) Târgu-Mureş, Beşa forest, 05.1953, leg. Konya Istvan, det. Silvia Oroian (5995)
	ROSACEAE	<i>Pyrus pyraister</i> Burgsd.	Târgu-Mureş, Platoul Corneşti, 13.05.1939, Nagy Ödön (1909) Târgu-Mureş, Platoul Corneşti, 28.04.1939, Nagy Ödön (1912) Gurghiu, Poiana Narciselor, 05.05.1992, Silvia Oroian (7605)
	SALICACEAE	<i>Salix alba</i> L.	Târgu-Mureş, toward Budiu, 17.05.1937, Nagy Ödön (2289) Târgu-Mureş, Mureş river shore, 26.04.1936, Nagy Ödön (2292) Târgu-Mureş, 1 Mai Hill, leg. Babos Bertalan, det. Silvia Oroian (7146) Răşoliţa, Lîsteş, 12.04.1991, Silvia Oroian (7149) Vidrasău, Mureş river shore, 19.06.1991, Silvia Oroian (7504, 7505, 7506) Gurghiu, arboretum, 04.06.1956, I. Gergely (8753)
	SALICACEAE	<i>Salix caprea</i> L.	Târgu-Mureş, Cocoşd Forest fringe, 24.03.1937, Nagy Ödön (2293) Târgu-Mureş, Budiu Forest fringe, 24.03.1937, Nagy Ödön (2294) Târgu-Mureş, Platoul Corneşti, 1938, Nagy Ödön (2295) Târgu-Mureş, Mureşeni Forest, 20.04.1939, Nagy Ödön (2296) Târgu-Mureş, the base of Halmok Hill, 28.04.1939, Nagy Ödön (2297) Târgu-Mureş, Stejăriş forest, 23.05.1938, Nagy Ödön (2298) Târgu-Mureş, Platoul Corneşti, 04.05.1939, Nagy Ödön (2299)

SALICACEAE	<i>Salix cinerea</i> L.	Târgu-Mureș, the base of Halmok Hill, 02.09.1948, Nagy Ödön (2288) Fărăgău Lake, 20.05.1976, Konya Istvan (5860) Gurghiu, 04.05.1991, Silvia Oroian (7147) Gurghiu, Poiana Narciselor, 04.05.1991, Silvia Oroian (7148) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7503)
SALICACEAE	<i>Salix fragilis</i> L.	Târgu-Mureș, Mureș river shore, 08.05.1938, Nagy Ödön (2300) Târgu-Mureș, Pocloș stream, 08.05.1938, Nagy Ödön (2301) Porumbeni, 16.04.1947, Nagy Ödön (2303) Sântana de Mureș, 13.04.1937, Nagy Ödön (2304) Târgu-Mureș, Mureș river shore, 17.04.1937, Nagy Ödön (2305) Târgu-Mureș, Mureș river shore, 17.04.1937, Nagy Ödön (2306) Târgu-Mureș, Mureș river shore, 06.04.1937, Nagy Ödön (2307)
SALICACEAE	<i>Salix purpurea</i> L.	Târgu-Mureș, 21.04.1959, Nagy Ödön (4579)
CAPRIFOLIACEAE	<i>Viburnum opulus</i> L.	Târgu-Mureș, Stejăriș forest, 480 m altit., 30.09.1937, Nagy Ödön (484) Târgu-Mureș, Budiu Hill, 450 m altit., 17.05.1937, Nagy Ödön (485) Târgu-Mureș, Mureș river shore, 350 m altit., 12.05.1936, Nagy Ödön (486) Târgu-Mureș, Platoul Cornești, 04.06.1944, Nagy Ödön (487) Târgu-Mureș, Stejăriș forest, 380 m altit., 23.05.1938, Nagy Ödön (488) Târgu-Mureș, Coccoșd forest, 350 altit., 09.05.1936, Nagy Ödön (489) Târgu-Mureș, Mureș river shore, 300 m altit., 12.05.1937 (490) Târgu-Mureș, cultivated, 320 m altit., Nagy Ödön (491) Târgu-Mureș, Stejăriș forest, 460 m altit., Nagy Ödön (997) Orșova, 29.07.2000, Mihaela Sămărghițan (11298) Piatra Orșova, 26.07.2000, Mihaela Sămărghițan (11375) Răstolița, Mureș river shore, 30.05.1993, Silvia Oroian (11376) Răstolița, 12.07.1996, Silvia Oroian (11377) Răstolița, 24.05.1996, Silvia Oroian (11378) Răstolița, Mureș river shore, 01.08.1993, Silvia Oroian (11383)
ANTHRAQUINONE DERIVATS	<i>Frangula alnus</i> Mill.	Târgu-Mureș, Platoul Cornești, 480 m altit., 05.10.1937, Nagy Ödön (993) Târgu-Mureș, Stejăriș forest, 17.06.1953, leg. Konya Istvan, det. Silvia Oroian (6039)
POLYGONACEAE	<i>Rumex acetosa</i> L.	Târgu-Mureș, 18.05.1938, Nagy Ödön (624) Târgu-Mureș, island on Mureș river, 25.05.1948, Nagy Ödön (625) Sânpaul, 27.05.1939, Nagy Ödön (1939) Târgu-Mureș, 29.05.1939, Nagy Ödön (639) Orșova, Seci hamlet, 05.1979, Sarkany Andrei, (7168)

POLYGONACEAE	<i>Rumex acetosa</i> L.	Sântana de Mureş, Beşa hill, 05.06.1990, Silvia Oroian (7176) Gurghiu, Poiana Narciselor, 04.05.1991, Silvia Oroian (7177) Gurghiu, Poiana Narciselor, 02.06.1992, Silvia Oroian (7636) Deleni, 06.1992, Silvia Oroian (8020) Jabenița, 19.08.1994, Silvia Oroian (8023)
POLYGONACEAE	<i>Rumex acetosella</i> L.	Târgu-Mureş, Platoul Cornești, 380 m altit., 13.08.1947, Nagy Ödön (619, 620, 621) Târgu-Mureş, Stejăriș forest, 360 m altit., 06.05.1938, Nagy Ödön (622) Târgu-Mureş, near church, 380 m altit., Nagy Ödön (623) Hetiu, Sighișoara, 29.05.1984, Silvia Oroian (7164) Răstolița, 07.08.1986, Silvia Oroian (7165) Răstolița, Bistra Mureșului, 16.05.1988, Silvia Oroian (7166) Gurghiu, Poiana Narciselor, 02.06.1992, Silvia Oroian (7635) (f. <i>multifidus</i>) Jabenița, 1994, Silvia Oroian (8028) Jabenița, 01.07.1993, Silvia Oroian (8029) Deleni, 06.1992, Silvia Oroian (8030)
POLYGONACEAE	<i>Rumex conglomeratus</i> Murray	Târgu-Mureş, 03.06.1942, Nagy Ödön (635) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (8032)
POLYGONACEAE	<i>Rumex crispus</i> L.	Târgu-Mureş, "Râtul cu scoici", 316 m altit., 23.06.1947, Nagy Ödön (608) Târgu-Mureş, citadel's church, 350 m altit., 14.06.1941, Nagy Ödön (609) Târgu-Mureş, Mare Hill, 360 m altit., 27.07.1947, Nagy Ödön (610) Târgu-Mureş, Platoul Cornești, 350 m altit., 05.08.1947, Nagy Ödön (611) Târgu-Mureş, garden, 23.06.1947, Nagy Ödön (612) Târgu-Mureş, "Râtul cu scoici", 23.06.1947, Nagy Ödön (613) Târgu-Mureş, Budiu Forest, 350 m altit., 22.05.1939, Nagy Ödön (614) Târgu-Mureş, 29.05.1942, Nagy Ödön (616) Târgu-Mureş, str. 7 Noiembrie, 25.05.1948, Nagy Ödön (617) Târgu-Mureş, Mare Hill vineyard, 380 m altit., 17.05.1948, Nagy Ödön (618) Daneş, 11.06.1984, Silvia Oroian (7169) Hetiu, 29.05.1984, Silvia Oroian (7170) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7633) Sântana de Mureş, 05.06.1990, Silvia Oroian (8033) Sângeorgiu de Mureş, 30.06.1993, Silvia Oroian (8036)
FABACEAE	<i>Sophora japonica</i> L.	Târgu-Mureş, 16.08.1946, Nagy Ödön (1051)

NAPHTHODIANTHRONES	HYPERICACEAE	<i>Hypericum maculatum</i> Cr. <i>Hypericum perforatum</i> L.	Răstoia, 03.07.1995, Silvia Oroian, Mihaela Sămărghițan (11367) Târgu-Mureș, Căciș forest, 29.06.1946, Nagy Ödön (1393) Târgu-Mureș, Beș, 19.06.1942, Nagy Ödön (1394) Târgu-Mureș, Stejăriș forest, 14.08.1950, Nagy Ödön (1395) Târgu-Mureș, Mureșeni, 02.06.1947, Nagy Ödön (1396) Târgu-Mureș, Platoul Cornești, 05.10.1937, Nagy Ödön (1397) Săbed, Corhan Hill, 01.07.1981, Silvia Oroian (5790) Târgu-Mureș, Botanical Garden of UMF, 1984, Silvia Oroian (5968) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7611) Gălăoia, 30.07.1993, Silvia Oroian (11372)
CARDIOTONIC GLYCOSIDES	RANUNCULACEAE	<i>Adonis vernalis</i> L.	Band, 14.04.1937, Nagy Ödön (2245) Porumbeni, 09.04.1947, Nagy Ödön (2246) Târgu-Mureș, Căciș Forest fringe, 20.04.1940, Nagy Ödön (2247) Târgu-Mureș, the base of Halmok Hill, 10.05.1941, Nagy Ödön (2248) Zau de Câmpie, 26.04.1967, leg. Konya Istvan, det. Silvia Oroian (5730) Târgu-Mureș, Botanical Garden of UMF, 1984, Silvia Oroian (5973) Crăiești toward Herepea, 28.05.1985, Silvia Oroian (7308) Gheja-Luduș, 03.05.1988, Silvia Oroian (7309) Băla-Lefaia, 15.05.1983, Silvia Oroian (7310) Săbed, reserve, 06.04.1989, Silvia Oroian (7311) Zau de Câmpie, reserve, 30.04.1991, Silvia Oroian (7340) Târgu-Mureș, 24.03.1908, Bitai Arpad (8073) Târgu-Mureș, Căciș forest, 25.04.1936, Nagy Ödön (8074) Zau de Câmpie, 04.1994, Mihaela Sămărghițan (8075) Hărâu, 12.04.1995, Ion Patachi (8076) Porumbeni, church yard, 07.05.1995, leg. Ana Berbecar, det. Mihaela Sămărghițan (8210)
	ASPARAGACEAE	<i>Asparagus officinalis</i> L.	Săngeorgiu de Mureș, 21.06.1943, Nagy Ödön (1571) Târgu-Mureș, 07.06.1943, Nagy Ödön (1572) Târgu-Mureș, 17.06.1959, Ion Patachi (7574)
	ASPARAGACEAE	<i>Convallaria majalis</i> L.	Târgu-Mureș, Căpâlnița, 02.05.1939, Nagy Ödön (1577) Târgu-Mureș, cultivated, 1939, Nagy Ödön (1578) Târgu-Mureș, Rotundă Forest, 08.05.1908, Bitai Arpad (7562) Târgu-Mureș, garden, 21.04.1936, Nagy Ödön (7568) Glodeni, 06.05.1959, Ion Patachi (7576)

SCROPHULARIACEAE	<i>Digitalis grandiflora</i> Mill.	Târgu-Mureş, the base of Halmok Hill, 1938, Nagy Ödön (2011) Zau de Câmpie, 05607.1981, leg. Eftenie Ioan, det. Silvia Oroian (5668) Târgu-Mureş, Botanical Garden of UMF, 14.06.1980, Silvia Oroian (5767) Târgu-Mureş, Botanical Garden of UMF, 14.06.1980, Konia Isrvan (5774) Gurghiu, Poiana Narciselor, 02.06.1992, Silvia Oroian (7658)
SCROPHULARIACEAE	<i>Digitalis lanata</i> Ehrh.	Târgu-Mureş, Botanical Garden of UMF, 16.06.1952, Nagy Ödön (2012, 2013)
SCROPHULARIACEAE	<i>Digitalis purpurea</i> L.	Târgu-Mureş, Botanical Garden of UMF, 16.06.1952, Nagy Ödön (2014, 2015)
BRASSICACEAE	<i>Erysimum odoratum</i> Ehrh.	Târgu-Mureş, Botanical Garden of UMF, 1984, Silvia Oroian (5977) Târgu-Mureş, Corunca, 03.06.1939, Nagy Ödön (3197) Târgu-Mureş, 1 Mai Hill, 21.07.1948, Nagy Ödön (3198) Târgu-Mureş, 1939, Nagy Ödön (3199) Târgu-Mureş, Beşa, 19.06.1942, Nagy Ödön (3200) Târgu-Mureş, the citadel's wall, 05.06.1942, Nagy Ödön (3201) Târgu-Mureş, Beşa Valley, 19.06.1942, Nagy Ödön (3202) Târgu-Mureş, Platoul Corneşti, 01.08.1947, Nagy Ödön (3203) Porumbeni, 26.07.1948, Nagy Ödön (3204) Târgu-Mureş, the citadel's wall, 13.06.1941, Nagy Ödön (3205) Târgu-Mureş, the citadel's wall, 21.06.1947, Nagy Ödön (3206) Târgu-Mureş, Mare Hill, 23.06.1943, Nagy Ödön (3207) Zau de Câmpie, 17.07.1937, leg. Konya Isrvan, det. Silvia Oroian (7732) Săbed, reserve, 12.08.1989, Silvia Oroian (7733)
CELASTRACEAE	<i>Euonymus europaea</i> L.	Târgu-Mureş, Stejăriş forest, 18.05.1938, Nagy Ödön (3022) Târgu-Mureş, Trebely, 18.05.1938, Nagy Ödön (3023) Târgu-Mureş, 24.04.1936, Nagy Ödön (3026) Târgu-Mureş, Platoul Corneşti, 07.05.1936, Nagy Ödön (3027)
CELASTRACEAE	<i>Euonymus verrucosa</i> Scop.	Târgu-Mureş, Platoul Corneşti, 11.05.1946, Nagy Ödön (3025) Târgu-Mureş, Cicoş forest, 12.05.1936, Nagy Ödön (3029)
RANUNCULACEAE	<i>Helleborus purpurascens</i> W. et K.	Târgu-Mureş, Platoul Corneşti, 05.04.1939, Nagy Ödön (2197) Târgu-Mureş, Mare forest, 1941, Nagy Ödön (2198) Târgu-Mureş, the base of Halmok Hill, 29.04.1939, Nagy Ödön (2199) Târgu-Mureş, near Uriaş Hill, 09.04.1937, Nagy Ödön (2200) Băgaciu, 1886 (5463) Târgu-Mureş, Botanical Garden of UMF, 1984, Silvia Oroian (7345, 7807) Craieşti toward Herepea, 06.08.1985, Silvia Oroian (7346) Săbed, reserve, 23.03.1989, Silvia Oroian (7347, 7805) Săbed, reserve, 06.04.1989, Silvia Oroian (7348, 7804) Hetiur-Sighişoara, 29.05.1985, Silvia Oroian (7349)

	RANUNCULACEAE	<i>Helleborus purpurascens</i> W. et K.	Zau de Câmpie, 06.07.1981, Eftenie, Ioan (7350) Gurghiu, Poiana Narciselor, 04.05.1991, Silvia Oroian (7393, 7808) Zau de Câmpie, 06.05.1981, Eftenie, Ioan (7802) Hetiur, 29.05.1984, Silvia Oroian (7803) Adămuș, Herepea village, 08.06.1985, Konya Isrvan, Szombath Zoltán, Silvia Oroian (7806) Târgu-Mureș, Coccoșd forest, 14.03.1936, Nagy Ödön (7947) Deda, 16.04.1995, Silvia Oroian (8104) Sângeorgiu de Mureș, 10.05.1959, Ion Patachi (8105) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (8221) Târgu-Mureș, Budiu Hill, 350 m altit., 26.05.1936, Nagy Ödön (156) Târgu-Mureș, "Cartierul Funcionarilor", 300 m altit., 04.06.1937 (157) Târgu-Mureș, Platoul Cornești, 01.08.1947, Nagy Ödön (158) Târgu-Mureș, airport, 305 m altit., 06.07.1940, Nagy Ödön (159) Târgu-Mureș, Botanical Garden of UMF, 1984, Silvia Oroian (5974)
	LAMIACEAE	<i>Leonurus cardiaca</i> L.	
SAPONINS	HIPPOCASTANACEAE	<i>Aesculus hippocastanum</i> L.	Târgu-Mureș, cultivated, 13.05.1939, Nagy Ödön (1401) Târgu-Mureș, Platoul Cornești, 28.04.1940, Nagy Ödön (1402) Târgu-Mureș, 09.05.1939, Nagy Ödön (1403) Târgu-Mureș, Fire Department yard, 19.05.1980, Silvia Oroian (5822)
	CARYOPHYLLACEAE	<i>Agrostemma githago</i> L.	Târgu-Mureș, 06.06.1939, Nagy Ödön (2924) Târgu-Mureș, Mureș river dead branch, 08.06.1939, Nagy Ödön (2925)
	PRIMULACEAE	<i>Anagallis arvensis</i> L.	Târgu-Mureș, 05.08.1947, Nagy Ödön (2258) Târgu-Mureș, Budiu Forest, 03.10.1938, Nagy Ödön (2259) Târgu-Mureș, Platoul Cornești, 16.06.1936, Nagy Ödön (2260) Târgu-Mureș, near Stejaris, 05.08.1947, Nagy Ödön (2261) Târgu-Mureș, 05.08.1947, Nagy Ödön (2262)
	PRIMULACEAE	<i>Anagallis foemina</i> Miller (syn. <i>Anagallis arvensis</i> L. ssp. <i>caerulea</i> Hartman)	Târgu-Mureș, Budiu, 31.05.1946, Nagy Ödön (2252) Târgu-Mureș, the base of Halmok Hill, 07.09.1940, Nagy Ödön (2253, 2254) Porumbeni, 18.08.1947, Nagy Ödön (2255) Porumbeni, 26.07.1948, Nagy Ödön (2256) Târgu-Mureș, 09.1937, Nagy Ödön (2257)
	ASTERACEAE	<i>Bellis perennis</i> L.	Târgu-Mureș, cultivated, 25.03.1938, Nagy Ödön (2719) Târgu-Mureș, 19.05.1939, Nagy Ödön (2720) Băgaciu, 1872 (5406) Băgaciu, 1886 (5472) Târgu-Mureș, 10.1981, Silvia Oroian (5650) Târgu-Mureș, Platoul Cornești, 12.04.1970, Konya Isrvan (5821)

APIACEAE	<i>Bupleurum falcatum</i> L.	Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7592)
ASTERACEAE	<i>Calendula officinalis</i> L.	Târgu-Mureş, garden, 21.06.1951, Nagy Ödön (2723) Târgu-Mureş, Botanical Garden of UMF, 1984, Silvia Oroian (5976)
EQUISETACEAE	<i>Equisetum arvense</i> L.	Târgu-Mureş, 315 m altit., 1937, Nagy Ödön (192) Târgu-Mureş, 340 m altit., 09.05.1939, Nagy Ödön (193) Târgu-Mureş, near Budiş Forest, 22.05.1939, Nagy Ödön (194) Sântana de Mureş, 320 m altit., 09.06.1939, Nagy Ödön (195) Târgu-Mureş, Mureş river shore, 308 m altit., 18.05.1939, Nagy Ödön (196) Sânpaul, Mureş river shore, 02.05–27.05.1939, Nagy Ödön (197) Târgu-Mureş, Reformed cemetery, 01.07.1958, Nagy Ödön (198) Zau de Câmpie, 08.06.1981, leg. Eftenie Ioan, det. Silvia Oroian (5677) Săbed, Corhan Hill, 19.08.1980, Silvia Oroian (5794) Sântana de Mureş, 23.06.1989, Konya Istvan (7054) Orşova, Seci hamlet, 23.06.1989, Silvia Oroian (7054) Orşova, Seci hamlet, 05.1979, Sarkany Andrei (7055) Sântana de Mureş, 05.06.1990, Silvia Oroian (7132) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7497)
APIACEAE	<i>Eryngium campestre</i> L.	Târgu-Mureş, Platoul Corneşti, 30.10.1955, Nagy Ödön (1329) Porumbeni, 22.07.1946, Nagy Ödön (1331) Târgu-Mureş, Platoul Corneşti, 24.07.1947, Nagy Ödön (2563, 2564)
APIACEAE	<i>Eryngium planum</i> L.	Târgu-Mureş, 1 Mai Hill, 16.06.1936, Nagy Ödön (1327) Târgu-Mureş, Platoul Corneşti, 31.08.1937, Nagy Ödön (1330) Târgu-Mureş, Platoul Corneşti, 24.07.1947, Nagy Ödön (2565)
CARYOPHYLLACEAE	<i>Gypsophila paniculata</i> L.	Târgu-Mureş, 29.06.1946, Nagy Ödön (2968) Târgu-Mureş, Botanical Garden of UMF, 16.06.1952, Nagy Ödön (2969)
ARALIACEAE	<i>Hedera helix</i> L.	Zau de Câmpie, 1982, leg. Eftenie Ioan, det. Silvia Oroian (5708)
EUPHORBIACEAE	<i>Mercurialis perennis</i> L.	Târgu-Mureş, Căpâlniţa, 30.03.1936, Nagy Ödön Răstoliţa, The Iod Valley, 13.04.1991, Silvia Oroian (7293) Pădurea Săbed, 14.04.2000, Mihaela Sămărghitan (11292) Răstoliţa, 05.04.1984, Silvia Oroian, Mihaela Sămărghitan (11391)
FABACEAE	<i>Ononis arvensis</i> L. (<i>Ononis hircina</i> Jacq.)	Târgu-Mureş, 1939, Nagy Ödön (1028) Târgu-Mureş, Căpâlniţa forest, 07.10.1938, Nagy Ödön (1030) Târgu-Mureş, Stejăriş forest, fringe, Nagy Ödön (1031) Târgu-Mureş, „Dâmbul cu Comoară”, 27.09.1938, Nagy Ödön (1032) Târgu-Mureş, „1 Mai”, 21.07.1948, Nagy Ödön (1033) Târgu-Mureş, „Dâmbul cu Comoară”, 11.08.1948, Nagy Ödön (1034) Porumbeni, 22.07.1946, Nagy Ödön (1035)

FABACEAE	<i>Ononis arvensis</i> L. (<i>Ononis hircina</i> Jacq.)	Sântana de Mureș, 27.08.1941, Nagy Ödön (1036) Sântana de Mureș, 09.06.1939, Nagy Ödön (1037) Târgu-Mureș, near Kali spring, 18.06.1947, Nagy Ödön (1038) Sângeriu de Mureș, 11.08.1950, Nagy Ödön (1039) Târgu-Mureș, hippodrome, 08.07.1960, leg. Konya Istvan, det. Silvia Oroian (6017) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7649) (f. <i>inermis</i> (Ldb.))
POLYGALACEAE	<i>Polygala comosa</i> Schkuhr	Târgu-Mureș, Stejăriș forest, 01.05.1936, Nagy Ödön (577, 578) Târgu-Mureș, Mureșeni Forest, 02.06.1943, Nagy Ödön (579) Târgu-Mureș, Platoul Cornești, 17.06.1944, Nagy Ödön (580) Târgu-Mureș, Platoul Cornești, 08.05.1939, Nagy Ödön (581) Târgu-Mureș, Budiș, 28.05.1946, Nagy Ödön (582) Târgu-Mureș, Platoul Cornești, 400 m altit., 15.05.1938, Nagy Ödön (583) Târgu-Mureș, bricks factory, 350 m altit., 18.05.1938, Nagy Ödön (584) Târgu-Mureș, Beșa forest, 360 m altit., 23.05.1938, Nagy Ödön (585) Târgu-Mureș, 312 m altit., 06.05.1938, Nagy Ödön (586) Târgu-Mureș, "Dâmbul cu Comoară", 350 m altit., 27.09.1938, Nagy Ödön (587) Târgu-Mureș, Corunca park, 19.06.1944, Nagy Ödön (588) Târgu-Mureș, Corunca park, 340 m altit., 03.06.1939, Nagy Ödön (589) Târgu-Mureș, near church, 350 m altit., 10.06.1937, Nagy Ödön (590) Târgu-Mureș, 1 Mai Hill, 08.06.1946, Nagy Ödön (2330) Băgaciu, 1872 (5391, 5446) Zau de Câmpie, 09.07.1981, leg. Eftenie Ioan, det. Silvia Oroian (5665) Fărăgău Lake, 20.05.1976, Vasarhely Zoltan (5852) Morești, 24.06.1953, Konya Istvan (5883)
POLYGALACEAE	<i>Polygala vulgaris</i> L.	Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7647) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7648)
PRIMULACEAE	<i>Primula veris</i> L. em. Huds (syn. <i>Primula officinalis</i> (L.) Hill)	Târgu-Mureș, "Dâmbul cu Comoară", 09.05.1939, Nagy Ödön (2280) Târgu-Mureș, the base of Halmok Hill, 19.04.1939, Nagy Ödön (2281) Târgu-Mureș, Platoul Cornești, 10.05.1937, Nagy Ödön (2282) Târgu-Mureș, Trebely, 17.05.1938, Nagy Ödön (2283) Târgu-Mureș, Platoul Cornești, 21.04.1936, Nagy Ödön (2284) Târgu-Mureș, Mureș river shore, 02.05.1939, Madar Lajos, Nagy Ödön (2285) Târgu-Mureș, Căpâlnița, 09.05.1939, Nagy Ödön (2286) Băgaciu, 1886 (5478) Târgu-Mureș, Platoul Cornești, 06.1953, leg. Konya Istvan, det. Silvia Oroian (5751) Băgaciu, 29.04.1972 (6057)

RANUNCULACEAE	<i>Ranunculus ficaria</i> L. (syn. <i>Ficaria verna</i> Huds.)	Luduş, 12.04.1939, Nagy Ödön (2162) Târgu-Mureş, Platoul Corneşti, 16.04.1937, Nagy Ödön (2163) Zau de Câmpie, 04.07.1981, leg. Eftenie Ioan, det. Silvia Oroian (5671) Săbed, Lechinţa forest, 23.04.1981, leg. Szombath Zoltán, det. Silvia Oroian (5907) Săbed, 08.05.1980, leg. Szombath Zoltán, det. Silvia Oroian (5808) Sântana de Mureş, 06.04.1989, Silvia Oroian (7361, 7789) Gheja-Luduş, 29.04.1988, Silvia Oroian (7362, 7788) Papiu Ilarian, Şandru forest, 04.05.1988, Silvia Oroian (7363, 7787) Săbed, reserve, 06.04.1989, Silvia Oroian (7364) Mureşeni, Mureş river shore, 03.04.1968, Szombath Zoltán (7365, 7786) Zau de Câmpie, 30.04.1991, Silvia Oroian (7392) Mureşeni, Mureş river shore, 03.04.1968, leg. Szombath Zoltán, det. Silvia Oroian (7785) Zau de Câmpie, reserve, 30.04.1991, Silvia Oroian (7795) Târgu-Mureş, Rotundă Forest, 18.03.1908, Bitai Arpad, (8128) Târgu-Mureş, Mureş river shore, 20.04.1936, Nagy Ödön (8129) Deda, 16.04.1995, Silvia Oroian (8130) Gurghiu, 05.05.1992, Silvia Oroian (8224)
CARYOPHYLLACEAE	<i>Saponaria officinalis</i> L.	Târgu-Mureş, Mureş river shore, 06.1952, Nagy Ödön (2991) Târgu-Mureş, Mureş river shore, 25.09.1951, Nagy Ödön (2992) Târgu-Mureş, island on Mureş river, 16.08.1960, Konya Istvan (7219) Târgu-Mureş, 15.06.1959, Ion Patachi (8052) Târgu-Mureş, 10.09.1960, Ion Patachi (8053)
ASTERACEAE	<i>Solidago virgaurea</i> L.	Târgu-Mureş, Platoul Corneşti, 05.10.1937, Nagy Ödön (2397) Târgu-Mureş, Platoul Corneşti 16.10.1956, Nagy Ödön (2398) Târgu-Mureş, 19.10.1956, Nagy Ödön (2399)
VIOLACEAE	<i>Viola arvensis</i> Murray	Târgu-Mureş, Trebely Hill, 350 m altit., 17.05.1938, Nagy Ödön (876) Târgu-Mureş, 360 m altit., 21.06.1946, Nagy Ödön (877) Târgu-Mureş, Beşa, 31.05.1944, Nagy Ödön (878) Târgu-Mureş, Near church, 400 m altit., 10.05.1937, Nagy Ödön (879) Târgu-Mureş, Mare forest, 400 m altit., 10.06.1946, Nagy Ödön (880) Târgu-Mureş, 10.06.1946, Nagy Ödön (881) Târgu-Mureş, Mureşeni Forest, 350 m altit., 28.07.1939, Nagy Ödön (882) Târgu-Mureş, Platoul Corneşti, 480 m altit., 16.06.1936, Nagy Ödön (883) Târgu-Mureş, Mare hill, 360 m altit., 17.04.1948, Nagy Ödön (884) Târgu-Mureş, the edge of Beşa forest, 350 m altit., 31.05.1949, Nagy Ödön (885) Târgu-Mureş, Beşa, 03.06.1951, Nagy Ödön (886) Corneşti, railroad side, 21.06.1942, Nagy Ödön (887)

	VIOLACEAE	<i>Viola odorata</i> L.	Sănpaul, 16.04.1939, Nagy Ödön (860) Târgu-Mureș, Platoul Cornești, 480 m altit., 24.03.1936, Nagy Ödön (861) Băgaciu, 1886 (5485) Zau de Câmpie, 06.06.1981, leg. Eftenie Ioan, det. Silvia Oroian (5723)
FLAVONOIDS	APIACEAE	<i>Anthriscus cerefolium</i> (L.) Hoffm.	Băgaciu, 1872 (5411)
	APIACEAE	<i>Anthriscus sylvestris</i> (L.) Hoffm.	Păuloaia, 06.07.2000, Mihaela Sămărghițan (11295)
	BETULACEAE	<i>Betula pendula</i> Roth (<i>Betula verrucosa</i> Ehrh.)	Târgu-Mureș, Stejaris forest, 400 m altit., 20.05.1920, Nagy Ödön (331) Târgu-Mureș, Platoul Cornești, 480 m altit., 20.04.1936, Nagy Ödön, (332) Târgu-Mureș, Platoul Cornești, 380 m altit., 09.06.1942, Nagy Ödön (333) Târgu-Mureș, Platoul Cornești, 480 m altit., 01.04.1936, Nagy Ödön (334) Târgu-Mureș, 01.09.1934, Nagy Ödön, (335) Târgu-Mureș, 05.1937, Nagy Ödön, (336) Târgu-Mureș, 22.04.1943, Nagy Ödön (337) Târgu-Mureș, Platoul Cornești, 21.04.1936, Nagy Ödön (338) Târgu-Mureș, 24.04.1952, Nagy Ödön (339) Sănpaul, park, 01.04.1939, Nagy Ödön (339) Zau de Câmpie, 1982, leg. Eftenie Ioan, det. Silvia Oroian (5712) Târgu-Mureș, Platoul Cornești, 20.06.1984, leg. Sarkany Andrei, det. Silvia Oroian (7099) Târgu-Mureș, 06.04.1908, Bitai Arpad (8025)
	BRASSICACEAE	<i>Capsella bursa-pastoris</i> (L.) Medicus	Târgu-Mureș, 26.02.1948, Nagy Ödön (3171) Târgu-Mureș, Mureș river shore, 27.07.1956, Nagy Ödön (3172) Târgu-Mureș, 25.05.1941, Nagy Ödön (3173) Târgu-Mureș, plough land, 05.04.1939, Nagy Ödön (3174) Târgu-Mureș, plough land, 19.04.1938, Nagy Ödön (3175) Băgaciu, 1872 (5371) Gurghiu, Poiana Narciselor, 05.05.1991, Silvia Oroian (7509) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7614) Târgu-Mureș, 1 Mai Hill, 15.05.1940, leg. Babos Bertalan, det. Silvia Oroian (7744)
	ROSACEAE	<i>Crataegus monogyna</i> Jacq.	Târgu-Mureș, 04.06.1958, Nagy Ödön (1881), f. <i>decussata</i> (Wallr.) Târgu-Mureș, garden, 20.05.1939, Nagy Ödön (1871) Târgu-Mureș 1 Mai Hill, 03.05.1936, Nagy Ödön (1872) Târgu-Mureș, near citadel's church, 10.05.1937, Nagy Ödön (1873) Târgu-Mureș, 19.02.1938, Nagy Ödön (1874) Târgu-Mureș, near Căpâlnița, 30.05.1944, Nagy Ödön (1875)

ROSACEAE	<i>Crataegus monogyna</i> Jacq.	Târgu-Mureş, Stejăriş forest, northern side, 23.05.1938, Nagy Ödön (1876) Târgu-Mureş, Stejăriş forest, 12.08.1950 (1877) Târgu-Mureş, Platoul Corneşti, 10.05.1939, Nagy Ödön (1878) Târgu-Mureş, 20.04.1939, Nagy Ödön (1879) Târgu-Mureş, Stejăriş forest, northern side, 10.1937, Nagy Ödön (1880) Târgu-Mureş, Beşa forest, 05.1953, leg. Konya Işvan, det. Silvia Oroian (6033) Gurghiu, near Poiana Narciselor, 06.06.1991, Silvia Oroian (7597) Gurghiu, Poiana Narciselor, 05.05.1992, Silvia Oroian (7600)
RUTACEAE	<i>Dictamnus albus</i> L.	Crăieşti, toward Herepea, 04.06.1984, Silvia Oroian (5517) Zau de Câmpie, 09.05.1973, Konya Işvan (5776) Toldal, 26.05.1985, Sarkany A. (5982)
ASTERACEAE	<i>Eupatorium cannabinum</i> L.	Târgu-Mureş, Mureş river dead branch, near Sântana de Mureş, 30.09.1958, Nagy Ödön (2566)
MORACEAE	<i>Ficus carica</i> L.	Târgu-Mureş, Stejăriş forest, 14.08.1950, Nagy Ödön (2567)
GINKGOACEAE	<i>Ginkgo biloba</i> L.	Sânpaul, cultivated, 27.05.1939, Nagy Ödön (681)
ASTERACEAE	<i>Hieracium pilosella</i> L.	Târgu-Mureş, 19.07.1958, Nagy Ödön (4582) Târgu-Mureş, 01.11.1958, Nagy Ödön (4583) Porumbeni, 03.08.1948, Nagy Ödön (2865) Târgu-Mureş, Mare hill, 01.08.1947, Nagy Ödön (2866) Târgu-Mureş, 06.06.1943, Nagy Ödön (2867) Sânpaul, 20.05.1939, Nagy Ödön (2868)
SCROPHULARIACEAE	<i>Linaria vulgaris</i> Mill.	Târgu-Mureş, Platoul Corneşti, 380 m altit., 01.08.1947, Nagy Ödön (154) Târgu-Mureş, 18.06.1947, Nagy Ödön (155) Târgu-Mureş, 30.09.1936, Nagy Ödön (2021) Târgu-Mureş, 23.06.1956, Nagy Ödön (2022) Târgu-Mureş, 24.09.1937, Nagy Ödön (2023) Zau de Câmpie, 05.07.1981, leg. Eftenie Ioan, det. Silvia Oroian (5660) Cuieşd, 29.08.1960, Konya Işvan (5942)
MORACEAE	<i>Morus nigra</i> L.	Pietroasa Valley, 28.07.2000, Mihaela Sămărghitan (11299)
APIACEAE	<i>Petroselinum hortense</i> Hoffm.	Acăţari, 322 m altit., 17.05.1937, Nagy Ödön (677, 678)
POLYGONACEAE	<i>Polygonum persicaria</i> L.	Târgu-Mureş, 16.06.1939
ROSACEAE	<i>Prunus avium</i> L. (<i>Cerasus avium</i> (L.) Moench)	Târgu-Mureş, plough land, 350 m altit., 14.10.1937, Nagy Ödön (605) Târgu-Mureş, airport, 29.08.1941, Nagy Ödön (606) Târgu-Mureş, 10.05.1937, Nagy Ödön (1976) Sânpaul, 16.04.1939, Nagy Ödön (1977) Gurghiu, Poiana Narciselor, 05.05.1992, Silvia Oroian (7604)

FABACEAE	<i>Robinia pseudacacia</i> L.	Târgu-Mureș, 01.06.1938, Nagy Ödön (1048) Târgu-Mureș, 05.06.1938, Nagy Ödön (1049) Târgu-Mureș, 23.05.1939, Nagy Ödön (1050) Săbed, Lechința forest, 09.06.1986, leg. Szombath Zoltán, det. Silvia Oroian (5809)
CAPRIFOLIACEAE	<i>Sambucus nigra</i> L.	Băgaciu, 1872 (5443) Răstolița, 12.07.1996, Silvia Oroian (11379) Răstolița, Mureș river shore, 30.05.1993, Silvia Oroian (11385)
CAPRIFOLIACEAE	<i>Sambucus racemosa</i> L.	Răstolița, 24.06.1995, Silvia Oroian (11381)
FABACEAE	<i>Trifolium medium</i> L.	Târgu-Mureș, Platoul Cornești, 30.06.1941, Nagy Ödön (1066)
FABACEAE	<i>Trifolium montanum</i> L.	Târgu-Mureș, Stejăriș forest, 12.05.1936, Nagy Ödön (1067) Târgu-Mureș, Stejăriș forest fringe, 23.05.1938, Nagy Ödön (1068) Zau de Câmpie, 06.07.1982, leg. Eftenie Ioan, det. Silvia Oroian (5696)
FABACEAE	<i>Trifolium pratense</i> L.	Târgu-Mureș, Mureș river shore, 08.06.1936, Nagy Ödön (1070) Târgu-Mureș, Mare forest, 13.07.1946, Nagy Ödön (1071) Târgu-Mureș, 08.05.1936, Nagy Ödön (1072) Sânpaul, 28.05.1939, Nagy Ödön (1073) Târgu-Mureș, Budiu Forest fringe, 22.05.1939, Nagy Ödön (1074) Băgaciu, 1872 (5402) Zau de Câmpie, 1982, leg. Eftenie Ioan, det. Silvia Oroian (5713) Fărăgău Lake, 03.06.1976, Sarkany A. (5844) Gurghiu, Poiana Narciselor, 02.06.1992, Silvia Oroian (7593)
FABACEAE	<i>Trifolium repens</i> L.	Târgu-Mureș, Mureșeni Forest, 12.05.1936, Nagy Ödön (1075) Târgu-Mureș, 23.05.1940, Nagy Ödön (1076) Târgu-Mureș, near Căpâlnița, 30.05.1944, Nagy Ödön (1077) Sângeorgiu de Mureș, 12.07.1956, Nagy Ödön (1078) Fărăgău Lake, 03.06.1976, Sarkany A. (5846) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7650) Bedeni, 30.05.1948, Nagy Ödön (2064)
SCROPHULARIACEAE	<i>Veronica anagallis-aquatica</i> L.	
SCROPHULARIACEAE	<i>Veronica arvensis</i> L.	Târgu-Mureș, 24.05.1943, Nagy Ödön (2065, 2066) Târgu-Mureș, Platoul Cornești, 14.05.1951, Nagy Ödön (2067) Târgu-Mureș, 29.05.1941, Nagy Ödön (2068) Târgu-Mureș, Platoul Cornești, 02.06.1941, Nagy Ödön (2069) Târgu-Mureș, 07.1959, Konya Istvan (5867)
SCROPHULARIACEAE	<i>Veronica beccabunga</i> L.	Târgu-Mureș, "Fântâna puturoasă" spring, 23.05.1938, Nagy Ödön (2070) Târgu-Mureș, "Dâmbul cu Comoară", Nagy Ödön (2071) Deda – Bistra Mureșului, 15.06.1960, Konya Istvan (5931)

SCROPHULARIACEAE	<i>Veronica chamaedrys</i> L.	Târgu-Mureş, Platoul Corneşti, 24.04.1936, Nagy Ödön (2077) Târgu-Mureş, Trebely, 17.05.1938, Nagy Ödön (2078) Târgu-Mureş, 06.06.1943, Nagy Ödön (2079) Târgu-Mureş, near citadel's church, Nagy Ödön (2080) Băgaciu, 1872 (5390) Zau de Câmpie, 08.06.1981, leg. Eftenie Ioan, det. Silvia Oroian (5676) Deda Bistra, 15.06.1960, Konya Istvan (5864) Târgu-Mureş, 05.1953, Konya Istvan (5865) Gurghiu, Poiana Narciselor, 02.06.1992, Silvia Oroian (7652) Gurghiu, Poiana Narciselor, 05.05.0992, Silvia Oroian (7659)
SCROPHULARIACEAE	<i>Veronica officinalis</i> L.	Târgu-Mureş, Stejăriş forest, 12.06.1938, Nagy Ödön (2095) Târgu-Mureş, top of 1 Mai Hill, 08.06.1946, Nagy Ödön (2096) Târgu-Mureş, the base of Halmok Hill, 30.04.1939, Nagy Ödön (2097) Târgu-Mureş, 1939, Nagy Ödön (2098) Târgu-Mureş, Platoul Corneşti, 17.06.1953, Konya Istvan (5870)
SCROPHULARIACEAE	<i>Veronica persica</i> Poiret	Târgu-Mureş, Mureş river dead branch, 26.04.1936, Nagy Ödön (2072) Târgu-Mureş, Platoul Corneşti, 22.03.1936, Nagy Ödön (2073) Târgu-Mureş, 20.10.1939, Nagy Ödön (2074) Târgu-Mureş, 12.10.1937, Nagy Ödön (2075) Târgu-Mureş, 1941, Nagy Ödön (2076) Băgaciu, 1872 (5449)
SCROPHULARIACEAE	<i>Veronica spicata</i> L. ssp. <i>orchidea</i> Crantz (<i>Pseudolysimachion orchideum</i> (Cr.) T.Wrab. <i>Veronica orchidea</i> Crantz)	Târgu-Mureş, Mare Hill, 26.07.1950, Nagy Ödön (2099) Târgu-Mureş, Platoul Corneşti, 13.07.1947, Nagy Ödön (2100) Târgu-Mureş, Mare Hill, 03.07.1948, Nagy Ödön (2101) Târgu-Mureş, Platoul Corneşti, 18.06.1936, Nagy Ödön (2102) Porumbeni, 18.08.1947, Nagy Ödön (2103) Târgu-Mureş, 07.1947, Nagy Ödön (2104) Târgu-Mureş toward Livezeni, 18.09.1938, Nagy Ödön (2105) Sântana de Mureş, 28.08.1941, Nagy Ödön (2106) Porumbeni, 18.08.1947, Nagy Ödön (2107) Târgu-Mureş, Mare Hill, 14.07.1948, Nagy Ödön (2112) Săbed, Corhan Hill, 18.08.1980, Silvia Oroian (5575) Săbed, Corhan Hill, 24.06.1972, Konya Istvan (5576, 5577, 5579) Săbed, Corhan Hill, 01.07.1981, Szombath Zoltan (5578) Cuieşd, 29.08.1960, Konya Istvan (5874) Moreşti, 24.06.1960, Konya Istvan (5875)

SCROPHULARIACEAE	<i>Veronica spicata</i> L. ssp. <i>spicata</i>	Târgu-Mureș, Platoul Cornești, 18.06.1936, Nagy Ödön (2119) Porumbeni, 22.07.1946, Nagy Ödön (2120) Târgu-Mureș, Valea Rece, 21.07.1948, Nagy Ödön (2121) Târgu-Mureș, Stejăriș forest, 21.07.1948, Nagy Ödön (2122) Târgu-Mureș, "Dâmbul cu Comoară", 11.08.1947, Nagy Ödön (2123) Târgu-Mureș, Căsoș forest, 29.06.1946, Nagy Ödön (2124) Târgu-Mureș, Vulpii stream, 17.07.1940, Nagy Ödön (2125) Târgu-Mureș, Cornești, 07.07.1946, Nagy Ödön (2126) Târgu-Mureș, Platoul Cornești, 16.10.1960, Konya Istvan (5869) Târgu-Mureș, Mureșeni Forest, 12.05.1936, Nagy Ödön (2084) Băgaciu, 1872 (5397, 5438) Sângeriu de Mureș, 06.1953, Konya Istvan (5872)
SCROPHULARIACEAE	<i>Veronica teucrium</i> L.	Târgu-Mureș, Stejăriș forest, 28.08.1958, Nagy Ödön (321) Târgu-Mureș, Platoul Cornești, 480 m altit., 18.05.1937, Nagy Ödön (322) Târgu-Mureș, Mureșeni Forest, 13.06.1951, Nagy Ödön (323, 324) Târgu-Mureș, Platoul Cornești, 380 m altit., 26.06.1948, Nagy Ödön (325) Zau de Câmpie, 06.07.1982, leg. Eftenie Ioan, det. Silvia Oroian (5689) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7638) Orșova Pădure, 03.06.1994, leg. So, det. Mihaela Sămărghițan (11189) Bistra Mureșului, 30.05.1993, Silvia Oroian (11192) Lunca Bradului, 14.06.1994, Silvia Oroian (11193) Stânceni, Leu Mountain, 18.05.1994, Silvia Oroian (11194) Răstolița, 24.05.1996, Silvia Oroian, Mihaela Sămărghițan (11195) Lunca Bradului, 25.07.1996, Silvia Oroian (11196) Băgaciu, 1872 (5394)
VIOLACEAE	<i>Viola tricolor</i> L.	
ANTOCIANS	ASTERACEAE	Târgu-Mureș, Stejăriș forest, 06.06.1939, Nagy Ödön (9) Șardu Nirajului, 02.06.1947, Nagy Ödön (10) Târgu-Mureș, Mare forest, 13.07.1946, Nagy Ödön (11) Sînpaul, 1939, Nagy Ödön, (12) Târgu-Mureș, Corunca, 22.05.1939, Nagy Ödön (13) Târgu-Mureș, Dealul cu Comoară, 345 m altit., Nagy Ödön (14) Zau de Câmpie, 09.05.1973, Konya Istvan (5775, 5780) Beica de Sus, 31.05.1999, Mihaela Sămărghițan (11275)
	RANUNCULACEAE	Târgu-Mureș, 11.08.1947, Nagy Ödön (2201) Târgu-Mureș, "Dâmbul cu Comoară", 05.09.1946, Nagy Ödön (2202) Târgu-Mureș, 01.06.1938, Nagy Ödön (2203)

	RANUNCULACEAE	<i>Consolida regalis</i> S.F.Gray	Târgu-Mureş, "Dâmbul cu Comoară", 22.09.1938, Nagy Ödön (2204) Târgu-Mureş, satul Stejăriş, 15.09.1935, Nagy Ödön (2205) Băgaciu, 1872 (5428) Moreşti, 24.06.1953, Konya Istvan (5917) Crăieşti, toward Herepea, 06.08.1985, Silvia Oroian (7330) Sântana de Mureş, 23.06.1989, Silvia Oroian (7331) Sântana de Mureş, 08.06.1989, Silvia Oroian (7332) Săbed, reserve, 20.06.1989, Silvia Oroian (7333) Cerghid, 19.06.1974, Konya Istvan (7334) Târgu-Mureş, 1 Mai Hill, 15.05.1940, Babos Bertalan (7335, 8331) Vidrasău, semănături, 11.07.1991, Silvia Oroian (7942) Târgu-Mureş, 17.04.1935, Nagy Ödön (8332) Târgu-Mureş, 02.06.1908, Bitai Arpad (8333) Târgu-Mureş, 10.06.1959, Ion Patachi (8103) Jabeniţa, 1994, Silvia Oroian (8220)
	PAPAVERACEAE	<i>Papaver rhoeas</i> L.	Târgu-Mureş, plough land, 01.05.1939, Nagy Ödön (534) Băgaciu, 1872 (5417) Vidrasău, 28.05.1989, Silvia Oroian (7128) Târgu-Mureş, 15.06.1960, Ion Patachi (8156) Răstoliţa, 28.07.1995, Silvia Oroian (11095)
COUMARINS	RUBIACEAE	<i>Cruciata laevipes</i> Opiz	Băgaciu, 1872 (5384) Fărăgău Lake, 20.05.1976, Konya Istvan (5856) Târgu-Mureş, Platoul Corneşti, 06.1953, leg. Konya Istvan, det. Silvia Oroian (5989)
	OLEACEAE	<i>Fraxinus excelsior</i> L.	Târgu-Mureş, Mare forest, 01.06.1938, Nagy Ödön (656) Târgu-Mureş, reformed cemetery, 03.05.1942, Nagy Ödön (657) Târgu-Mureş, reformed cemetery, 340 m altit., 09.06.1942, Nagy Ödön (658)
	RUBIACEAE	<i>Galium aparine</i> L. <i>Galium mollugo</i> L.	Fărăgău Lake, 13.06.1976, Konya Istvan (5858) Fărăgău Lake, 03.06.1976, Sarkany A. (5859) Târgu-Mureş, island, 16.08.1960, leg. Konya Istvan, det. Silvia Oroian (5986) Târgu-Mureş, hippodrome, 07.1959, leg. Konya Istvan, det. Silvia Oroian (5987) Sângeriu de Mureş, 07.1959, leg. Konya Istvan, det. Silvia Oroian (5988) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7679) Reghin, 02.05.2000, Mihaela Sămărghitan (11225)
	RUBIACEAE	<i>Galium odoratum</i> (L.) Scop. (<i>Asperula odorata</i> L.)	Târgu-Mureş, Platoul Corneşti, 06.1936, leg. Konya Istvan, det. Silvia Oroian (5990) Deda-Bistra, Scaunul Domnului, 15.06.1953, leg. Konya Istvan, det. Silvia Oroian (5992) Moreşti, 24.06.1953, leg. Konya Istvan, det. Silvia Oroian (5993)

RUBIACEAE	<i>Galium verum</i> L.	Zau de Câmpie, 07.07.1981, leg. Eftenie Ioan, det. Silvia Oroian (5669) Târgu-Mureș, hippodrome, 08.07.1960, Konya Isrvan (5898) Târgu-Mureș, Beșa forest, 05.1953, Konya Isrvan (5899)
APIACEAE	<i>Heracleum sphondylium</i> L.	Târgu-Mureș, 16.07.1946, Nagy Ödön (1823) Târgu-Mureș, 08.07.1946, Nagy Ödön (1824)
FABACEAE	<i>Medicago falcata</i> L.	Târgu-Mureș, 312 m altit., 14.10.1937, Nagy Ödön (998) Budiu near Târgu-Mureș, 23.06.1935, Nagy Ödön (999) Târgu-Mureș, Platoul Cornești, 480 m altit., 16.03.1936, Nagy Ödön (1000) Târgu-Mureș, "1 Mai", 340 m altit., 30.09.1935, Nagy Ödön (1001) Târgu-Mureș, Platoul Cornești, 480 m altit., 02.09.1936, Nagy Ödön (1003) Fărăgău Lake, 03.06.1976, Sarkany A. (5840)
FABACEAE	<i>Medicago lupulina</i> L.	Târgu-Mureș, Mureșeni Forest, 08.05.1936, Nagy Ödön (1002) Sângeriu de Mureș, 12.07.1956, Nagy Ödön (1004) Târgu-Mureș, Mureș river shore, 02.05.1939, Nagy Ödön (1006, 1007) Târgu-Mureș, Trebely Hill, 350 m altit., 17.05.1938, no (1008) Târgu-Mureș, island, 16.08.1960, leg. Konya Isrvan, det. Silvia Oroian (6013) Târgu-Mureș, Beșa forest, 05.1953, leg. Konya Isrvan, det. Silvia Oroian (6014, 6015)
FABACEAE	<i>Medicago sativa</i> L.	Porumbeni, 20.09.1947, Nagy Ödön (1009) Târgu-Mureș, at the border of Sântana de Mureș, 12.08.1939, Nagy Ödön (1010) Gornești, Mureș river shore, 21.06.1942, Nagy Ödön (1011) Târgu-Mureș, 312 m altit., 27.09.1937, Nagy Ödön (1012) Sânpaul, 28.05.1938, Nagy Ödön (1013)
FABACEAE	<i>Melilotus officinalis</i> (L.) Pall.	Târgu-Mureș, citadel's wall, 24.06.1941, Nagy Ödön (1014) Porumbeni, 01.08.1948, Nagy Ödön (1015, 1016) Târgu-Mureș, Platoul Cornești, 480 m altit., 27.09.1937, Nagy Ödön (1017)
APIACEAE	<i>Pastinaca sativa</i> L.	Târgu-Mureș, Mureș river shore, 27.07.1956, Nagy Ödön (1827) Târgu-Mureș, 24.07.1948, Nagy Ödön (1828) Târgu-Mureș, garden, 26.07.1948, Nagy Ödön (1829) Târgu-Mureș, garden, 26.07.1948, Nagy Ödön (1830) Târgu-Mureș, Stejăriș forest fringe, 28.07.1958, Nagy Ödön (1831) Târgu-Mureș, Pocloș stream, 28.08.1958, Nagy Ödön (1832) Târgu-Mureș, plough land, 23.08.1950, Nagy Ödön (1833)
APIACEAE	<i>Pimpinella anisum</i> L.	Târgu-Mureș, garden, 18.09.1952, Nagy Ödön (1844)
APIACEAE	<i>Pimpinella major</i> (L.) Huds. (syn. <i>Pimpinella saxifraga</i> L. var. <i>major</i> L.)	Târgu-Mureș, Platoul Cornești, 05.10.1937, Nagy Ödön (1845) Târgu-Mureș, "Dâmbul cu Comoară", 11.08.1947, Nagy Ödön (1846)

		<i>Pimpinella saxifraga</i> L.	<p>Târgu-Mureş, 28.08.1936, Nagy Ödön (1847)</p> <p>Târgu-Mureş, "Dâmbul cu Comoară", 11.08.1947, Nagy Ödön (1848)</p> <p>Târgu-Mureş, Platoul Corneşti, 11.09.1938, Nagy Ödön (1849)</p> <p>Târgu-Mureş, the base of Halmok Hill, 02.09.1948, Nagy Ödön (1850)</p> <p>Târgu-Mureş, Mureşeni Forest, 28.08.1940, Nagy Ödön (1851)</p>
TANNINS	ROSACEAE	<i>Agrimonia eupatoria</i> L.	<p>Târgu-Mureş, 23.06.1936, Nagy Ödön (1868)</p> <p>Târgu-Mureş, "Fântâna puuroasă", 29.06.1946, Nagy Ödön (1869)</p> <p>Porumbeni, 21.07.1946, Nagy Ödön (1870)</p> <p>Săbed, Corhan Hill, 01.07.1981, Silvia Oroian (5637)</p> <p>Herghelia, Ceuaşul de Câmpie commune, 12.07.1972, Konya Istvan (5657)</p> <p>Târgu-Mureş, Căpâlniţa, 10.08.1982, Silvia Oroian (5658)</p> <p>Săbed, Corhan Hill, 18.08.1980, Silvia Oroian (5797)</p> <p>Vidraşu, 11.07.1991, Silvia Oroian (7713)</p> <p>Sântana de Mureş, Bocşa Hill, 05.06.1990, Silvia Oroian (7714)</p>
	BETULACEAE	<i>Alnus glutinosa</i> (L.) Gaertn	<p>Târgu-Mureş, Remetea, 16.05.1936, Nagy Ödön (340)</p> <p>Târgu-Mureş, 1938, Nagy Ödön (341)</p> <p>Târgu-Mureş, Podeni, 16.05.1936, Nagy Ödön (342)</p> <p>Zau de Câmpie, 1982, leg. Eftenie Ioan, det. Silvia Oroian (5711)</p> <p>Târgu-Mureş, 18.03.1908, Bitai Arpad (8022)</p>
	FABACEAE	<i>Anthyllis vulneraria</i> L.	<p>Săbed, Corhan Hill, 29.05.1981, Silvia Oroian (5785)</p> <p>Jabeniţa, salty soil, 1994, Silvia Oroian (11049)</p> <p>Jabeniţa, Lacul Sărat, 26.06.1992, I. Eftenie (11050)</p> <p>Stănceni, Meştera, 09.06.1996, leg. Florentina Toghănel, det. Silvia Oroian (11051)</p> <p>Răstoliţa, 10.06.1995, Silvia Oroian (11052)</p> <p>Stănceni, Leu Mountain, 18.05.1994, Silvia Oroian (11053)</p> <p>Stănceni, Mureş river shore, 17.09.1993, Silvia Oroian (11055)</p> <p>Răstoliţa, The Iod Valley, 07.08.1986, Silvia Oroian (11054)</p> <p>Deleni, 06.1992, Silvia Oroian (11056)</p> <p>Târgu-Mureş, Stejăriş forest, 10.07.1959, Ion Parachi (11057)</p> <p>Crăieşti toward Herepea, 28.05.1985, leg. Konya Istvan, det. Silvia Oroian (11060)</p> <p>Hetiur-Sighişoara, 29.05.1984, Silvia Oroian (11062)</p> <p>Crăieşti-Herepea, Fănaţe Hill, 04.06.1984, Silvia Oroian (11062)</p> <p>Zau de Câmpie, Bota Mare, 28.05.1980, Silvia Oroian (11063)</p>
	FAGACEAE	<i>Castanea sativa</i> Miller (subspont.)	<p>Târgu-Mureş, "1 Mai", 27.08.1933, Nagy Ödön (1344)</p> <p>Săbed, pădure, 20.06.1959, Ion Parachi (8034)</p>

BETULACEAE	<i>Corylus avellana</i> L.	Sânpaul, 01.04.1939, Nagy Ödön (347) Târgu-Mureș, Platoul Cornești, 480 m altit., 10.03.1937, Nagy Ödön (348, 349) Târgu-Mureș, Mică Forest, 25.03.1935, Nagy Ödön (350) Târgu-Mureș, Mureșeni Forest, 05.04.1940, Nagy Ödön (351) Târgu-Mureș, Mare forest, 18.03.1938, Nagy Ödön (352) Târgu-Mureș, Parcul UMF, 14.08.1957, Nagy Ödön (353) Târgu-Mureș, 05.06.1950, Nagy Ödön (354) Adămuș, Herepea commune, 05.1979, Silvia Oroian (7095) Adămuș, Herepea commune, 1986, Silvia Oroian (7096) Târgu-Mureș, Platoul Cornești 20.04.1940, leg. Babos Bertalan, det. Silvia Oroian (7097) Orșova, Seci hamlet, 05.1979, leg. Sarkany Andrei, det. Silvia Oroian (7098)
ONAGRACEAE	<i>Epilobium angustifolium</i> L.	Târgu-Mureș, 24.06.1950, Nagy Ödön (676) Răstolița, 10.07.1995, Silvia Oroian (11110)
ONAGRACEAE	<i>Epilobium hirsutum</i> L.	Răstolița, Mureș river shore, 25.07.1996, Silvia Oroian (11111) Târgu-Mureș, dealul cu comoară, 370 m altit., 02.09.1948, Nagy Ödön (671) Târgu-Mureș, the base of Halmok Hill, 01.09.1948, Nagy Ödön (672) Târgu-Mureș, Mureș river shore, 310 m altit., 17.09.1936, Nagy Ödön (673) Târgu-Mureș, Mureș river shore, 311 m altit., 10.09.1938, Nagy Ödön (674) Târgu-Mureș, toward Sângeorgiu de Mureș, 11.08.1950, Nagy Ödön (675) Reghin, 11.07.2000, Mihaela Sămărghițan (11250) Răstolița, 25.07.1996, Silvia Oroian (11128)
ONAGRACEAE	<i>Epilobium parviflorum</i> Schreb.	Târgu-Mureș, Pocloș stream, 300 m sltit., 11.10.1937, Nagy Ödön (664) Târgu-Mureș, 26.09.1951, Nagy Ödön (665)
ASTERACEAE	<i>Erigeron acris</i> L.	Târgu-Mureș, Mare Hill vineyard, 20.06.1957, Nagy Ödön (2558) Târgu-Mureș, Corunca, 03.06.1939, Nagy Ödön (2559) Târgu-Mureș, island on Mureș, "Râțul cu scoici", 25.05.1948, Nagy Ödön (2560)
GERANIACEAE	<i>Erodium cicutarium</i> (L.) L'Héritier	Târgu-Mureș, Mureș river shore, 23.06.1947, Nagy Ödön (1352) Porumbeni, 06.04.1947, Nagy Ödön (1353) Târgu-Mureș, 15.10.1942, Nagy Ödön (1354)
ROSACEAE	<i>Fragaria vesca</i> L.	Târgu-Mureș, Stejăriș forest fringe, 13.05.1940, Nagy Ödön (1895) Târgu-Mureș, Stejăriș forest, 12.04.1939, Nagy Ödön (1896) Sânpaul, 28.05.1939, Nagy Ödön (1897) Târgu-Mureș, the base of dealului 1 Mai, 18.04.1939, Nagy Ödön (1898) Târgu-Mureș, Stejăriș forest, 18.05.1938, Nagy Ödön (1899) Băgaciu, 1872 (5386) Băgaciu, 1886 (5476) Târgu-Mureș, Platoul Cornești 19.05.1982, leg. Konya Istvan, det. Silvia Oroian (5648)

ROSACEAE	<i>Fragaria vesca</i> L.	Deda-Bistra, Scaunul Domnului, 15.06.1960, leg. Konya Istvan, det. Silvia Oroian (6036) Târgu-Mureş, Platoul Corneşti, 06.1953, leg. Konya Istvan, det. Silvia Oroian (6037) Orşova, Seci hamlet, 05.1979, leg. Sarkany Andrei, det. Silvia Oroian (7722) Sântana de Mureş, pasture, 22.05.1989, Silvia Oroian (7725) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7726) Râstoliţa, The Iod Valley, meadow, 17.04.1991, Silvia Oroian (7728)
ROSACEAE	<i>Fragaria viridis</i> Duch.	Zau de Câmpie, 07.07.1981, leg. Efenie Ioan, det. Silvia Oroian (5670) Sânpaul, 12.05.1987, Silvia Oroian (7723) Valea Izvoarelor, Măgheruş Hill, 13.05.1987, Silvia Oroian (7724) Zau de Câmpie, reserve, 30.04.1990, Silvia Oroian (7727)
GERANIACEAE	<i>Geranium robertianum</i> L.	Târgu-Mureş, Platoul Corneşti, 26.06.1948, Nagy Ödön (1384) Târgu-Mureş, "1 Mai", 21.07.1948, Nagy Ödön (1385) Târgu-Mureş, Mureşeni Forest, 14.05.1937, Nagy Ödön (1386) Târgu-Mureş, 21.05.1936, Nagy Ödön (1387) Târgu-Mureş, the base of Halmok Hill, 01.05.1939, Nagy Ödön (1388) Târgu-Mureş, Stejăriş forest, 17.06.1953, Konya Istvan (5958)
ROSACEAE	<i>Geum urbanum</i> L.	Târgu-Mureş, the base of Halmok Hill, 01.05.1939, Nagy Ödön (1900) Târgu-Mureş, Platoul Corneşti, 31.05.1942, Nagy Ödön (1901) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7598)
JUGLANDACEAE	<i>Juglans regia</i> L. (subspont.)	Târgu-Mureş, 08.05.1939, Nagy Ödön (1413) Târgu-Mureş, 01.04.1939, Nagy Ödön (1414) Târgu-Mureş, 12.05.1937, Nagy Ödön (1415) Târgu-Mureş, 14.05.1937, Nagy Ödön (1416) Târgu-Mureş, 02.05.1936, Nagy Ödön (1417) Târgu-Mureş, 08.05.1936, Nagy Ödön (1418) Târgu-Mureş, 13.05.1939, Nagy Ödön (1419) Târgu-Mureş, Mică Forest, 17.04.1939, Nagy Ödön (1420)
PLUMBAGINACEAE	<i>Limonium gmelini</i> (Willd.) O. Kuntze (<i>Statice gmelinii</i> Willd.)	Sânpaul, 1938, Nagy Ödön (549)
PRIMULACEAE	<i>Lysimachia nummularia</i> L.	Târgu-Mureş, 14.06.1944, Nagy Ödön (2271) Târgu-Mureş, top of 1 Mai Hill, 16.06.1936, Nagy Ödön (2272) Târgu-Mureş, Trebely, 19.05.1942, Nagy Ödön (2273) Târgu-Mureş, "Râtul cu scoici", 21.07.1940, Nagy Ödön (2274) Băgaciu, 1886 (5507) Târgu-Mureş, hippodrome, 07.1959, Konya Istvan (5962) Târgu-Mureş, Stejăriş forest, 17.06.1953, Konya Istvan (5963) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7653)

PRIMULACEAE	<i>Lysimachia punctata</i> L.	Târgu-Mureș, Mureșeni Forest, 13.06.1951, Nagy Ödön (2263) Târgu-Mureș, Stejăriș forest, 06.06.1939, Nagy Ödön (2264) Târgu-Mureș, Platoul Cornești, 10.04.1948, Nagy Ödön (2275) Târgu-Mureș, top of 1 Mai Hill, 08.06.1946, Nagy Ödön (2276) Târgu-Mureș, Stejăriș forest, 14.08.1950, Nagy Ödön (2277) Târgu-Mureș, Platoul Cornești, 26.06.1948, Nagy Ödön (2278) Târgu-Mureș, Platoul Cornești, 03.06.1941, Nagy Ödön (2279) Târgu-Mureș, Botanical Garden of UMF, 1984, Silvia Oroian (5971)
PRIMULACEAE	<i>Lysimachia vulgaris</i> L.	Târgu-Mureș, Mureș river shore, 12.08.1956, Nagy Ödön (2265)
LYTHRACEAE	<i>Lythrum salicaria</i> L.	Târgu-Mureș, Stejăriș forest, 31.08.1936, Nagy Ödön (1545) Târgu-Mureș, "Râțul cu scoici", 21.07.1940, Nagy Ödön (1546) Târgu-Mureș, Mureș river shore, 20.05.1939, Nagy Ödön (1547) Sânpaul, 28.05.1939, Nagy Ödön (1548) Porumbeni, 20.08.1947, Nagy Ödön (1549)
POLYGONACEAE	<i>Polygonum aviculare</i> L.	Târgu-Mureș, island, 16.08.1953, leg. Konya Istvan, det. Silvia Oroian (6047) Târgu-Mureș, plough land, 300 m altit., 28.08.1936, Nagy Ödön (598) Târgu-Mureș, Budiu Forest, 350 m altit., 03.10.1938, Nagy Ödön (599) Târgu-Mureș, 10.07.1960, Ion Patachi (8010) Sângeorgiu de Mureș, 30.06.1993, Silvia Oroian (8011)
POLYGONACEAE	<i>Polygonum bistorta</i> L.	Târgu-Mureș, plough land, 315 m altit., 01.05.1936, Nagy Ödön (604)
ROSACEAE	<i>Potentilla anserina</i> L.	Gurghiu, Poiana Narciselor, 02.06.1992, Silvia Oroian (7637) Târgu-Mureș, Mureș river shore, "Râțul cu scoici", 03.06.1938, Nagy Ödön (1925) Târgu-Mureș, Beșa, 31.05.1944, Nagy Ödön (1926) Băgaciu, 1872 (5407) Reghin, 02.05.2000, Mihaela Sămărghițan (11210)
ROSACEAE	<i>Potentilla arenaria</i> (syn. <i>P. cinerea</i> Chaix ex Vill.)	Târgu-Mureș, Platoul Cornești, 05.04.1939, Nagy Ödön (1921) Porumbeni, 07.04.1947, Nagy Ödön (1922) Târgu-Mureș, the base of Halmok Hill, 30.03.1939, Nagy Ödön (1923) Târgu-Mureș, "Dealul Uriș", 09.04.1937, Nagy Ödön (1924) Băgaciu, 1872 (5387, 5456)
ROSACEAE	<i>Potentilla argentea</i> L.	Târgu-Mureș, Platoul Cornești, 13.07.1947, Nagy Ödön (1913, 1914) Târgu-Mureș, Mureșeni Forest, 12.05.1936, Nagy Ödön (1915) Târgu-Mureș, Mureșeni Forest, 24.09.1938, Nagy Ödön (1916) Târgu-Mureș, Platoul Cornești, 13.07.1947, Nagy Ödön (1917) Târgu-Mureș, Beșa, 19.06.1942, Nagy Ödön (1918) Târgu-Mureș, Mureș river shore, 03.06.1938, Nagy Ödön (1919) Târgu-Mureș, Stejăriș forest, 08.06.1946, Nagy Ödön (1920) Băgaciu, 1872 (5423)

ROSACEAE	<i>Potentilla erecta</i> (L.) Rauschel	Târgu-Mureş, Cocoş forest, 20.05.1941, Nagy Ödön (1929) Târgu-Mureş, 1 Mai Hill, 21.07.1948, Nagy Ödön (1930) Târgu-Mureş, Platoul Corneşti, 29.05.1941, Nagy Ödön (1931) Târgu-Mureş, Budiu Forest, 03.10.1938, Nagy Ödön (1932) Târgu-Mureş, "Dealul Uriaş", 14.1939, Nagy Ödön (1933) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7599) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7606)
ROSACEAE	<i>Potentilla recta</i> L.	Târgu-Mureş, the base of Mare Hill, 20.06.1957 (1946) Târgu-Mureş, Platoul Corneşti, 01.07.1956, Nagy Ödön (1947) Târgu-Mureş, the fringe of Platoul Corneşti, toward Livezeni, 18.09.1948, Nagy Ödön (1948) Târgu-Mureş, Stejăriş forest, 30.09.1937, Nagy Ödön (1949) Târgu-Mureş, Platoul Corneşti, 19.10.1936, Nagy Ödön (1950) Târgu-Mureş, Platoul Corneşti, 26.06.1948, Nagy Ödön (1951) Târgu-Mureş, Platoul Corneşti, 13.07.1947, Nagy Ödön (1952, 1953) Târgu-Mureş, toward Platoul Corneşti, 16.06.1948, Nagy Ödön (1954) Sântana de Mureş, Bocşa Hill, 05.06.1990, Silvia Oroian (7729)
ROSACEAE	<i>Potentilla reptans</i> L.	Târgu-Mureş, 05.06.1950, Nagy Ödön (1938) Târgu-Mureş, Platoul Corneşti, 05.06.1943, Nagy Ödön (1939) Băgaciu, 1872 (5434)
ROSACEAE	<i>Prunus spinosa</i> L.	Târgu-Mureş, Platoul Corneşti, 16.04.1937, Nagy Ödön (1965) Târgu-Mureş, Platoul Corneşti, 06.1953, leg. Konya Istvan, det. Silvia Oroian (6031)
ROSACEAE	<i>Prunus tenella</i> Batsch	Târgu-Mureş, Platoul Corneşti, 18.04.1939, Nagy Ödön (1968) Săbed, Corhan Hill, 23.04.1981, Szombath Zoltán, Silvia Oroian (5639) Săbed, Corhan Hill, 08.05.1980, Silvia Oroian (5792)
FAGACEAE	<i>Quercus petraea</i> (Matt.) Liebl.	Săbed, reserve, 12.08.1989, Silvia Oroian (7104) Târgu-Mureş, 27.04.1908, Bitai Arpad (8035)
FAGACEAE	<i>Quercus pubescens</i> Willd.	Orşova, Sici hamlet, 05.1979, Sarkany Andrei (7112)
FAGACEAE	<i>Quercus robur</i> L.	Târgu-Mureş, Near church, 380 m altit., 10.05.1937, Nagy Ödön (990) Târgu-Mureş, 28.09.1928, Nagy Ödön (991) Târgu-Mureş, Platoul Corneşti, 01.05.1939 (1336) Târgu-Mureş, 01.05.1943, Nagy Ödön (1337) Târgu-Mureş, 24.04.1936, Nagy Ödön (1338) Târgu-Mureş, 10.05.1936, Nagy Ödön (1339) Târgu-Mureş, Platoul Corneşti, 29.06.1939, Nagy Ödön (1340) Târgu-Mureş, 16.05.1936, Nagy Ödön (1341) Târgu-Mureş, Platoul Corneşti, 10.1948, Nagy Ödön (1342)

	FAGACEAE	<i>Quercus robur</i> L.	Săbed, reserve, 16.09.1989, Silvia Oroian (7105) Săbed, reserve, 12.08.1989, Silvia Oroian (7106) Săbed, reserve, 20.06.1989, Silvia Oroian (7107) Adămuș, Herepea commune, 29.05.1984, Silvia Oroian (7108) Petelea, 05.06.1967, Konya Istvan (7109) Gurghiu, Poiana Narciselor, forest, 06.06.1991, Silvia Oroian (7500) Păuloaia Valley, 06.07.2000, Mihaela Sămărghițan (11297) Viilor Hill Gurghiu, 27.07.2000, Mihaela Sămărghițan (11300) Târgu-Mureș, Platoul Cornești, 18.10.1936, Nagy Ödön (1994) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7601)
	ROSACEAE	<i>Sanguisorba officinalis</i> L.	
DEPSIDES	ASTERACEAE	<i>Cichorium intybus</i> L.	Târgu-Mureș, 16.08.1957, Nagy Ödön (2526) Târgu-Mureș, plough land, 16.09.1941, Nagy Ödön (2527) Săbed, Corhan Hill, 18.08.1980, Silvia Oroian (5636) Târgu-Mureș, museum's yard, 10.07.1980, Silvia Oroian (5652)
FATTY OILS	CUCURBITACEAE	<i>Cucurbita pepo</i> L.	Târgu-Mureș, the base of Dealului Halmok, 01.09.1948, Nagy Ödön (2746) Târgu-Mureș, garden, 29.05.1939, Nagy Ödön (2747)
	ASTERACEAE	<i>Helianthus annuus</i> L.	Târgu-Mureș, plough land, 16.09.1941, Nagy Ödön (2577)
	ONAGRACEAE	<i>Oenothera biennis</i> L.	Târgu-Mureș, Mureș dam, 07.09.1948, Nagy Ödön (660) Târgu-Mureș, Mureș river shore, 26.06.1942, Nagy Ödön (661) Lunca Bradului, 25.07.1996, Silvia Oroian (11109) Lunca Bradului, 25.07.1996, leg. Silvia Oroian, det. Mihaela Sămărghițan (11112) Reghin, 17.06.2000, Mihaela Sămărghițan (11289)
VOLATILE OILS	ASTERACEAE	<i>Achillea millefolium</i> L.	Târgu-Mureș, Mureș river shore, 20.05.1939, Nagy Ödön (2675) Târgu-Mureș, 320 m altit., 30.09.1937, Nagy Ödön (2676) Târgu-Mureș, the citadel's wall, 24.06.1941, Nagy Ödön (2677) Zau de Câmpie, 21.06.1981, leg. Eftenie Ioan, det. Silvia Oroian (5692) Târgu-Mureș, Botanical Garden of UMF, 1984, Silvia Oroian (5970)
	ASTERACEAE	<i>Achillea ptarmica</i> L.	Lăpușna, 14.08.1997, Mihaela Sămărghițan (11256) Vălea Bătrâna, 12.08.1998, Mihaela Sămărghițan (11260) Dubiste, 06.08.1997, Mihaela Sămărghițan (11279, 11282)
	APIACEAE	<i>Anethum graveolens</i> L.	Târgu-Mureș, 19.06.1939, Nagy Ödön (1262)
	APIACEAE	<i>Angelica archangelica</i> L.	Târgu-Mureș, 26.06.1939, Nagy Ödön (1263)
	ASTERACEAE	<i>Anthemis tinctoria</i> L.	Târgu-Mureș, 16.06.1952, Nagy Ödön (1264) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7518) Beica de Sus, 16.06.1999, Mihaela Sămărghițan (11272)

ARISTOLOCHIACEAE	<i>Asarum europaeum</i> L.	Sânpaul, 27.05.1939, Nagy Ödön (316) Târgu-Mureş, Platoul Corneşti, 480 m altit., 04.04.1937, Nagy Ödön (317) Târgu-Mureş, 18.04.1939, Nagy Ödön (318) Târgu-Mureş, Platoul Corneşti, 480 m altit, 1938, Nagy Ödön (319) Târgu-Mureş, Platoul Corneşti, 22.04.1939, Nagy Ödön (320) Băgaciu, 1872 (5369) Băgaciu, 1886 (5468) Săbed, reserve, 12.08.1989, Silvia Oroian (7114) Săbed, reserve, 06.04.1989, Silvia Oroian (7115) Papiu Ilarian, Şandru forest, 04.05.1988, Silvia Oroian (7116) Orşova, Seci hamlet, 05.1979, Sarkany Andrei, (7117) Răstoliţa, The Iod Valley, 07.08.1986, Silvia Oroian (7118) Târgu-Mureş, Mare forest, Ion Parachi (8162) Livezeni, 25.04.1936, Nagy Ödön (8163) Răstoliţa, Podirei, 09.05.1993, Silvia Oroian (8169) Răstoliţa, Podirei, 26.09.1993, Silvia Oroian (8170) Răstoliţa, Podirei, 20.06.1993, Silvia Oroian (8171) Răstoliţa, pădure, 26.07.1985, Silvia Oroian (8172) Răstoliţa, 04.05.1997, Silvia Oroian (11386)
APIACEAE	<i>Carum carvi</i> L.	Târgu-Mureş, Botanical Garden of UMF, 10.06.1980, Silvia Oroian (5770) Târgu-Mureş, Beşa forest, 05.1953, Konya Istvan (5886) Bedeni, 25.05.1948, Nagy Ödön (1307) Târgu-Mureş, str. Libertăţii, 30.05.1948, Nagy Ödön (1308) Târgu-Mureş, Mureşeni Forest, 24.09.1938, Nagy Ödön (1309) Târgu-Mureş, toward Platoul Corneşti, 04.06.1944, Nagy Ödön (1310) Târgu-Mureş, Mureşeni Forest, 05.1937, Nagy Ödön (1311) Târgu-Mureş, 09.05.1936, Nagy Ödön (1312) Târgu-Mureş, 01.05.1936, Nagy Ödön (1313)
APIACEAE	<i>Coriandrum sativum</i> L.	Târgu-Mureş, Medicinal Plants Garden of a UMF, 10.07.1952, Nagy Ödön (1304) Târgu-Mureş, Medicinal Plants Garden of a UMF, 16.06.1952, Nagy Ödön (1305)
IRIDACEAE	<i>Iris pseudacorus</i> L.	Fărăgău Lake, 26.05.1976, Vasarhelyi Zoltan (5828) Fărăgău Lake, 13.06.1976, Konya Istvan (5829) Răstoliţa, 1959, Ion Patachi (7524) Târgu-Mureş, Mureş river dead branch, 31.05.1936 (7526) Reghin, toward Beica, 31.05.1999, Mihaela Sămărghitan (11331)
IRIDACEAE	<i>Iris sibirica</i> L.	Gurghiu, Poiana Narciselor, 1992, Silvia Oroian (7519) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7695, 7703) Gurghiu, Poiana Narciselor, 22.05.1998, Mihaela Sămărghitan (11327)

CUPRESSACEAE	<i>Juniperus communis</i> L.	Târgu-Mureș, 310 m altit., 06.03.1939, Nagy Ödön (211) Târgu-Mureș, Platoul Cornești, 480 m altit., Nagy Ödön (212) Târgu-Mureș, 330 m altit., 12.04.1937, Nagy Ödön (213) Târgu-Mureș, catholic cemetery, 31.04.1941, Nagy Ödön (214)
ASTERACEAE	<i>Matricaria recutita</i> (syn. <i>Matricaria chamomilla</i> L.)	Sângeorgiu de Mureș, 05.06.1941, Nagy Ödön (2333) Târgu-Mureș, 21.05.1938, Nagy Ödön (2334)
LAMIACEAE	<i>Melissa officinalis</i> L.	Târgu-Mureș, cultivated, 02.07.1950, Nagy Ödön (148)
LAMIACEAE	<i>Mentha aquatica</i> L.	Târgu-Mureș, Botanical Garden of UMF, 1984, Silvia Oroian (5966)
LAMIACEAE	<i>Mentha arvensis</i> L.	Târgu-Mureș, Beșa, 19.06.1942, Nagy Ödön (134) Târgu-Mureș, Mureș dam, 07.09.1948, Nagy Ödön (135, 136) Târgu-Mureș, Mureș river shore, 310 m altit., Nagy Ödön (137) Târgu-Mureș, 07.09.1940, Nagy Ödön (138), var. <i>angustissima</i> Târgu-Mureș, Mureșeni Forest, 07.09.1940, Nagy Ödön (139) Târgu-Mureș, Stejăriș forest, 470 m altit., 04.09.1938 (140) Sinpaul, 28.05.1939, Nagy Ödön (141) Târgu-Mureș, 06.09.1940, Nagy Ödön (142) Târgu-Mureș, Mureșeni Forest, 340 m altit., 29.08.1940 (143) Târgu-Mureș, Platoul Cornești, 480 m altit., Nagy Ödön (144) Târgu-Mureș, airport, 28.08.1941, Nagy Ödön (131) Târgu-Mureș, 1 Mai Hill, 21.07.1948, Nagy Ödön (132) Târgu-Mureș, "Dealul cu Comoară", 112 m altit., 25.09.1939, Nagy Ödön (132) Târgu-Mureș, 29.07.1953, Nagy Ödön (4564) Târgu-Mureș, Botanical Garden of UMF, 20.10.1980, leg. Konya Istvan, det. Silvia Oroian (5652) Târgu-Mureș, 12.08.1957, Nagy Ödön (4566) Târgu-Mureș, garden, 13.08.1951, Nagy Ödön (4567) Târgu-Mureș, garden, 12.08.1957, Nagy Ödön (4571) Târgu-Mureș, cultivated, 13.08.1951, Nagy Ödön (129) Acățari, cultivated, 13.09.1935, Nagy Ödön (130) Târgu-Mureș, the base of Mare Hill, 300 m altit., 14.07.1948, Nagy Ödön (126) Târgu-Mureș, Budiș Hill, 400 m altit., 26.06.1936, Nagy Ödön (127) Zau de Câmpie, 09.07.1982, leg. Eftenie Ioan, det. Silvia Oroian (5684) Lechința de Mureș, 02.07.1985, col. Sarkany Andrei, det. Silvia Oroian (7898) Târgu-Mureș, 07.09.1940, Nagy Ödön (124) Târgu-Mureș, "Dâmbul cu Comoară", 11.08.1947, Nagy Ödön (125) Târgu-Mureș, Botanical Garden of UMF, 20.10.1980, leg. Konya Istvan, det. Silvia Oroian (5645) Zau de Câmpie, 19.07.1982, leg. Eftenie Ioan, det. Silvia Oroian (5687)
LAMIACEAE	<i>Mentha longifolia</i> (L.) Huds.	
LAMIACEAE	<i>Mentha pulegium</i> L.	
LAMIACEAE	<i>Mentha rotundifolia</i> L.	
LAMIACEAE	<i>Mentha verticillata</i> (L.) Hudson	
LAMIACEAE	<i>Mentha x piperita</i> L. (<i>M. aquatica</i> x <i>spicata</i>)	
LAMIACEAE	<i>Nepeta nuda</i> L. ssp. <i>nuda</i> (<i>Nepeta pannonica</i> L.)	
LAMIACEAE	<i>Origanum vulgare</i> L.	

ASTERACEAE	<i>Petasites hybridus</i> (L.) P.Gaertner, B.Meyer et Schreb.	Târgu-Mureş, Mureş river shore, 15.04.1938, Nagy Ödön (2340, 2341) Târgu-Mureş, Mureş river shore, 12.05.1937, Nagy Ödön (2342) Orşova, 12.05.1997, Mihaela Sămărghitan (11281)
APIACEAE	<i>Peucedanum oreoselinum</i> (L.) Moench	Porumbeni, 20.07.1948, Nagy Ödön (1835) Porumbeni, 01.08.1948, Nagy Ödön (1836, 1838) Târgu-Mureş, the base of Halmok Hill, 02.09.1948, Nagy Ödön (1837)
PINACEAE	<i>Pinus nigra</i> Arnold	Târgu-Mureş, Budiu Forest, 350 m altit., Nagy Ödön (226) Săbed, reserve, 23.03.1989, Silvia Oroian (7081)
PINACEAE	<i>Pinus sylvestris</i> L.	Târgu-Mureş, Platoul Corneşti, 350 m altit., 15.05.1937, Nagy Ödön (228) Târgu-Mureş, Platoul Corneşti, 06.06.1937, Nagy Ödön (229) Târgu-Mureş, 1937, Nagy Ödön (230) Acăţari, 320 m altit., 17.05.1937, Nagy Ödön (231) Târgu-Mureş, Platoul Corneşti, 500 m altit., 04.1938, Nagy Ödön (232) Târgu-Mureş, 29.05.1942, Nagy Ödön, (233) Săbed, reserve, 12.08.1989, Silvia Oroian (7082, 7085) Târgu-Mureş, Platoul Corneşti, 12.05.1940, leg. Babos Bertalan, det. Nagy Ödön (7083) Târgu-Mureş, Platoul Corneşti, 26.04.1940, leg. Babos Bertalan, det. Nagy Ödön (7084)
LAMIACEAE	<i>Salvia officinalis</i> L.	Târgu-Mureş, Platoul Corneşti, 22.05.1936, Nagy Ödön (3117) Târgu-Mureş, Mare Hill vineyard, 17.06.1949, Nagy Ödön (3118) Târgu-Mureş, Botanical Garden of UMF, 16.06.1952, Nagy Ödön (3119)
LAMIACEAE	<i>Salvia sclarea</i> L.	Târgu-Mureş, Botanical Garden of UMF, 10.07.1952, Nagy Ödön (3110, 3111)
LAMIACEAE	<i>Thymus glabrescens</i> Willd.	Târgu-Mureş, Căpâlniţa, 01.06.1938, Nagy Ödön (3043) Băgaciu, 1872 (5404)
LAMIACEAE	<i>Thymus pannonicus</i> All.	Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7672) Târgu-Mureş, Căpâlniţa, 19.05.1937, Nagy Ödön (3019) Târgu-Mureş, 06.06.1943, Nagy Ödön (3033) Târgu-Mureş, Mureşeni Forest, 06.06.1943, Nagy Ödön (3034) Târgu-Mureş, Platoul Corneşti, 05.06.1943, Nagy Ödön (3038) Târgu-Mureş, 27.05.1943, Nagy Ödön (3042) Târgu-Mureş, 18.06.1947, Nagy Ödön (3048) Târgu-Mureş, "Râul cu scoici", 25.06.1947, Nagy Ödön (3049) Târgu-Mureş, 18.06.1947, Nagy Ödön (3050) Târgu-Mureş, "Râul cu scoici", 23.06.1947, Nagy Ödön (3051) Fărăgău Lake, 26.05.1976, Vasarhely Zoltan
LAMIACEAE	<i>Thymus pulegioides</i> L.	Târgu-Mureş, Stejăriş forest fringe, 12.05.1946, Nagy Ödön (3040) (ssp. chamaedrys) Târgu-Mureş, Stejăriş forest fringe, 09.05.1947, Nagy Ödön (3040) (ssp. chamaedrys) Târgu-Mureş, Platoul Corneşti, 11.05.1946, Nagy Ödön (3045) (ssp. chamaedrys)

LAMIACEAE	<i>Thymus pulegioides</i> L.	Târgu-Mureș, the base of pădurii Strejariș, 11.05.1937, Nagy Ödön (3046) (ssp. chamaedrys) Târgu-Mureș, 21.05.1946, Nagy Ödön (3047) (ssp. chamaedrys) Deda-Bistra Mureșului, 15.06.1960, Konya Istvan (5939)
LAMIACEAE	<i>Thymus serpyllum</i> L.	Târgu-Mureș, 21.06.1936, Nagy Ödön (3052) Târgu-Mureș, Platoul Cornești, 06.1953, Konya Istvan (5937)
LAMIACEAE	<i>Thymus x daciensis</i> Borb. (<i>T. pannonicus</i> x <i>T. pulegioides</i>)	Târgu-Mureș, Mureșeni Forest, 03.06.1943, Nagy Ödön (3035) Târgu-Mureș, 06.06.1943, Nagy Ödön (3036) Târgu-Mureș, Mureșeni Forest, 02.06.1943, Nagy Ödön (3037) Târgu-Mureș, 05.06.1943, Nagy Ödön (3039) Târgu-Mureș, 06.06.1943, Nagy Ödön (3044)
TILIACEAE	<i>Tilia cordata</i> Mill.	Sănpaul, garden, 27.05.1939, Nagy Ödön (926) Târgu-Mureș, 29.05.1938, Nagy Ödön (927) Târgu-Mureș, 05.07.1957, Nagy Ödön (928) Târgu-Mureș, Budiu Hill, 380 m altit., 17.05.1937, Nagy Ödön (929) Târgu-Mureș, hippodrome, 08.07.1960, leg. Konya Istvan, det. Silvia Oroian (6045) Răstolița, 01.08.1993, Silvia Oroian (11168) Răstolița, 24.05.1996, Silvia Oroian (11170) Gălăoaia, 30.07.1996, Silvia Oroian (11171)
TILIACEAE	<i>Tilia platyphyllos</i> Scop.	Târgu-Mureș, 05.07.1957, Nagy Ödön (925) Răstolița, 24.05.1996, Silvia Oroian (11166) Lunca Bradului, 15.10.1993, Silvia Oroian (11167) Lunca Bradului, 19.10.1993, Silvia Oroian (11169)
TILIACEAE	<i>Tilia tomentosa</i> Moench	Târgu-Mureș, Mare Hill, 15.06.1950, Nagy Ödön (924) (cultivated)
VALERIANACEAE	<i>Valeriana officinalis</i> L.	Târgu-Mureș, Platoul Cornești 30.05.1944, Nagy Ödön (901) Târgu-Mureș, 31.05.1947, Nagy Ödön (902) Târgu-Mureș, Mureș river shore, 17.09.1956, Nagy Ödön (903, 904) Zau de Câmpie, 08.06.1981, leg. Eftenie Ioan, det. Silvia Oroian (5675) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7682) (var. tenuifolia Vohl.) Gurghiu, Poiana Narciselor, 02.06.1992, Silvia Oroian (7682) (var. tenuifolia Vohl.) Răstolița, 10.07.1995, Silvia Oroian (11175) Stănceni, Leu Mountain, 18.05.1994, Silvia Oroian (11176) Răstolița, Podirei, 22.04.1994, Silvia Oroian (11177) Ciobotani-Toplița, 18.05.1994, Silvia Oroian (11178) Răstolița, Vișa Valley, 29.05.1995, Silvia Oroian (11179)
ASTERACEAE	<i>Xanthium spinosum</i> L.	Târgu-Mureș, 20.07.1951, Nagy Ödön (2420) Porumbeni, 18.08.1947, Nagy Ödön (2421)

	ASTERACEAE	<i>Xanthium strumarium</i> L.	Târgu-Mureş, 17.08.1951, Nagy Ödön (2422) Târgu-Mureş, Mureş river shore, 17.09.1956, Nagy Ödön (2423) Sântana de Mureş, 16.10.1937, Nagy Ödön (2424)
ALLANTOIN	BORAGINACEAE	<i>Symphytum officinale</i> L.	Porumbeni, 20.08.1947, Nagy Ödön, (419) Târgu-Mureş, plough land, 300 m altit., 13.05.1936, Nagy Ödön (420) Băgaciu, 1872 (5399)
RESINES	CANNABACEAE	<i>Cannabis sativa</i> L.	Porumbeni, 03.08.1948, Nagy Ödön (682) Botanical Garden of UMF, Silvia Oroian (7152)
	CANNABACEAE	<i>Humulus lupulus</i> L.	Târgu-Mureş, Mureş river dead branch, 310 m altit., 18.09.1936, Nagy Ödön (679) Târgu-Mureş, 309 m altit., 20.09.1941, Nagy Ödön (680) Reghin, 02.05.2000, Mihaela Sămărghitan (11291)
GLYCO-REZINES	CONVOLVULACEAE	<i>Calyptegia sepium</i> (L.) R.Br.	Târgu-Mureş, malul părauului Kali, 19.09.1938, Nagy Ödön (2643) Târgu-Mureş, near Platoul Corneşti, plough land, 05.08.1947, Nagy Ödön (2644) Voiniceni, 27.07.1948, Nagy Ödön (2645)
	CONVOLVULACEAE	<i>Convolvulus arvensis</i> L.	Târgu-Mureş, plough land, 06.1937, Nagy Ödön (2646) Târgu-Mureş, at the base of Platoul Corneşti (2647) Băgaciu, 1872 (5427) Târgu-Mureş, museum's yard, 02.07.1960, Konya Istvan (5919) Târgu-Mureş, hippodrome, 07.1959, Konya Istvan (5920) Săbed, Corthan Hill, 01.07.1981, Silvia Oroian (7906) Crăieşti toward Herepea, 28.05.1985, leg. Konya Istvan, det. Silvia Oroian (7907) Zau de Câmpie, reserve, 12.07.1991, Silvia Oroian (7908) Vidrasău, Mureş river shore, 19.06.1991, Silvia Oroian (7909) Târgu-Mureş, museum's yard, 27.05.1985, Silvia Oroian (7910) Sântana de Mureş, 05.06.1990, Silvia Oroian (7911)
SULFUR COMPOUNDS	BRASSICACEAE	<i>Alliaria petiolata</i> (Bieb.) Cavarra & Grande (syn. <i>Alliaria officinalis</i> Andry. et Bieb.)	Târgu-Mureş, Platoul Corneşti, 04.04.1937, Nagy Ödön (3128) Târgu-Mureş, the base of Dealului Halmok, 28.04.1939, Nagy Ödön (3135) Băgaciu, 1886 (5488) Târgu-Mureş, Platoul Corneşti, 06.0953, Konya Istvan (5935) Gurghiu, Poiana Narciselor, 05.05.1992, Silvia Oroian (7620) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7621) Târgu-Mureş, hippodrome, 28.04.1980, Silvia Oroian (7747)
	ALLIACEAE	<i>Allium ursinum</i> L.	Băgaciu, 1872 (5416) Gurghiu, school, 26.04.1960, Ion Patachi (7554) Valea Orşova, Obârsii Hill, 15.05.1997, Mihaela Sămărghitan (11332)

ALLIACEAE	<i>Allium ursinum</i> L.	Valea Orșova, Obârsii Hill, 12.05.1997, Mihaela Sămărghițan (11333) Gurghiu, 23.05.1995, leg. So, det. Mihaela Sămărghițan (11338) Orșova Pădure, 03.06.1994, Silvia Oroian, Mihaela Sămărghițan (11352)
BRASSICACEAE	<i>Armonia rusticana</i> P. Gaertner	Târgu-Mureș, garden, 18.05.1940, Nagy Ödön (3138) Târgu-Mureș, garden, 27.05.1939, Nagy Ödön (3139) Târgu-Mureș, garden, 20.04.1939, Nagy Ödön (3139)
IRIDOIDS	<i>Ajuga genevensis</i> L.	Târgu-Mureș, Budiu, 07.07.1942, Nagy Ödön, (59) Târgu-Mureș, near Stejăriș forest, 03.06.1969, Nagy Ödön (60) Târgu-Mureș, Stejăriș forest, 08.06.1946, Nagy Ödön, (61) Târgu-Mureș, Mureșeni Forest, 350 m altit., 12.05.1936 (67) Târgu-Mureș, Near church, 440 m altit., 16.05.1936, Nagy Ödön (68) Târgu-Mureș, Near church, 440 m altit., 10.05.1937, Nagy Ödön (69) Târgu-Mureș, Platoul Cornești, 27.05.1951, Nagy Ödön, (70) Târgu-Mureș, Beșa forest, 380 m altit., 14.05.1939, Nagy Ödön (71) Băgaciu, 1872 (5373) Gurghiu, Poiana Narciselor, 02.06.1992, Silvia Oroian (7655) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7667) Gurghiu, Poiana Narciselor, 05.05.1992, Silvia Oroian (7668)
LAMIACEAE	<i>Ajuga reptans</i> L.	Târgu-Mureș, Platoul Cornești, 13.05.1937, Nagy Ödön, (64) Târgu-Mureș, Near church, 440 m altit., 10.05.1967, Nagy Ödön (65) Târgu-Mureș, 28.04.1939, Nagy Ödön, (66) Târgu-Mureș, 03.05.1936, Nagy Ödön (72) Băgaciu, 1886 (5491, 5492) Deda Bistra, „Scaunul Domnului”, 15.06.1960, Konya Istvan (5594) Deda – Bistra Mureșului, 15.06.1960, Konya Istvan (5941) Gurghiu, Poiana Narciselor, 09.05.1991, Silvia Oroian (7669) Glodeni, 10.05.1959, Ion Parachi (7892)
SCROPHULARIACEAE	<i>Euphrasia stricta</i> D.Wolf	Porumbeni, 09.08.1948, Nagy Ödön (2024) Porumbeni, 25.08.1947, Nagy Ödön (2025) Târgu-Mureș, Mureșeni Forest, 03.06.1951, Nagy Ödön (2026)
LAMIACEAE	<i>Lamium album</i> L.	Târgu-Mureș, Mureș river shore, 02.05.1939, Nagy Ödön (112) Târgu-Mureș, 1939, Nagy Ödön (113) Băgaciu, 1886 (5480, 5481) Sângeorgiu de Mureș, 07.1959, Konya Istvan (5605) Fărăgău Lake, 13.06.1976, Konya Istvan (5847) Gurghiu, Poiana Narciselor, 02.06.1992, Silvia Oroian (7665)
CAPRIFOLIACEAE	<i>Sambucus ebulus</i> L.	Târgu-Mureș, “Râțul cu scoici”, 309 m altit., 21.07.1940, Nagy Ödön (477)

	SCROPHULARIACEAE	<i>Scrophularia nodosa</i> L.	Târgu-Mureş, Mureşeni Forest, 12.05.1936, Nagy Ödön (2049)
	SCROPHULARIACEAE	<i>Scrophularia scopolii</i> Hoppe	Reghin, 02.05.2000, Mihaela Sămărghitan (11209)
	LAMIACEAE	<i>Stachys germanica</i> L.	Târgu-Mureş, Corbul, 30.05.1948, Nagy Ödön (3085) Târgu-Mureş, 1 Mai Hill, 08.06.1946, Nagy Ödön (3086) Târgu-Mureş, 1 Mai Hill, 16.06.1946, Nagy Ödön (3087) Curteni 27.08.1941, Nagy Ödön (3088) Târgu-Mureş, 21.06.1935, Nagy Ödön (3089) Târgu-Mureş, Stejăriş forest, 12.06.1938, Nagy Ödön (3090) Târgu-Mureş, 11.06.1959, Nagy Ödön (4569) Băgaciu, 1872 (5426)
	LAMIACEAE	<i>Stachys officinalis</i> L. (syn. <i>Betonica officinalis</i> L.)	Târgu-Mureş, 08.09.1936, Nagy Ödön (3078) Târgu-Mureş, Platoul Corneşti, 01.07.1946, Nagy Ödön (3071) Târgu-Mureş, Platoul Corneşti, 26.06.1918, Nagy Ödön (3080) Târgu-Mureş, Cocoşd forest, 29.06.1946, Nagy Ödön (3081) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7656)
	LAMIACEAE	<i>Stachys recta</i> L.	Târgu-Mureş, Corunca, 03.06.1939, Nagy Ödön (3069) Târgu-Mureş, Beşa, 16.05.1936, Nagy Ödön (3070) Săbed, Corhan Hill, 18.08.1980, Silvia Oroian (5574) Zau de Câmpie, 09.07.1982, leg. Eftenie Ioan, det. Silvia Oroian (5725) Lechinţa de Mureş, 02.07.1985, col. Sarkany Andrei, det. Silvia Oroian (7901)
	VERBENACEAE	<i>Verbena officinalis</i> L.	Târgu-Mureş, Platoul Corneşti 19.06.1942, Nagy Ödön (889) Târgu-Mureş, Beşa, 13.05.1939, Nagy Ödön (889) Târgu-Mureş, "Dâmbul cu Comoară", 350 m altit., 11.08.1947, Nagy Ödön (890, 891) Târgu-Mureş, Mureş river dead branch, 310 m altit., 15.06.1936, Nagy Ödön (892)
ALKALOIDS	PINACEAE	<i>Abies alba</i> Miller	Târgu-Mureş, cultivated, 320 m altit., 07.02.1939, Nagy Ödön (208) Târgu-Mureş, cultivated, 330 m altit., 1938, Nagy Ödön (209) Săbed, reserve, 06.04.1989, Silvia Oroian (7077)
	ACERACEAE	<i>Acer campestre</i> L.	Târgu-Mureş, Near church, 400 m altit., 10.05.1937, Nagy Ödön (262)
	ACERACEAE	<i>Acer negundo</i> L.	Târgu-Mureş, 25.04.1939, Nagy Ödön (253) Târgu-Mureş, Platoul Corneşti, 29.03.1939, Nagy Ödön (254) Târgu-Mureş, 17.04.1937, Nagy Ödön (255) Târgu-Mureş, Mureş river shore, 09.04.1935, Nagy Ödön (256) Târgu-Mureş, 02.04.1937, Nagy Ödön (257) Târgu-Mureş, sub the citadel's wall, 10.06.1947, Nagy Ödön (258) Târgu-Mureş, 10.05.1939, Nagy Ödön (259) Cristeşti, 315 m altit., 28.05.1939, Nagy Ödön (260) Târgu-Mureş, Platoul Corneşti, 450 m altit., 05.05.1937, Nagy Ödön (261)

ACERACEAE	<i>Acer platanoides</i> L.	Târgu-Mureș, Platoul Cornești, 380 m altit., 24.04.1936, Nagy Ödön (248) Târgu-Mureș, Platoul Cornești, 450 m altit., 29.04.1938, Nagy Ödön (249) Târgu-Mureș, cimitirul reformat, 350 m altit., 12.06.1942, Nagy Ödön (250) Târgu-Mureș, Platoul Cornești, 400 m altit., 18.04.1938, Nagy Ödön (251) Târgu-Mureș, cultivated, 10.05.1939, Nagy Ödön (252) Târgu-Mureș, Platoul Cornești, 25.10.1938, Nagy Ödön (982)
ACERACEAE	<i>Acer pseudoplatanus</i> L.	Târgu-Mureș, Platoul Cornești, 1937, 1938, Nagy Ödön (263) Târgu-Mureș, Platoul Cornești, 380 m altit., 27.04.1939, Nagy Ödön (264) Târgu-Mureș, UMF, 340 m altit., 16.04.1930, Nagy Ödön (265) Deda-Bistra, Scaunul Domnului, 15.06.1960, leg. Konya Isrvan, det. Silvia Oroian (6055)
RANUNCULACEAE	<i>Aconitum moldavicum</i> (L.) Hacq.	Târgu-Mureș, the base of Halmok Hill, Gheorghe Doja, 17.05.1937, Nagy Ödön (2251) Săbed, Lechința forest, 09.06.1980, Silvia Oroian (7300) Lunca Bradului, Neagra, 14.06.1994, Silvia Oroian (8070)
RANUNCULACEAE	<i>Aconitum napellus</i> L.	Târgu-Mureș, Botanical Garden of UMF, 14.06.1980, Silvia Oroian (7301)
ARISTOLOCHIACEAE	<i>Aristolochia clematitis</i> L.	Târgu-Mureș, 05.06.1941, Nagy Ödön (313, 314, 315) Vidrasău, Mureș river shore, 19.06.1991, Silvia Oroian (7397)
SOLANACEAE	<i>Atropa bella-donna</i> L.	Târgu-Mureș, Medicinal Plants Garden of UMF, 10.07.1952, Nagy Ödön (975) Târgu-Mureș, Botanical Garden of UMF, 10.06.1980, Silvia Oroian (5980)
BERBERIDACEAE	<i>Berberis vulgaris</i> L.	Târgu-Mureș, Botanical Garden of UMF, 1988, Silvia Oroian (7119) Târgu-Mureș, garden, 1908, Bitai Arpad (8165)
SOLANACEAE	<i>Capsicum annuum</i> L.	Târgu-Mureș, cultivated, 29.05.1939, Nagy Ödön (974)
FABACEAE	<i>Chamaespartium sagittale</i> (L.) P.Gibbs (syn. <i>Genista sagittalis</i> L.)	Gurghiu, Poiana Narciselor, 02.06.0992, Silvia Oroian (7646) (f. <i>latifolia</i>)
PAPAVERACEAE	<i>Chelidonium majus</i> L.	Târgu-Mureș, Mare Hill, 03.05.1939, Nagy Ödön (520) Târgu-Mureș, Beșa forest, 30.05.1939, Nagy Ödön (521) Târgu-Mureș, Mare Hill, 01.05.1939, Nagy Ödön (523) Băgaciu, 1872 (5414) Târgu-Mureș, museum's yard, 1984, Silvia Oroian (5981) Târgu-Mureș, 16.06.1959, Ion Patachi (8151) Neagra, Mureș river shore, 19.10.1993, Silvia Oroian (11093)
RANUNCULACEAE	<i>Clematis recta</i> L.	Târgu-Mureș, forest fringe, 20.06.1957, Nagy Ödön (2213) Târgu-Mureș, 07.06.1953, Nagy Ödön (2214) Târgu-Mureș, 21.09.1956, Nagy Ödön (2215) Târgu-Mureș, 20.05.1939, Nagy Ödön (2216) Târgu-Mureș, Platoul Cornești, 04.05.1938, Nagy Ödön (2217) Târgu-Mureș, top of 1 Mai Hill, 18.06.1946, Nagy Ödön (2218)

RANUNCULACEAE	<i>Clematis recta</i> L.	Târgu-Mureş, 06.06.1952, Nagy Ödön (2219) Târgu-Mureş, "Dâmbul cu Comoară", 27.09.1937, Nagy Ödön (2220) Târgu-Mureş, 12.06.1952, Nagy Ödön (2221) Târgu-Mureş, Mare Hill, 12.06.1935, Nagy Ödön (2222) Herepea, 1986, Silvia Oroian (7328)
RANUNCULACEAE	<i>Clematis vitalba</i> L.	Târgu-Mureş, 09.09.1952, Nagy Ödön (2209) Târgu-Mureş, 17.10.1951, Nagy Ödön (2210) Târgu-Mureş, Mureş river shore, 17.10.1951, Nagy Ödön (2211) Târgu-Mureş, 1954, Nagy Ödön (2212) Zau de Câmpie, 1981, leg. Eftenie Ioan, det. Silvia Oroian (5674) Săbed, reserve, 12.08.1989, Silvia Oroian (7329) Sântana de Mureş, orchard, 05.06.1990, Silvia Oroian (7336) Săbed, reserve, 12.08.1989, Silvia Oroian (7940) Răstoliţa, Mureş river shore, 20.06.1993, Silvia Oroian (8101) (f. <i>integrata</i> D.C.)
COLCHICACEAE	<i>Colchicum autumnale</i> L.	Târgu-Mureş, near Kali spring, 19.10.1938, Nagy Ödön (1574, 1575) Zau de Câmpie, 24.09.1981, leg. Eftenie Ioan, det. Silvia Oroian (5679) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7691, 7699) Borzia, 13.06.1996, Silvia Oroian (11316) Meştera, 19.10.1993, Silvia Oroian (11319) Orşova, Seci hamlet, 05.1979, leg. Sarkany Andrei, det. Mihaela Sămărghitan (11339)
APIACEAE	<i>Conium maculatum</i> L.	Târgu-Mureş, 14.08.1950, Nagy Ödön (1306)
FUMARIACEAE	<i>Corydalis cava</i> (L.) Schweigger et Koerte (<i>Corydalis bulbosa</i> (L.) Pers.)	Târgu-Mureş, Platoul Corneşti, 11.04.1953, Konya Isrvan (7120) Gurghiu Mountains, Fâncel, 17.04.1960, Ion Patachi (8152) Târgu-Mureş, Rotundă Forest, 28.03.1908, Bitai Arpad (8154) Răstoliţa, Podirei, 05.04.1994, Silvia Oroian (11093, 11097, 11103, 11104) Răstoliţa, Podirei, 08.04.1995, Silvia Oroian (11096) Răstoliţa, 09.05.1993, Silvia Oroian (11102) Rstoliţa, Podirei, 09.04.1995, Silvia Oroian (11105) Răstoliţa, Podirei, 08.04.1995, leg. Silvia Oroian, det. Mihaela Sămărghitan (11106) Pădurea Săbed, 14.04.2000, Mihaela Sămărghitan (11293)
FUMARIACEAE	<i>Corydalis solida</i> (L.) Sw.	Băgaciu, 1872 (5366) Băgaciu, 1886 (5460, 5462) Târgu-Mureş, Platoul Corneşti, 23.03.1986, Silvia Oroian (7121) Răstoliţa, The Iod Valley, 13.04.1991, Silvia Oroian (7122) Răstoliţa, Listeş, 22.04.1991, Silvia Oroian (7123) Sântana de Mureş, 15.03.1989, Silvia Oroian (8124) Săbed, reserve, 06.04.1989, Silvia Oroian (7125)

FUMARIACEAE	<i>Corydalis solida</i> (L.) Sw.	Răstolița, Podirei, 05.04.1994, Silvia Oroian (11092, 11101) Răstolița, 09.05.1993, Silvia Oroian (11098, 11102) Răstolița, The Iod Valley, 13.04.1991, Silvia Oroian (11099) Răstolița, 09.05.1993, Silvia Oroian (11100)
BORAGINACEAE	<i>Cynoglossum officinale</i> L.	Târgu-Mureș, 19.06.1948, Nagy Ödön (365) Târgu-Mureș, Mureșeni Forest, 350 m altit., 12.05.1936, Nagy Ödön (366)
SOLANACEAE	<i>Datura stramonium</i> L.	Târgu-Mureș, 20.07.1951, Nagy Ödön (973)
BORAGINACEAE	<i>Echium vulgare</i> L.	Târgu-Mureș, 02.10.1938, Nagy Ödön (376) Porumbeni, 22.08.1946, Nagy Ödön (377) Târgu-Mureș, 300 m altit., 10.06.1935, Nagy Ödön (378) Târgu-Mureș, "Cartierul Funcționarilor", 02.06.1936, Nagy Ödön (379) Băgaciu, 1872 (5451) Târgu-Mureș, 07.1959, Konya Istvan (5606, 5614) Morești, 24.06.1953, Konya Istvan (5607) Târgu-Mureș, hippodrome, 08.07.1960, Konya Istvan (5608) Deda Bistra „Scaunul Domnului”, 15.06.1960, Konya Istvan (5610, 5616) Târgu-Mureș, museum's yard, 02.07.1960, Konya Istvan (5615) Săbed, Corhan Hill, 18.08.1980, Silvia Oroian (5782, 5796) Săbed, Corhan Hill, 24.06.1972, Konya Istvan (5795) Deda-Bistra, Scaunul Domnului, 15.06.1960, leg. Konya Istvan, det. Silvia Oroian (6049) Sângeorgiu de Mureș, 06.1953, leg. Konya Istvan, det. Silvia Oroian (6053)
FUMARIACEAE	<i>Fumaria officinalis</i> L.	Târgu-Mureș, 02.05.1908, Bitai Arpad (8150)
FUMARIACEAE	<i>Fumaria vaillantii</i> Loisel.	Târgu-Mureș, garden, 30.05.1951, Nagy Ödön (536) Târgu-Mureș, 27.05.1948, Nagy Ödön (537) Livezeni, miriște, 15.05.1939, Nagy Ödön (538) Târgu-Mureș, Stejăriș forest, 10.05.1939, Nagy Ödön (539) Târgu-Mureș, 350 m altit., 26.04.1939, Nagy Ödön (540) Târgu-Mureș, Mureș dam, 27.05.1939, Nagy Ödön (541) Târgu-Mureș, Nagy Ödön (542) Târgu-Mureș, the base of Halmok Hill, 01.05.1939, Nagy Ödön (543)
AMARYLLIDACEAE	<i>Galanthus nivalis</i> L.	Corunca, 28.01.1948, Nagy Ödön (298) Târgu-Mureș, Mureșeni Forest, 340 m altit., 09.04.1940, Nagy Ödön (299) Târgu-Mureș, 350 m altit., 29.03.1942, Nagy Ödön (300) Târgu-Mureș, Platoul Cornești, 380 m altit., 02.04.1939, Nagy Ödön (301) Târgu-Mureș, 380 m altit., 05.03.1938, Nagy Ödön, (302) Băgaciu, 1872 (5359) Săbed, pădurea Lechinței, 23.04.1981, Szombath Zoltán, Silvia Oroian (5640)

AMARYLLIDACEAE	<i>Galanthus nivalis</i> L.)Târgu-Mureș, Platoul Cornești 16.03.1938, Varodi Mildos (7539) Târgu-Mureș, Cocoșd forest, 01.03.1936, Nagy Ödön (7540) Săbed, 15.03.1959, Ion Patachi (7541) Andreasa, 19.03.1995, Mihaela Sămăghițan (11303)
FABACEAE	<i>Galega officinalis</i> L.	Târgu-Mureș, 24.06.1950, Nagy Ödön (750, 751) Târgu-Mureș, airport, 07.1940, Nagy Ödön (752) Târgu-Mureș, 26.08.1939, Nagy Ödön (753) Târgu-Mureș, Budiu Hill, 26.09.1937, Nagy Ödön (754) Sănpaul, 28.05.1939, Nagy Ödön (755) Târgu-Mureș, Mureș river shore, 300 m altit., 16.09.1936, Nagy Ödön (756)
FABACEAE	<i>Genista tinctoria</i> L. (syn. <i>Genista elatior</i> Koch.)	Târgu-Mureș, 350 m altit., 19.06.1936, Nagy Ödön (757) Târgu-Mureș, Cocoșd forest, 29.06.1946, Nagy Ödön (758) Târgu-Mureș, Stejăriș forest, 16.08.1950, Nagy Ödön (759) Porumbeni, 01.08.1948, Nagy Ödön (760) Stejăriș village, near Târgu-Mureș, 15.09.1935, Nagy Ödön (761)
FABACEAE	<i>Genista tinctoria</i> L. ssp. <i>elata</i> (Mnch.) A. et G.	Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7651)
SOLANACEAE	<i>Hyoscyamus niger</i> L.	Porumbeni, 22.08.1947, Nagy Ödön (968) Târgu-Mureș, Mureș river shore, 27.07.1956, Nagy Ödön (969) Târgu-Mureș, 11.06.1942, Nagy Ödön (970) Târgu-Mureș, plough land, 30.05.1929, Nagy Ödön (971) Târgu-Mureș, Medicinal Plants Garden of UMF, 30.05.1952, Nagy Ödön (972)
LAMIACEAE	<i>Hyssopus officinalis</i> L.	Târgu-Mureș, Medicinal Plants Garden of a UMF, 16.06.1952, Nagy Ödön (97) Târgu-Mureș, the citadel's wall, 330 m altit., 06.09.1941, Nagy Ödön (98, 99) Târgu-Mureș, the citadel's wall, 25.08.1951, Nagy Ödön (100) Târgu-Mureș, cetate, Nagy Ödön (4568) Târgu-Mureș, Botanical Garden of UMF, 1984, Silvia Oroian (5978)
FABACEAE	<i>Laburnum anagyroides</i> Medicus	Târgu-Mureș, cultivated, 380 m altit., 03.06.1939, Nagy Ödön (766)
PINACEAE	<i>Larix decidua</i> Mill.	Târgu-Mureș, Platoul Cornești, 480 m altit., 01.05.1939, Nagy Ödön (240) Târgu-Mureș, Platoul Cornești, 24.04.1937, Nagy Ödön (241) Târgu-Mureș, Platoul Cornești, 480 m altit., 01.04.1938, Nagy Ödön (242) Târgu-Mureș, "Cartierul Funcționarilor", 02.06.1939, Nagy Ödön (243) Târgu-Mureș, 27.05.1908, Bitai Arpad (7966)
AMARYLLIDACEAE	<i>Leucojum vernum</i> L.	Săngeorgiu de Mureș-Tofalău, 14.03.1936, Nagy Ödön (7542) Târgu-Mureș, 03.05.1908, Bitai Arpad (7543) Gurghiu, 10.04.1960, Ion Patachi (7546)

AMARYLLIDACEAE	<i>Leucojum vernum</i> L.	Făncel river meadow, 03.04.1998, Mihaela Sămărghițan (11184) Dubîște, Hodac commune, 05.04.1997, leg. Elena Boer, det. Mihaela Sămărghițan (11186, 11306) Brădețel, Gurghiu Valley, 03.04.1998, Silvia Oroian, Mihaela Sămărghițan (11344, 11348) Gurghiu Valley, Gura Făncel, 03.04.1998, Mihaela Sămărghițan (11346) Orșova Pădure, 03.04.1998, Silvia Oroian, Mihaela Sămărghițan (11347)
LAMIACEAE	<i>Majorana hortensis</i> Mnch.	Târgu-Mureș, cultivated, 29.07.1948, Nagy Ödön (150)
SOLANACEAE	<i>Nicotiana tabacum</i> L.	Târgu-Mureș, cultivated, 05.10.1948, Nagy Ödön (151)
NYMPHAEEAE	<i>Nuphar lutea</i> (L.) Sibth. et Sm.	Porumbeni, 20.08.1947, Nagy Ödön (961, 962) Porumbeni, 18.08.1947, Nagy Ödön (963)
NYMPHAEEAE	<i>Nymphaea alba</i> L.	Târgu-Mureș, near Mureș dam, 11.06.1932, Nagy Ödön (684)
PAPAVERACEAE	<i>Papaver somniferum</i> L.	Târgu-Mureș, Mureș river dead branch, 31.05.1936, Nagy Ödön (7496)
LAMIACEAE	<i>Prunella vulgaris</i> L.	Târgu-Mureș, cultivated, 330 m altit., 13.05.1939, Nagy Ödön (533) Târgu-Mureș, Botanical Garden of UMF, 14.06.1980, Silvia Oroian (7129) Târgu-Mureș, Platoul Cornești, altit. 490 m, 14.09.1936 (121) (var.alba) Târgu-Mureș, "Cartierul Funcționarilor", 350 m altit., 23.06.1936 (122) Târgu-Mureș, UMF park, 14.08.1957 (123) Târgu-Mureș, Stejăriș forest, 17.06.1953, Konya Istvan (5592) Târgu-Mureș, 08.07.1960, Konya Istvan (5593) Târgu-Mureș, island, 16.08.1960, Konya Istvan (5602) Târgu-Mureș, Ștejăriș village, 17.06.1953, Konya Istvan (5943) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7673)
SOLANACEAE	<i>Scopolia carniolica</i> Jacq.	Răstolița, 24.04.1995, Silvia Oroian (11145) Between Răstolița and Borzia, 08.06.1996, leg. Silvia Oroian, det. Mihaela Sămărghițan (11146) Răstolița, Costeasa Valley, 08.06.1996, Silvia Oroian (11147) Răstolița, Podirei, 15.06.1994, Silvia Oroian (11150, 11151) Reghin, 02.05.2000, Mihaela Sămărghițan (11235)
ASTERACEAE	<i>Senecio jacobaea</i> L.	Târgu-Mureș, Platoul Cornești, 19.07.1948, Nagy Ödön (2362) Târgu-Mureș, Valea Recc, 21.07.1948, Nagy Ödön (2363) Târgu-Mureș, Ștejăriș forest, 14.08.1950, Nagy Ödön (2364) Târgu-Mureș, Ștejăriș forest, 21.07.1948, Nagy Ödön (2365) Zau de Câmpie, 19.07.1982, leg. Eftenie Ioan, det. Silvia Oroian (5694)

ASTERACEAE	<i>Senecio vulgaris</i> L.	Târgu-Mureş, 11.05.1937, Nagy Ödön (2368) Târgu-Mureş, 18.05.1946, Nagy Ödön (2369) Târgu-Mureş, 27.09.1947, Nagy Ödön (2370) Târgu-Mureş, 19.05.1937, Nagy Ödön (2371) Târgu-Mureş, 12.06.1942, Nagy Ödön (2372) Târgu-Mureş, 01.06.1950, Nagy Ödön (2373)
SOLANACEAE	<i>Solanum dulcamara</i> L.	Târgu-Mureş, "Râtul cu scoici", 23.06.1947, Nagy Ödön (948) Târgu-Mureş, Corunca, 340 m altit., 03.06.1939, Nagy Ödön (953) Gurghiu, Poiana Narciselor, 02.07.1992, Silvia Oroian (7666) Valea Gălăoaia, 02.06.1996, Silvia Oroian (11148) Răstoliţa-Gălăoaia, 02.06.1996, Silvia Oroian (11149)
SOLANACEAE	<i>Solanum tuberosum</i> L.	Sânpaul, 27.05.1939, Nagy Ödön (941) Târgu-Mureş, garden, 13.06.1939, Nagy Ödön (942) Târgu-Mureş, garden, 19.06.1936, Nagy Ödön (943)
TAXACEAE	<i>Taxus baccata</i> L.	Târgu-Mureş, park near stadium, 14.04.1937, Nagy Ödön (244) Târgu-Mureş, 28.05.1938, Nagy Ödön (245) Târgu-Mureş, 29.04.1938, Nagy Ödön (246, 247) Târgu-Mureş, 09.01.1959, Nagy Ödön(4584) Târgu-Mureş, 18.04.1908, Bitai Arpad (7961)
RANUNCULACEAE	<i>Thalictrum aquilegifolium</i> L.	Târgu-Mureş, Budiu, 03.06.1946, Nagy Ödön (2135) Târgu-Mureş, Stejăriş forest, lizieră, 03.06.1942, Nagy Ödön (2136) Băgaciu, 1886 (5467, 5490) Fărăgău Lake, 03.06.1967, Sarkany A. (5838) Zau de Câmpie, Valea Borei Mari, 28.05.1980, Silvia Oroian (7379, 7776) Gurghiu, 08.05.1967, Konya Istvan (7380) Orşova, Seci hamlet, 05.1979, Sarkany Andrei (7381) Orşova, Seci hamlet, 05.1979, leg. Sarkany Andrei, det. Silvia Oroian (7773) Gurghiu, 08.05.1967, leg. Konya Istvan, det. Silvia Oroian (7774) Lunca Bradului, 19.07.1959, Ion Patachi (8140) Orşova Pădure, 03.06.1994, Silvia Oroian (8227) Gurghiu, near Poiana Narciselor, 12.07.1993, Silvia Oroian (8228)
RANUNCULACEAE	<i>Thalictrum minus</i> L.	Târgu-Mureş, 13.07.1953, Nagy Ödön (2132) Orşova, Seci hamlet, 05.1979, Sarkany Andrei (7381) Săbed, Corhan Hill, 01.07.1981, Silvia Oroian (7383, 7771) Săbed, reserve, 12.08.1989, Silvia Oroian (7384, 7770) Valea Izvoarelor, Măgheruş Hill, 13.05.1987, Silvia Oroian (7385, 7769) Saschiz, Cloaşterf, 12.06.1984, Silvia Oroian (7386, 7768)

	RANUNCULACEAE	<i>Thalictrum minus</i> L.	Herepea, 1986, Silvia Oroian (7387) Orșova, Seci hamlet, 05.1979, leg. Sarkany Andrei, det. Silvia Oroian (7772) Zau de Câmpie, reserve, 12.07.1991, Silvia Oroian (7943) Andreacsa, 18.05.1944, Silvia Oroian (8141)
	MELANTHIACEAE	<i>Venarum album</i> L.	Deda Bistra, Scaunul Domnului, 15.06.1960, Konya Isrvan (5589) Gurghiu, Poiana Narciselor, 06.06.1991, Silvia Oroian (7692, 7704) Gurghiu, pasture, 04.05.1991, Silvia Oroian (7698, 7767)
	APOCYNACEAE	<i>Vinca herbacea</i> W. et K.	Târgu-Mureș, Stejăriș forest, 500 m altit., 27.04.1936, Nagy Ödön (306) Târgu-Mureș, 29.04.1939, Nagy Ödön (307) Porumbeni, 07–09.04.1947, Nagy Ödön, (308) Valea Izvoarelor, Măgheruș Hill, 17.04.1991, Silvia Oroian (7850) Zau de Câmpie, reserve, 30.04.1991, Silvia Oroian (7851)
	APOCYNACEAE	<i>Vinca minor</i> L.	Târgu-Mureș, 27.04.1939, Nagy Ödön (309) Târgu-Mureș, Platoul Cornești, 480 m altit., 07.02.1938, Nagy Ödön (310) Târgu-Mureș, Stejăriș forest, 400 m altit., 27.04.1936, Nagy Ödön (311) Târgu-Mureș, Stejăriș forest, 500 m altit., 21.04.1937, Nagy Ödön (312) Băgaciu, 1872 (5374) Băgaciu, 1886 (5470) Săbed, Corhan Hill, 08.05.1980, Silvia Oroian (5635) Zau de Câmpie, 09.07.1982, leg. Eftenie Ioan, det. Silvia Oroian (5702)
	LORANTHACEAE	<i>Viscum album</i> L.	Târgu-Mureș, Mare forest, 03.1952, Nagy Ödön (1637)
BITTER PRINCIPLES	LAMIACEAE	<i>Ballota nigra</i> L.	Târgu-Mureș, church yard din cetate, 21.05.1947, Nagy Ödön (73) Târgu-Mureș, Platoul Cornești, 480 m altit., 02.09.1936 (74) Târgu-Mureș, Vulpii stream, 17.07.1940, Nagy Ödön (75) Târgu-Mureș, Curteni, 310 m altit., 28.08.1940, Nagy Ödön (76) Târgu-Mureș, Săsvári stream, 26.07.1958, Nagy Ödön (4559) Târgu-Mureș, Platoul Cornești, 05.1953, Konya Isrvan (5944)
	GENTIANACEAE	<i>Centaurium erythraea</i> Rafn	Târgu-Mureș, Mare forest, 01.08.1947, Nagy Ödön (1348) Porumbeni, 03.08.1948, Nagy Ödön (1349) Târgu-Mureș, Căcoșd forest, Nagy Ödön (1350)
	LAMIACEAE	<i>Glechoma hederacea</i> L.	Târgu-Mureș, Platoul Cornești, 480 m altit., 21.04.1936, Nagy Ödön (92) Târgu-Mureș, Mureș dam, 24.04.1948, Nagy Ödön (93, 94) Târgu-Mureș, 18.04.1939, Nagy Ödön (95) Târgu-Mureș, 08.07.1960, Konya Isrvan (5595) Târgu-Mureș, Platoul Cornești, 19.05.1982, Silvia Oroian (5649)

	ASTERACEAE	<i>Tanaxacum officinale</i> Webber	Târgu-Mureş, Platoul Corneşti, 16.04.1939, Nagy Ödön (2409) Târgu-Mureş, Mureş river shore, 02.05.1939, Nagy Ödön (2410) Târgu-Mureş, the base of Mare Hill, 01.05.1939, Nagy Ödön (2411)
BITTER-AROMATIC PRINCIPLES	ASTERACEAE	<i>Artemisia annua</i> L.	Târgu-Mureş, 23.09.1937, Nagy Ödön (2696) Târgu-Mureş, 22.09.1937, Nagy Ödön (2697)
	ASTERACEAE	<i>Artemisia campestris</i> L.	Târgu-Mureş, "Dâmbul cu Comoară", 11.08.1947, Nagy Ödön (2694, 2695)
	ASTERACEAE	<i>Artemisia vulgaris</i> L.	Porumbeni, 05.09.1946, Nagy Ödön (2691) Târgu-Mureş, Platoul Corneşti, 09.09.1937, Nagy Ödön (2692)
	ASTERACEAE	<i>Tanacetum vulgare</i> L.	Târgu-Mureş, 29.07.1946, Nagy Ödön (2521) Târgu-Mureş, plough land, 02.09.1936, Nagy Ödön (2522) Târgu-Mureş, Stejăriş forest, 12.08.1950, Nagy Ödön (2523) Târgu-Mureş, museum's yard, Konya Istvan (5625)
	LAMIACEAE	<i>Teucrium chamaedrys</i> L.	Porumbeni, 28.07.1948, Nagy Ödön (3062) Târgu-Mureş, Corunca, 19.06.1944, Nagy Ödön (3063) Târgu-Mureş, Budiu, Nagy Ödön (3064) Târgu-Mureş, liziera Pădurii Mari, 14.07.1948, Nagy Ödön (3065) Săbed, Corhan Hill, 01.07.1981, Szombath Zoltán (5585) Săbed, Corhan Hill, 01.07.1981, Silvia Oroian (5791) Reghin, 17.06.1953, Konya Istvan (5945)
	LAMIACEAE	<i>Teucrium montanum</i> L.	Săbed, Corhan Hill, 18.08.1980, Silvia Oroian (5782)
PHLOROGLUCINS	DRYOPTERIDACEAE	<i>Dryopteris filix-mas</i> (L.) Schott	Târgu-Mureş, Platoul Corneşti, 450 m altit., Nagy Ödön (188) Târgu-Mureş, Pocloş stream, 10.03.1948, Nagy Ödön (189) Târgu-Mureş, 06.1935, Nagy Ödön (190) Orşova, Seci hamlet, 05.1979, Sarkany Andrei (7066) Răstoliţa, 16.05.1988, Silvia Oroian (7067) Valea Izvoarelor, 12.05.1988, Silvia Oroian (7068) Târgu-Mureş, 20.04.1936, Nagy Ödön (8003) Târgu-Mureş, 08.05.1908, Bitai Arpad, (8005) Răstoliţa, Podirei, 26.09.1993, Silvia Oroian (8200) Andreanea, rocks, 19.10.1993, Silvia Oroian (8201) Neagra, Mureş river shore, 19.10.1993, Silvia Oroian (8202) Ciobotani, pasture, 19.10.1993, Silvia Oroian (8203) Răstoliţa, Mureş river shore, 01.08.1993, Silvia Oroian (8204) Stănceni, Leu Mountain, 18.05.1994, Silvia Oroian (8205) Răstoliţa, 10.07.1995, Silvia Oroian (8206)

ORGANIC ACIDS, VITAMINS AND PRO- VITAMINS	ROSACEAE	<i>Cydonia oblonga</i> Mill.	Târgu-Mureș, Trebely, 18.05.1938, Nagy Ödön (1886) Târgu-Mureș, garden, 07.05.1939, Nagy Ödön (1887)
	APIACEAE	<i>Daucus carota</i> L.	Târgu-Mureș, Halmok Hill, 07.09.1940, Nagy Ödön (1323) Sânpaul, Nagy Ödön (1324) Târgu-Mureș, 28.08.1936, Nagy Ödön (1326) Târgu-Mureș, island, 16.08.1960, Konya Istvan (5888)
	SOLANACEAE	<i>Physalis alkekengi</i> L.	Târgu-Mureș, 21.06.1953, Nagy Ödön (950) Târgu-Mureș, 19.06.1953, Nagy Ödön (951) Târgu-Mureș, Platoul Cornești, 480 m altit., 10.05.1936, Nagy Ödön (952) Târgu-Mureș, Budiu, 350 m altit., 21.05.1946, Nagy Ödön (954) Târgu-Mureș, 20.10.1951, Nagy Ödön (955) Târgu-Mureș, Sântana Hill, 350 m altit., Nagy Ödön (956) Târgu-Mureș, Platoul Cornești, 06.06.1943, Nagy Ödön (957)
	ROSACEAE	<i>Rosa canina</i> L.	Târgu-Mureș, toward Budiu, 26.05.1936, Nagy Ödön (1987) Târgu-Mureș, 04.06.1944, Nagy Ödön (1988) Târgu-Mureș, 04.06.1942, Nagy Ödön (1990) Gurghiu, near Poiana Narciselor, 06.06.1991, Silvia Oroian (7607)
	ROSACEAE	<i>Rubus caesius</i> L.	Târgu-Mureș, 31.05.1951, Nagy Ödön (1978) Târgu-Mureș, Mureșeni Forest, 13.06.1951, Nagy Ödön (1979) Târgu-Mureș, toward Budiu, 26.05.1936, Nagy Ödön (1980) Târgu-Mureș, the citadel's wall, 24.06.1941, Nagy Ödön (1981) Târgu-Mureș, at the border with Sântana de Mureș, 12.08.1939, Nagy Ödön (1982) Reghin, 02.05.2000, Mihaela Sămărghițan (11217)
	ROSACEAE	<i>Rubus idaeus</i> L.	Târgu-Mureș, garden, 18.05.1939, Nagy Ödön (1983) Târgu-Mureș, 28.05.1939, Nagy Ödön (1984) Târgu-Mureș, 20.05.1939, Nagy Ödön (1985)
	ROSACEAE	<i>Sorbus aucuparia</i> L.	Târgu-Mureș, 19.05.1938, Nagy Ödön (1995) Between Bistra Mureșului and Răstolița, 16.05.1988, Silvia Oroian (7716)
	URTICACEAE	<i>Urtica dioica</i> L.	Târgu-Mureș, Platoul Cornești, 480 m altit., 29.04.1939, Nagy Ödön (906) Târgu-Mureș, Platoul Cornești, 13.05.1939, Nagy Ödön (907)
	VITACEAE	<i>Vitis vinifera</i> L.	Târgu-Mureș, 13.06.1947, Nagy Ödön (827) Bedeni, 04.10.1947, Nagy Ödön (828) Târgu-Mureș, 07.06.1942, Nagy Ödön (847) Târgu-Mureș, 29.05.1939, Nagy Ödön (848, 849) Târgu-Mureș, 330 m altit., 06.06.1939, Nagy Ödön (850)

Conclusions

In this paper 1555 herbarium sheets with medicinal plants were processed.

Following the research of the botanical collection of the Department of Natural Sciences, a total of 302 taxa belonging to 69 families have been identified.

Families with the most numerous representatives are: Lamiaceae (31 species), Asteraceae (27 species), Rosaceae (23 species), Apiaceae, Scrophulariaceae (18 species each) and Fabaceae (17 species).

Medicinal species of the collections come both from the wild flora, from many towns in the county, as well as from crops especially from the Botanical Garden of the University of Medicine and Pharmacy Targu-Mureș.

The earliest samples come from "Herbarium of Băgaciu", sheets dating from 1872–1886. A remarkable number of sheets belong to "Nagy Ödön" collection, a biology professor at Bolyai Farkas High School in Târgu-Mureș, which has the merit of having studied the flora in the town surroundings, from 1920 to 1950.

Depending on the dominant active principles for which they are used in traditional medicine and phytotherapy, it was found that the largest plants contain: alkaloids (16.89%), essential oils (13.25%), tannins (11.59%), flavonoids (11.26%), saponins (7.62%), mucilage (6.95%), and coumarin (4.97%).

Among the 302 taxa analyzed there are also 11 species in various degrees of endangerment, included in national and European red lists.

Abbreviations:

Leg. = Legit

Det. = determined by

UMF = University of Medicine and Farmacy Târgu-Mureș

Altit.= altitude

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FLORA MEDICINALĂ A JUDEȚULUI MUREȘ OGLINDITĂ ÎN COLECȚIA SECȚIEI DE ȘTIINȚELE NATURII A MUZEULUI JUDEȚEAN MUREȘ

Obiectivul acestui studiu este prezentarea speciilor de plante medicinale din colecția muzeului, colectate din județul Mureș, pentru a completa inventarul floristic al acestei zone și astfel, a avea o imagine mai clară asupra diversității floristice a covorului vegetal precum și a evoluției acestuia.

Patrimoniul Secției de Științele Naturii din cadrul Muzeului Județean Mureș cuprinde numeroase colecții, a căror valoare științifică și documentară este incontestabilă. Colecția botanică a muzeului cuprinde aproximativ 20 000 piese, provenite din cercetări pe teren, donații și achiziții. Dintre aceste piese o pondere remarcabilă o au și speciile medicinale.

Inventarierea florei medicinale a județului Mureș prezente în colecțiile Secției de Științele Naturii a dus la identificarea a 302 taxoni cu conținut cert în compuși chimici terapeutici, încadrați în 69 de familii. Cele mai bine reprezentate familii sunt: Lamiaceae (31 specii), Asteraceae (27 specii), Rosaceae (23 specii), Apiaceae și Scrophulariaceae (câte 18 specii) și Fabaceae (17 specii).

În funcție de principiile active dominante pentru care ele sunt utilizate în medicina tradițională și fitoterapie, s-a constatat că cele mai numeroase plante conțin: alcaloizi (16,89%), uleiuri volatile (13,25%), taninuri (11,59%), flavonoide (11,26%), saponine (7,62%), mucilagii (6,95%), și cumarine (4,97%).

CONSIDERATIONS CONCERNING THE CONSERVATION STATUS OF THE NATURAL HABITATS FROM CEHLĂU NATIONAL PARK

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Abstract: In this paper a characterization of the conservation status of natural habitats from Ceahlău National Park was made. There were analyzed three types of habitats, according to NATURA 2000 classification, as follows: 8210 Calcareous rocky slopes with chasmophytic vegetation; 6170 Alpine and subalpine calcareous grasslands and 4060 Alpine and Boreal heaths.

Keywords: natural habitats, conservation, Ceahlău National Park.

Introduction

The Ceahlău Massif belongs to the central group of the Oriental Carpathians, being bounded on the north, east and south by river valleys: Bistricioara, Bistrița (Izvorul Muntelui–Bicaz Lake) and Bicaz. The western limit corresponds with the Pintic and Jidan Valleys, that flows into the Bicaz river. The Ceahlău Massif has a surface of 290 km², and the Ceahlău National Park occupies 26,7% of this (7 742,5 ha).

From geological point of view, the characteristic formations from Ceahlău Massif are: Ceahlău Canvas (sandstones, marls, clays, conglomerates known as „Ceahlău conglomerates”) and Teleajen Canvas (black shales, gray-green shales, gray micaceous sandstones, limestone sandstones, marls and green, red clays).

In terms of climate, Ceahlău Mountains have a moderate-temperate continental climate, with an annual average temperature of 0,7° C on Toaca Peak and 7,2° C on inferior mountain level. The annual average precipitation is over 700 mm. The most frequent winds are from the west, with an average speed of 6–8 m/s in summer and 12–14 m/s in winter.

The Ceahlău National Park was designated as Site of Community Importance (SCI) in accordance with MO M.M.D.D no. 1246/2007 for a total of 13 natural habitats, 5 species of mammals, 3 species of amphibians and reptiles and 4 species of plants.

Material and methods

The identification and characterization of the natural habitats from Ceahlău National Park was undertaken in 2011–2012 as part of the project *MANAGEMENT DEVELOPMENT FOR CEHLĂU NATIONAL PARK*. In this respect, there have been made phytosociological surveys in the field, in accordance with the method of Central-European School from Zürich-Montpellier [5]. The codes of the habitats correspond to the NATURA 2000 and Romanian

system of classification [6, 8]. The conservation status of the habitats was assessed by the indicators considered useful in this assessment: size of the area; presence of alien species; specific composition; structure and dynamic elements of the phytocoenoses.

The assessment of the conservation status of habitats (according to Article 17 of the Habitats Directive 92/43/EEC) was made by their classification into one of four categories: „good” (green), „unfavorable, inadequate” (orange), „very unfavorable” (red) and „unknown” (gray), depending on the attributes declared for each of them, threats of destruction and hazards that may cause destruction or disappearance [4].

Results and discussions

8210 Calcareous rocky slopes with chasmophytic vegetation

(R 6206 South-East Carpathian Communities of the limestone, rock walls cracks with *Cystopteris fragilis*, *Campanula carpatica*, *Saxifraga cuneifolia* and *Valeriana sambucifolia*; R6202 South-East Carpathian Communities of limestone rocks with *Artemisia eriantha* and *Gypsophila petraea*)

These coenoses were identified at Ocolaşu Mare, Toaca Peak, Bistra Mică well and Masa dacilor, at 1008–1900 m altitude, on surfaces of 10–15 m². Phytocoenoses with *Asplenium viride* and *Cystopteris fragilis* are poorer in species than those with *Artemisia eriantha* and *Gypsophila petraea*. In the latter, we found many characteristic species to the sesleriets, plant grouping whom they come in contact.

Characteristic species: *Asplenium viride*, *Artemisia eriantha*, *Silene zawadski*.

Edifying species: *Asplenium viride*, *Cystopteris fragilis*, *Artemisia eriantha*, *Gypsophila petraea*.

Frequent species in composition: *Saxifraga paniculata*, *S. corymbosa*, *Polypodium vulgare*, *Valeriana montana*, *Cortusa matthioli*, *Campanula carpatica*, *Daphne mezereum*, *Veronica urticifolia*, *Mycelis muralis*, *Senecio ovatus*, *Asplenium trichomanes*, *Helianthemum oelandicum* ssp. *alpestre*, *Primula veris* ssp. *columnae*, *Crepis jacquinii*, *Carex sempervirens*, *Oxytropis halleri*, *Thymus pulcherrimus*.

From the structural point of view, the vegetation has a height of 5–20 cm and a covering of 40–60%. The bryophytes layer is more developed for *Asplenio – Cystopteridetum fragilis* Oberd. (1939) 1949 association.

Habitat maintains its characteristic structure, although in some areas, biotopes with *Artemisia eriantha* and *Gypsophila petraea* can develop into sesleriets, because of the expansion of the heliophilous and transgressive mesotherms species from *Seslerietea albicantis* class (*Thymus pulcherrimus*, *Primula veris* ssp. *columnae*, *Helianthemum oelandicum* ssp. *alpestre*, *Crepis jacquinii*, *Anthyllis vulneraria* ssp. *alpestris*). These grouping have a large expansion on the limestone rocks from Ceahlău, it is well defined, with a good state of preservation on the route to Masa Dacilor, under Ocolaşu Mare. These coenoses occupy lower surfaces on the Toaca Peak, being identified near the touristic routes, a potential threat to the integrity of the habitat.

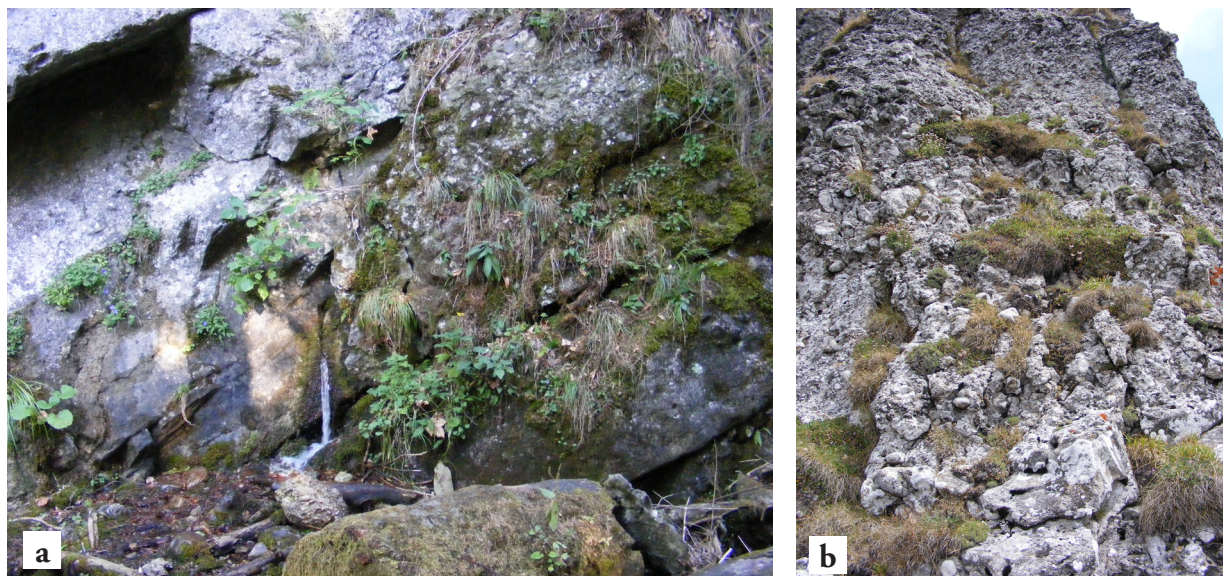


Photo 1, a: Coenoses with *Asplenium viride* and *Cystopteris fragilis* at Bistra well;
Photo 1, b: Coenoses with *Artemisia eriantha* and *Gypsophila petraea* at Masa Dacilor

The grouping with *Asplenium viride* and *Cystopteris fragilis* are fragmented, being identified on the limestone rocks, along the Bistra Mică creek. The stationary conditions (steep slopes, cracks, increased humidity) are favorable for maintaining these groups. As part of these coenoses, we observed juvenile specimens of *Abies alba*, *Fagus sylvatica*, *Picea abies*, given their presence in the beech forests of 91V0 habitat.

It is a habitat of high conservative value, which houses endemic species mentioned in Red List of vascular plant from Romania [7]: *Crepis jacquinii*, *Silene zawadskii*, *Thymus pulcherrimus*, *Trisetum alpestre*, *Campanula carpatica*.

6170 Alpine and subalpine calcareous grasslands

(R 3612 South-East Carpathian grasslands of *Carex sempervirens* and *Sesleria bielzii*, R3605 South-East Carpathian grasslands of *Festuca versicolor* and *Sesleria rigida* ssp. *haynaldiana*)

These coenoses are installed on the cornices with Jurassic limestone from subalpine and alpine zone, being identified at Ocolașu Mare, Gardul Stănilor, Toaca Peak. There are developed at 1500–1910 m altitude, on surfaces of 100 m².

The grazing ban has led to a regeneration of vegetal layer and to increased of the specific diversity. As part of this habitat were identified more than 55 species.

Characteristic and edifying species: *Festuca versicolor*, *Sesleria bielzii*.

Frequent species in composition: *Alyssum repens*, *Bupleurum diversifolium*, *Campanula cochlearifolia*, *Dianthus tenuifolius*, *Galium anisophyllum*, *Gypsophila petraea*, *Helianthemum oelandicum* ssp. *alpestre*, *Minuartia verna*, *Oxytropis halleri*, *Polygonum viviparum*, *Saxifraga corymbosa*, *S. paniculata*, *Scabiosa lucida* ssp. *barbata*, *Anthyllis vulneraria* ssp. *alpestris*, *Biscutella laevigata*, *Campanula glomerata*, *Carlina acaulis*, *Centaurea pinnatifida*, *Cruciata laevipes*, *C. glabra*, *Dryas octopetala*, *Euphrasia salisburgensis*, *Gymnadenia conopsea*, *Hieracium villosum*, *Leontopodium alpinum*, *Linum perenne* ssp. *extraaxillare*, *Myosotis alpestris*, *Onobrychis montana*, *Parnassia palustris*, *Phyteuma orbiculare*, *Pedicularis verticillata*, *Silene zawadski*, *Ranunculus oreophilus*, *Primula elatior*, *Thymus pulcherrimus*, *Festuca amethystina*, *Potentilla thuringiaca*, *Acinos alpinus*, *Allium senescens* ssp. *montanum*, *Alchemilla xanthochlora*, *Cirsium erisithales*, *Avenula pubescens*.

Alien species: *Picea abies*, *Juniperus sibirica*, *Pinus mugo*.

The vegetation stratification exists only in areas invaded by *Picea abies*, *Pinus mugo*, *Juniperus sibirica*, where distinguished a layer of grasses and shrubs. The vegetation has a height of 10–40 cm and a covering of 50–100%.



Photo 2: Coenoses with *Carex sempervirens* and *Sesleria bielzii* at Ocolașu Mare

The conservation status is good and it can be maintained by practicing a controlled tourism, requiring the tourists to travel only on marked routes in Toaca Peak. Otherwise, over time, the herbaceous layer is destroyed, soil will be degraded, erosion will increase and, not least, many specimens of rare plants will disappear. The juvenile specimens of *Picea abies*, *Pinus mugo* and *Juniperus sibirica* vegetate in the coenotic environment of limestone meadows, which can be evolved in bushes edified by *Vaccinium myrtillus*, *V. vitis-idaea*, *Juniperus sibirica* and *Pinus mugo*.

The habitat develops on steep slopes, with inclination of 70° and at the based on gentle slopes (30–45°) at the Masa Dacilor. We observed a covering of 100 % in these areas. But, in this case, the presence and development of *Picea abies* or *Juniperus sibirica* seedlings emphasize the assimilation of these coenoses by the spruce forest or subapine bushes.

The route to the Masa Dacilor is less frequented by tourists, because of it is inaccessibility, in some areas, and the populations of edelweiss (*Leontopodium alpinum*) are well developed in terms of individuals vigorously and their density.

This habitat has a high conservative value, expressed by the presence of endemic species: *Thymus pulcherrimus*, *Dianthus tenuifolius*, *Linum perenne* ssp. *extraaxilare*, *Onobrychis montana*, *Silene nutans* ssp. *dubia*, *S. zawadski*, *Centaurea pinnatifida*. Taxa such as *Leontopodium alpinum*, *Thymus pulcherrimus*, *Dianthus tenuifolius*, *Centaurea pinnatifida*, *Silene zawadski*, *S. nutans* ssp. *dubia*, *Oxytropis halleri* are sozological categories in the Red List of vascular plant from Romania [7].

4060 Alpine and Boreal heaths

(R 3617 Bushes with *Dryas octopetala*; R3108 South-East Carpathian bushes with *Juniperus sibirica*; R3111 South-East Carpathian bushes with *Vaccinium myrtillus*; R3109 South-East Carpathian bushes with *Empetrum nigrum* ssp. *hermaphroditum* and *Vaccinium gaultherioides*

Characteristic coenoses of this habitat were identified at 1700–1900 m altitude, as follows: Bâta lui Ghedeon; Lespezi, over the Dochia chalet, to Ocolașu Mare; Toaca Peak; Ocolașu Mare; Masa Dacilor; under the Ocolașu Mare, near to Gardul Stănilor; La Pălărie; Piciorul Șchiop; under the Gardul Stănilor; Piatra Lăcrimată.

This habitat occupies minimal variable surfaces in the subalpine level from 50 m² to 0,6 ha. The subshrub layer has a coverage between 60–80%, while the layer grass only 20–30%.

Characteristic species: *Dryas octopetala*, *Campanula patula* ssp. *abietina*, *Vaccinium myrtillus*, *V. vitis-idaea*, *V. uliginosum* ssp. *microphyllum*, *Cetraria islandica*, *Thamnolia vermicularis*.

Edifying species: *Dryas octopetala*, *Juniperus sibirica*, *Vaccinium myrtillus*, *V. vitis-idaea*, *V. uliginosum* ssp. *microphyllum*.

Frequent species in composition: *Antennaria dioica*, *Anthyllis vulneraria* ssp. *alpestris*, *Botrychium lunaria*, *Campanula alpina*, *C. glomerata*, *Carex sempervirens*, *Cruciata laevipes*, *C. glabra*, *Festuca amethystina*, *F. airoides*, *Galium anisophyllum*, *Gymnadenia conopsea*, *Helianthemum oelandicum* ssp. *alpestre*, *Minuartia verna*, *Oxytropis halleri*, *Parnassia palustris*, *Pedicularis verticillata*, *Phyteuma orbiculare*, *Pinguicula vulgaris*, *Polygonum viviparum*, *Primula elatior*, *Ranunculus oreophilus*, *Saxifraga paniculata*, *S. aizoides*, *S. oppositifolia*, *Scabiosa lucida* ssp. *barbata*, *Sesleria bielzii*, *Selaginella selaginoides*, *Silene zawadski*, *Thesium alpinum*, *Thymus pulcherrimus*, *Luzula luzuloides*, *Lotus corniculatus*, *Alchemilla xanthochlora*, *Artemisia eriantha*, *Anthoxanthum odoratum*, *Gentianella austriaca*, *Cotoneaster integerrimus*, *Picea abies*, *Polygonum bistorta*, *Calamagrostis arundinacea*, *C. villosa*, *Homogyne alpina*, *Solidago virgaurea*, *Gentiana asclepiadea*, *Huperzia selago*, *Senecio ovatus*, *Veratrum album*, *Poa alpina*, *Agrostis rupestris*.

There is a stratification of vegetation: the upper layer dominated by *Juniperus sibirica*, the subshrubs edified by *Vaccinium myrtillus*, *V. vitis-idaea*, *V. uliginosum* ssp. *microphyllum* and herbs and the lower layer of mosses and lichens. These are stable habitats, in some areas, *Vaccinium myrtillus* and *Juniperus sibirica* compete for dominance.

There is not a clear demarcation of characteristic groups of this habitat. At the Masa Dacilor, under the Ocolașu Mare asserted *Vaccinium myrtillus*, making the transition to vacciniets. At the route Piciorul Șchiop-Piatra Lăcrimată-Cabana Dochia, the habitat has two codominant species, *Vaccinium myrtillus* and *Juniperus sibirica*. Beside of these, participates with an important coverage *Picea abies*. In some areas, we found that the bushes with *Pinus mugo* alternate with vacciniets. The trend is the assimilation of the latter, forming the lower layer of *Pinus mugo* habitats.

Even if in the area of Ceahlău National Park area, the tourism is a very intense phenomenon, the development, especially of the specimens of *Juniperus sibirica* leads the tourists to use only the routes marked for this purpose.

We have not seen the *Empetrum nigrum* ssp. *hermaphroditum* in the composition of phytocoenoses dominated by *Vaccinium uliginosum* ssp. *microphyllum*. These grouping are fragmented, interspersed between the *Juniperus* bushes, which due to the dynamic development tend to invade them.



Photo 3: Coenoses with *Dryas octopetala* at Pălărie



Photo 4, a: Coenoses with *Juniperus sibirica* at Pălărie
Photo 4, b: Coenoses with *Vaccinium myrtillus* near the Gardul Stănilor

While the coenoses with *Vaccinium myrtillus* and *Campanula patula* ssp. *abietina*, that extending primary or secondary, other subtypes have a high conservative value, including endemic species from Red List of vascular plant from Romania [7], such as: *Dianthus tenuifolius*, *Campanula serrata*, *Thymus pulcherrimus*, *Th. comosus*, *Silene zawadski*, *Traunsteinera globosa*, *Gymnadenia conopsea*, *Oxytropis halleri*, *Crepis jacquinii*, *Festuca amethystina*. *Campanula serrata* is a community interest species which vegetates in all plant associations of this habitat, being mentioned in Annex IIb of Habitats Directive and OUG no. 57/2007, Annex 3b.

Conclusions

Phytosociological analysis allowed the identification of three natural habitats in the National Park Ceahlău, according to Natura 2000 classification: 8210 Calcareous rocky slopes with chasmophytic vegetation; 6170 Alpine and subalpine calcareous grasslands and 4060 Alpine and Boreal heaths. The conservation status of all analyzed habitats is good and we can provide the green code according to European classification.

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CONSIDERAȚII PRIVIND STAREA DE CONSERVARE A HABITATELOR NATURALE DIN PARCUL NAȚIONAL CEAHLĂU (Rezumat)

În lucrarea de față este realizată o caracterizare a stării de conservare a trei tipuri de habitate naturale din Parcul Național Ceahlău, parte integrantă a unui studiu mai amplu în cadrul contractului POS Mediu-*Dezvoltarea managementului pentru Parcul Național Ceahlău*, după cum urmează: 8210 Versanți stâncoși calcaroși cu vegetație casmofitică, 6170 Pajiști calcifile alpine și subalpine, 4060 Tufărișuri alpine și boreale. Evaluarea statutului de conservare a habitatelor s-a realizat prin aprecierea stării de conservare la nivelul UE, și anume, prin încadrarea lor în una din cele patru categorii: „favorabile”, „nefavorabil inadecvate”, „foarte nefavorabile” și „necunoscut”, în funcție de atributele anunțate pentru fiecare, de amenințările de distrugere și de pericolele ce pot provoca distrugerea sau dispariția lor.

RESEARCHES ON BRYOPHYTES COMMUNITIES FROM THE VÂLSAN RIVER BASIN

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Abstract: Were studied assemblages of bryophytes tericolous, saxicolous, epiphytic and saprolignicolous from on Vâlsan Valley Natural Reserve, Argeș County (Romania). For saxicolous bryophytes diversity analysis, we took into account the number of species and phytogeographical element, shape and growth “life strategy” of each species. Mosses epiphytic associations have a unitary character and more or less homogeneous, being represented by a small number of species. On saprolignicolous associations observed heterogeneous nature in terms of composition and structure in relation to successional stages determined by the maceration of the substrate as a result of microbiological processes. Some of the species is by abundance and frequency mosses remarkable population, especially in certain biotopes in determining ecological factors to ensure development.

Most studies focus on species diversity of their wealth, which is just one of the many facets of diversity.

Keywords: bryophytes, Vâlsan Valley Natural Reserve, bryophyte diversity variables

Introduction

The Vâlsan River Basin lies in the Făgăraș Mountain of Argeș County, Romania and contains Vâlsan Valley Natural Reserve and the Vâlsan Valley Protected Natural Area of Community Interest. Vâlsan Valley protected area is part of natural reservations appropriate IUCN category IV, aimed at protecting and conserving natural habitats and important species from flora, fauna, forestry, geology and paleontology.

Previous researches concerning Bryoflora of Făgăraș Mountains were made, in the west part of Massive, since 1846, but bryological exploration of Southern part of Făgăraș Mountain has not yet been sufficiently studied.

Plants do not grow almost never solitary in nature, but in different combinations, from some simple to most complex. Mosses are associated in the formations dominated for phanerogams or in own societies subordinated, often together with lichens. [2] The mosses associations from different substrates and habitats characteristic of various vegetation formations are classified into five groups: 1. aquatic; 2. terrestrial (tericolous); 3. rocks (saxicolous); 4. epiphytes (cortical, tree); 5. saprolignicolous (including epixylic bryophytes) with stages of succession according to their physical and biochemical processes of gradual disorganization of organic substrate. [9]

Several studies have shown that specific diversity of these groups of bryophytes depends, among other factors, latitude [1], exposure to sunlight habitat [3], microhabitat heterogeneity [6, 7] or successional age of the substrate [8, 4].

Material and methods

The bryophytes were collected from the Vâlsan River's Basin, between 2002–2009, from June to September.

Mosses were collected from the soil, trees, rotten wood, rocks and boulders, along the river and were stored in paper envelopes. Identification was done using relevant bryological literature. Nomenclature was actualized according to Hill et al. [5]. The bryophyte flora and its environmental correlated were studied.

Numerous photographs original was made that were intended to ease of identifying species, to complete descriptions and to highlight features of bryological communities.

Results and discussions

The environmental factors analysis from bryophytes species can prove the close connection that exists between physical and geographical conditions and their development planning and assemblage. For the analysis of bryophyte diversity, we used total species numbers, but we also classified the species into distribution-range types, growth forms and life-strategy types.

On the lower floor of the valley Vâlsan, in forests dominated by beech, the bryophyte vegetation is poorly developed and consists mostly of *Atrichum undulatum* and *Polytrichastrum formosum* while forests of holm oak or the beech and hornbeam mixed with are common, large areas, tericolous populations with: *Polytrichastrum formosum*, *Polytrichum juniperinum*, *Plagiomnium undulatum*, *Rhytidiadelphus squarrosus*, *Brachythecium rivulare*. In spruce and fir forests the bryophyte vegetation is richer and characterized by species as *Pleurozium schreberi*, *Rhytidiadelphus triquetrus*, *Plagiothecium undulatum*. Of forest species have identified characteristic species upper Vâlsan Valley: *Polytrichastrum formosum*, *Plagiomnium undulatum*, *Rhytidiadelphus triquetrus*, *Thuidium tamariscinum*, *Hylocomium splendens*, *Sanionia uncinata*, *Ptilium crista-castrensis*, *Marchantia polymorpha*, *Conocephalum conicum*, *Plagiochila asplenoides* and wetland habitats from the forest edge: *Plagiothecium undulatum*, *Sphagnum quinquefarium*, *Cratoneuron commutatum*, *Bryum pseudotriquetrum*.

Saxicolous and terricolous bryophytes present a group of organisms with specific physiological and ecological adaptations, which make them thrive in various terrestrial habitats.

Common species of Bryophytes on rocks and boulders are *Syntrichia ruralis*, *Schistidium apocarpum*, *Grimmia pulvinata*, *Bryum argenteum*, *Bartramia halleriana*, *Dicranum scoparium*.

Among growth forms, low acrocarpous bryophytes were positively related to base-rich cliffs (Photo 1), tall acrocarpous bryophytes were more frequent on small, shaded and acidic cliffs (Photo 2), and pleurocarpous mats were more frequent on larger cliffs (Photo 3). Generally, small acrocarpous bryophytes positively related sites are well lit, while tall acrocarpous bryophytes are linked to sites in shaded areas.



Photo 1: Saxicolous mosses communities installed in rock fissures with small acrocarpous bryophytes
(Photo Codruța Dobrescu)



Photo 2: Saxicolous mosses communities with tall acrocarpous bryophytes
(Photo Codruța Dobrescu)



Photo 3: Saxicolous mosses communities with pleurocarpous bryophytes
(Photo Codruța Dobrescu)

Epiphytic mosses associations have a unitary character and more or less homogeneous, being represented by a small number of species: *Dicranum montanum*, *Isothecium alopecuroides*, *Hypnum cupressiforme*, *Diplophyllum albicans*.

Characteristic bryophytes species on rotten wood are *Lophocolea heterophylla*, *Scapania nemorea* and *Lophozia incisa*; the succession is followed on older, decayed wood with *Dicranodontium denudatum*, *Plagiothecium cavifolium*, *Dicranum scoparium*, *Lepidozia reptans* and *Hypnum cupressiforme* (Photo 4, 5, 6).



Photo 4: Mosses communities on a tree just fell
(Photo Codruța Dobrescu)



Photo 5: Mosses communities located on a tree in a state of decomposition environment
(Photo Codruța Dobrescu)



Photo 6: Mosses communities on a tree in an advanced stage of decomposition
(Photo Codruța Dobrescu)

Saprolignicolous mosses are common among species that are at the same time saxicolous or silicicolous. It also can develop as tericolous species under heavy rains, water brings soil particles on plant debris resulting from logging.

Conclusions

Relationships between bryophyte diversity variables and environmental variables were analyzed and a bigger diversity in the superior tank of Vâlsan River which has a rich precipitation condition and a lower anthropic influence.

Some of the species forms by abundance and frequency, remarkable population, especially in certain biotopes in determining ecological factors to ensure development.

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CERCETĂRI PRIVIND CENOZELE BRIOFITICE DIN ARIA PROTEJATĂ VALEA VÂLSANULUI (Rezumat)

Plantele nu cresc aproape niciodată singurate în natură, ci în cele mai diverse combinații, de la unele simple, până la cele mai complexe. Mușchii sunt asociați în cadrul formațiunilor dominate de fanerogame sau în asocieri proprii subordonate (sinuzii), adesea împreună cu lichenii.

Au fost studiate cenozele briofitice tericole, saxicole, corticole și saprolignicole din Rezervația Naturală Valea Vâlsanului.

Pentru analiza diversității briofitelor saxicole, am ținut cont de numărul de specii, dar și de elementul fito-geografic, forma de creștere și „strategia de viață” a fiecărei specii.

Asociațiile muscinale epifite au un caracter unitar și mai mult sau mai puțin omogen, fiind reprezentate de un număr mic de specii.

La briocenozele saprolignicole s-a observat un caracter heterogen în ceea ce privește componența și structura, în raport cu stadiile succesionale determinate de gradul de macerare a substratului ca urmare a proceselor microbiologice.

Unele dintre specii constituie, prin abundența și frecvența lor, populații muscinale remarcabile, mai ales în anumite biotopuri în care factorii ecologici determinanți le asigură dezvoltarea.

Cele mai multe studii de diversitatea speciilor se concentrează pe bogăția acestora, care este doar una din multiplele fațete ale diversității.

MACROMYCETES FROM THE AGARICALES ORDER AMONG THE “GHEORGHE SĂLĂGEANU” COLLECTION OF TÂRGU-MUREȘ NATURAL SCIENCE MUSEUM (II)

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Abstract: This work presents a part of the „Gheorghe Sălăgeanu” collection which belongs to the Herbarium of Natural Science Museum from Târgu-Mureș. The 133 taxa of macromycetes from the Agaricales order, belong to 12 families: Clavariaceae, Fistulinaceae, Lyophyllaceae, Marasmiaceae, Mycenaceae, Physalacriaceae, Pleurotaceae, Pluteaceae, Schizophyllaceae, Tricholomataceae, Typhulaceae, Incertae sedis.

For each taxa there was indicated the scientific name, as well as the collecting location, date, phenophase, biological form, edibility or toxicity level (through conventional signs), number of patrimony belongings registered in the inventory „Plante inferioare”, of Natural Science Museum from Târgu-Mureș and last but not least, the number of specimens.

First of all, the collection has an important value because it emphasizes a part of the patrimony from our museum, secondly, due to the fact that it completes the knowledge concerning the ecology and chorology of some macromycetes from Romania and finally because of the antiquity of some species (for more than half a century) and the collector's notoriousness.

Keywords: mycetoendocormophyta, mycetoendomycophyta, mycetoepixilophyta, mycetoepibryophyta, mycetoendoxilophyta, mycetogeophyta mycorrhiza, mycetogeophyta parasitica, mycetogeophyta saprophytica.

Introduction

In 2005, the Herbarium of the Natural Science Museum from Târgu-Mureș has enriched with a new collection, bought from the Professor Gheorghe Sălăgeanu. It contains 650 species of macromycetes. These represent almost half of the species which were ever found in Romania [5].

The macromycetes are represented by fruit-bodies in different forms and colours, preserved by drying. The species were mentioned in „*Determinator pentru recunoașterea ciupercilor comestibile, necomestibile și otrăvitoare din România*”, which was issued in 1985, at the Ceres Publishing House, winning a Romanian Academy prize as the best contribution regarding this field.

The biologist Gheorghe Sălăgeanu, worked with „Ovidius” University of Constanța, Faculty of Natural Science. He was the dean of the Superior Educational Institute of Constanța, between 1976–1984. He was the author of numerous botanical works, one of them being „*Rezervații, monumente și frumuseți ale naturii din județul Constanța*”, edited by the The Natural Science Complex, Constanța, in 1978 and more than 60 other articles which were concerning the same scientific field. He was member of the European Society of Mapping Macromycetes, in the Romanian Biological Sciences Society and in the Romanian Commission of the Nature Monuments from Constanța.

This work completes the knowledge regarding the ecology and chorology of some macromycetes from Romania.

Material and methods

This work represents a part of the collection, more precisely 133 taxa of macromycetes, belonging to 12 families from the Agaricales order: Clavariaceae, Fistulinaceae, Lyophyllaceae, Marasmiaceae, Mycenaceae, Physalacriaceae, Pleurotaceae, Pluteaceae, Schizophyllaceae, Tricholomataceae, Typhulaceae, Incertae sedis.

The 692 patrimony belongings, were collected and assigned by Gheorghe Sălăgeanu.

The current name of the taxa and the systematic rules were achieved according to the *Index fungorum* (www.indexfungorum.org) and to the *Cybernome, the Nomenclator for Fungi and their Associated Organisms* [8, 9].

The phenophases, the biological forms, the edibility and toxicity level, as well as the conventional signs were established according to Sălăgeanu & Sălăgeanu (1985).

For each taxa there was indicated the scientific name, collecting location, date, phenophase, biological form, edibility or the toxicity level, number of patrimony belongings registred in the inventory „Plante inferioare”, of Natural Science Museum from Târgu-Mureș and last but not least, the number of specimens.

Results and discussions

The taxonomical diversity of the macromycetes from „Gheorghe Sălăgeanu” collection was finalised through the identification among the Agaricales order, during the second stage, of 133 taxa (132 species and one infraspecific taxa – varieties), belonging to 12 families: Clavariaceae, Fistulinaceae, Lyophyllaceae, Marasmiaceae, Mycenaceae, Physalacriaceae, Pleurotaceae, Pluteaceae, Schizophyllaceae, Tricholomataceae, Typhulaceae, Incertae sedis (Table no. 1, no. 2).

All of the above were collected from the following districts from Romania: Alba, Bihor, Bistrița-Năsăud, Cluj, Constanța, Maramureș, Satu-Mare and Sălaj, collected between 1954–1965, 1967, 1968 and 1970.

According to Sălăgeanu & Sălăgeanu (1985), the taxa are part of these biological forms:

- mycetoendocormophyta (E) = 2 taxa;
- mycetoendomycophyta = 3 taxa;
- mycetoepixilophyta(EPx) = 17 taxa;
- mycetoepibryophyta (EPbr) = 1 taxon;
- mycetoendoxilophyta(Ex) = 2 taxa;
- mycetogeophyta mycorrhiza (Gm) = 13 taxa;
- mycetogeophyta parasitica (Gp) = 3 taxa;
- mycetogeophyta saprophytica(Gs) = 70 taxa.

At those mentioned above, there can be supplemented some intermediar forms:

- EPx-Ex = 2 taxa;
- EPx-Gs = 1 taxon;
- Ex-EPx = 13 taxa;
- Gp-EPx = 1 taxon;
- Gs-EPx = 5 taxa.

In the first scientific work regarding this subject, we identified 92 taxa of macromycetes from the Agaricales order, which belong to 6 families: Agaricaceae, Amanitaceae, Bolbitiaceae, Coprinaceae, Entolomataceae, Hygrophoraceae [2].

These two taxonomical identifications combined result in a number of 225 taxa and 18 families: Agaricaceae (19 taxa), Amanitaceae (16 taxa), Bolbitiaceae (12 taxa), Clavariaceae (4 taxa), Coprinaceae (11 taxa), Entolomataceae (12 taxa), Fistulinaceae (1 taxon), Hygrophoraceae (22 taxa), Lyophyllaceae (11 taxa), Marasmiaceae (28 taxa), Mycenaceae (19 taxa), Physalacriaceae (8 taxa), Pleurotaceae (3 taxa), Pluteaceae (6 taxa), Schizophyllaceae (2 taxa), Tricholomataceae (48 taxa), Typhulaceae (2 taxa), Incertae sedis (1 taxon) (Fig. 1).

The Agaricales order represents more than 30% from the total number of taxa which can be found in this collection.

List of collecting sites

AB: Apuseni Mountains: Belioara-Scărișoara, Detunata.

BH: Vadul Crișului, Oradea.

BN: Rodnei Mountains: Vinului Valley, Corongiș Peak.

CS: Semenicului Mountains: Trei Ape.

CJ: Apuseni Mountains: Călățele; Cluj-Napoca: Babeș Park, Craiului Hill (Mănăstur), Galicer Hill, Hoia Forest, Hoia Hill, Lomb Forest, Mănăstur Forest, Someș, Someșul Mic (Babeș Park); Corus-Baciu; Dumbrava Hill; Făgetul Clujului (Coasta Mare, Plecica Valley); Gilăului Mountains: Băișoara, Buscat Peak; Mount Vlădeasa: Răcadului Valley.

CT: Agigea.

MM: Lăpușului Mountains: Toria Stream – Băiuț village, Băiuț Valley.

SM: Săuca village.

SJ: Năpradea (Jibou).

Table 1: The taxonomical conspect of macromycetes from the above mentioned families, with the confining of the biological forms and phenophases.

PHYLLUM Class Order	Family	Taxa	Bioform	Phenophase
BASIDIOMYCOTA Basidiomycetes Agaricales	Clavariaceae	<i>Clavaria fragilis</i>	Gs	IX–X
		<i>Clavaria fumosa</i>		
		<i>Clavulinopsis corniculata</i>	Gs	VIII–X
		<i>Clavulinopsis helvola</i>	Gs	VIII–X
	Fistulinaceae	<i>Fistulina hepatica</i>	Ex – EPx	VIII–X
	Lyophyllaceae	<i>Asterophora lycoperdoides</i>	Em	IX–XI
		<i>Asterophora parasitica</i>	Em	X–XI
		<i>Calocybe gambosa</i>	Gs	IV–VI
		<i>Lyophyllum connatum</i>	Gs	VIII–X
		<i>Lyophyllum decastes</i>	Gs	IX–XI
		<i>Ossicaulis lignatilis</i>	EPx	VII–IX
		<i>Rugosomyces carneus</i>	Gs	X–XI
		<i>Rugosomyces chrysenteron</i>	Gs	VIII–X
		<i>Rugosomyces ionides</i>	Gs	VII–IX
		<i>Tephrocycbe atrata</i>	Gs	IX–X

		<i>Tephrocye rancida</i>	Gs	IX–XI
	Marasmiaceae	<i>Clitocybula lacerata</i>	EPx	VIII–X
		<i>Crinipellis scabella</i>	E	VI–XI
		<i>Gymnopus androsaceus</i>	Gs	V–XI
		<i>Gymnopus brassicolens</i>	Gs	VI–VIII
		<i>Gymnopus confluens</i>	Gs	VII–XI
		<i>Gymnopus dryophilus</i>	Gs	V–XI
		<i>Gymnopus erythropus</i>	Ex-EPx	VI–X
		<i>Gymnopus foetidus</i>	EPx	VI–VIII
		<i>Gymnopus fuscopurpureus</i>	Gs	IX–X
		<i>Gymnopus fusipes</i>	EPx-Ex	VI–XI
		<i>Gymnopus hariolorum</i>	Gs	V–IX
		<i>Gymnopus impudicus</i>	Gs	VIII–XI
		<i>Gymnopus perforans</i>	Gs	I–XII
		<i>Gymnopus peronatus</i>	Gs	VII–XI
		<i>Marasmius epiphyllus</i>	Gs	X–XI
		<i>Marasmius graminum</i>	E	VII–IX
		<i>Marasmius oreades</i>	Gp	V–XI
		<i>Marasmius rotula</i>	EPx-Gs	V–X
		<i>Marasmius wynneae</i>	Gs	IX–X
		<i>Marasmiellus ramealis</i>	EPx	VI–X
		<i>Megacollybia platyphylla</i>	EPx	VI–X
		<i>Mycetinis alliaceus</i>	Gs	VIII–X
		<i>Mycetinis scorodoni</i>	Gp	VI–XI
		<i>Omphalotus olearius</i>	Ex-EPx	VIII–IX
		<i>Pleurocybella porrigens</i>	EPx	VII–X
		<i>Rhodocollybia butyracea</i>	Gs	VII–XI
		<i>Rhodocollybia maculata</i>	Gs	IX–X
		<i>Rhodocollybia prolixa var. distorta</i>	Gs	VIII–IX
	Mycenaceae	<i>Mycena aetites</i>	Gs-EPx	VII–XI
		<i>Mycena alcalina</i>	EPx	VII–X
		<i>Mycena atromarginata</i>	EPx	IX–XII
		<i>Mycena crocata</i>	Gs	IX–XI
		<i>Mycena epipterygia</i>	Gp, EPx	IX–XI
		<i>Mycena flavoalba</i>	Gs	VIII–XI
		<i>Mycena galericulata</i>	Ex-EPx	IV–XII
		<i>Mycena inclinata</i>	Ex-EPx	IX–XII
		<i>Mycena pelianthina</i>	Gs	IV–X
		<i>Mycena polygramma</i>	Gs-EPx	VIII–XI
		<i>Mycena pura</i>	Gs	VII–XI
		<i>Mycena rosella</i>	Gs	VIII–XI
		<i>Mycena sanguinolenta</i>	Gs	VI–XI
		<i>Mycena stylobates</i>	Gs	IX–X
		<i>Mycena vitrea</i>	Gs	VI–IX
		<i>Mycena vulgaris</i>	Gs	IX–XI
		<i>Panellus mitis</i>	Ex-EPx	X–III
		<i>Panellus stipticus</i>	EPx-Ex	I–XII
		<i>Xeromphalina campanella</i>	EPx	VII–X
	Physalacriaceae	<i>Armillaria mellea</i>	Ex-EPx	VIII–XII
		<i>Armillaria tabescens</i>	Ex-EPx	VIII–X
		<i>Flammulina velutipes</i>	Ex-EPx	X–IV
		<i>Oudemansiella mucida</i>	Ex	VIII–XI
		<i>Strobilurus esculentus</i>	Gs	III–V
		<i>Strobilurus tenacellus</i>	Gs	III–V

		<i>Xerula pudens</i>	Ex-EPx	VIII-X
		<i>Xerula radicata</i>	Gp	VI-X
	Pleurotaceae	<i>Hohenbuehelia petaloides</i>	Gs, EPx	VIII-XI
		<i>Pleurotus dryinus</i>	Ex	VI-XI
		<i>Pleurotus ostreatus</i>	Ex-EPx	IX-XII
	Pluteaceae	<i>Pluteus atromarginatus</i>	EPx	V-X
		<i>Pluteus cervinus</i>	EPx	V-XI
		<i>Pluteus nanus</i>	EPx	VIII-IX
		<i>Volvariella bombycina</i>	Ex-EPx	VI-X
		<i>Volvariella gloiocephala</i>	Gs	V-VII
		<i>Volvariella surrecta</i>	Em	VIII-XI
	Schizophyllaceae	<i>Schizophyllum amplum</i>	EPx	I-XII
		<i>Schizophyllum commune</i>	Ex-EPx	I-XII
	Tricholomataceae	<i>Arrhenia epichysium</i>	EPx	VII-X
		<i>Arrhenia griseopallida</i>	Gs	VI-X
		<i>Arrhenia onisca</i>	EPbr	VI-IX
		<i>Cantharellula umbonata</i>	Gs	VIII-XI
		<i>Clitocybe candicans</i>	Gs	IX-XI
		<i>Clitocybe dealbata</i>	Gs	IX-XI
		<i>Clitocybe infundibuliformis</i>	Gs	VI-IX
		<i>Clitocybe inornata</i>	Gs	IX-X
		<i>Clitocybe nebularis</i>	Gs	IX-XI
		<i>Clitocybe odora</i>	Gs	VIII-XI
		<i>Clitocybe phyllophila</i>	Gs	IX-XI
		<i>Clitocybe radicellata</i>	Gs	III-IV
		<i>Clitocybe suaveolens</i>	Gs	VII-XI
		<i>Clitocybe vermicularis</i>	Gs	III-IV
		<i>Collybia cirrhata</i>	Gs	VIII-XI
		<i>Collybia tuberosa</i>	Gs	VIII-XI
		<i>Delicatula integrella</i>	Gs-EPx	VI-IX
		<i>Infundibulicybe geotropa</i>	Gs	VIII-XI
		<i>Laccaria amethystina</i>	Gs	V-XI
		<i>Laccaria laccata</i>	Gs	V-XI
		<i>Laccaria tortilis</i>	Gs	VI-IX
		<i>Lepista flaccida</i>	Gs	VIII-X
		<i>Lepista nuda</i>	Gs	IX-XI
		<i>Lepista personata</i>	Gs	X-XI
		<i>Lepista sordida</i>	Gs	VII-IX
		<i>Leucopaxillus amarus</i>	Gs	VIII-X
		<i>Leucopaxillus lepidoides</i>		
		<i>Melanoleuca brevipes</i>	Gs	IV-XI
		<i>Melanoleuca evenosa</i>	Gs	IV-VIII
		<i>Melanoleuca grammopodia</i>	Gs	IV-VIII
		<i>Melanoleuca melaleuca</i>	Gs	IV-X
		<i>Myxomphalia maura</i>	Gs	IX-X
		<i>Omphalina pyxidata</i>	Gs	IX-XI
		<i>Pseudoclitocybe cyathiformis</i>	Gs-EPx	X-XI
		<i>Tricholoma acerbum</i>	Gm	VIII-X
		<i>Tricholoma album</i>	Gm	VIII-X
		<i>Tricholoma lascivum</i>	Gm	IX-X
		<i>Tricholoma populinum</i>	Gm	X-XI
		<i>Tricholoma resplendens</i>	Gm	IX-XI
		<i>Tricholoma saponaceum</i>	Gm	IX-XI
		<i>Tricholoma scalpturatum</i>	Gm	VII-XI

		<i>Tricholoma sejunctum</i>	Gm	IX–X
		<i>Tricholoma sulphureum</i>	Gm	VII–X
		<i>Tricholoma terreum</i>	Gm	VIII–XI
		<i>Tricholoma ustale</i>	Gm	VIII–XI
		<i>Tricholoma vaccinum</i>	Gm	VII–X
		<i>Tricholoma virgatum</i>	Gm	IX–X
		<i>Tricholomopsis rutilans</i>	EPx	VII–XI
	Typhulaceae	<i>Macrotyphula juncea</i>	Gs	X–XI
		<i>Typhula phacorrhiza</i>	Gs	IX–XI
	Not assigned	<i>Plicaturopsis crispa</i>	EPx	IX–XII

Table 2: The numerological report of the studied taxonomical categories.

Agaricales	Number of families	Number of genres	Number of taxa
	12	50	133

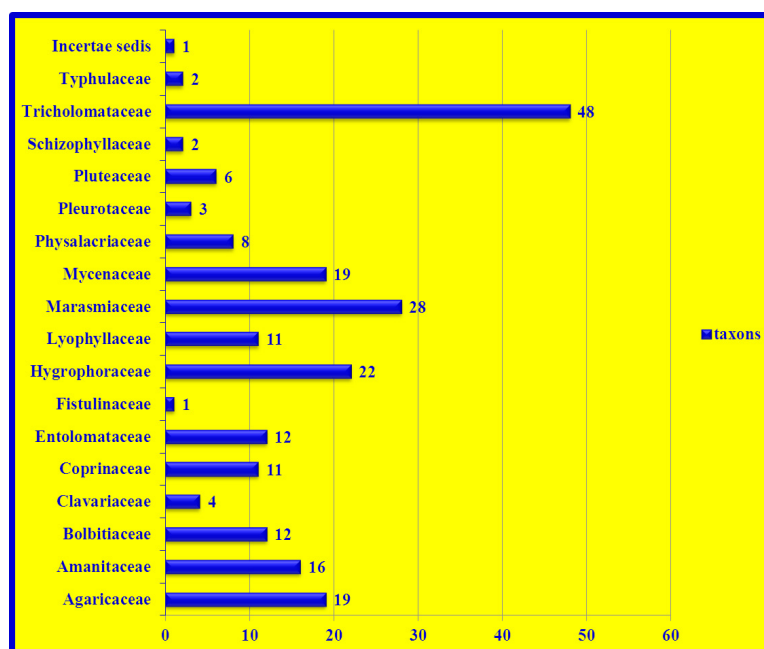


Fig. 1: The distribution into families of macromycetes.

The taxa list (the species and the families have been listed alphabetically):

Clavariaceae Family

Clavaria fragilis Holmsk. (1790)

CJ: on the wet lands, in the meadows, on Galicer Hill from Cluj-Napoca; 24 VIII 1968; IX–X; Gs; ; HM§ 510 under *C. vermicularis* Sw.; 5 ex.

Clavaria fumosa Fr.

BN: in clusters, in sunny and grassy places, at Vinului Valley from Rodnei Mountains; 29 X 1962; HM§ 511; 4 ex.

Clavulinopsis corniculata (Schaeff.) Corner (1950)


CJ: in the meadows with moss, on Galicer Hill, at Cluj-Napoca; 15 X 1956; VIII–X; Gs; HM§ 512 under *C. corniculata* (Schff. ex Fr.) Corner; 4 ex.

Clavulinopsis helvola (Pers.) Corner

CJ: in the meadows with moss, at the edge of Hoia Forest from Cluj-Napoca; 23 X 1965; VIII–X; **Gs**; HM§ 513 under *C. Helvola* (Pers. ex Fr.) Corner; 2 ex.

Fistulinaceae Family

Fistulina hepatica (Schaeff.) With.(1792)

CJ: at the base of Quercus trunks, in Hoia Forest and on Galicer Hill, at Cluj-Napoca; 17 X 1955; VIII–X; **Ex- EPx**; ; HM§ 557 under *F. hepatica* (Schff. ex Fr.) With.; 1 ex.

Lyophyllaceae Family




Asterophora lycoperdoides (Bull.) Ditmar (1809)

CJ: on the decaying/decayed fruit-bodies (*Russula nigricans*), on Dumbrava Hill, nearby Cluj-Napoca 14 VIII 1957; IX–XI; **Em**; HM§ 768 under *Nyctalis asterophora* Fr.; 2 ex.


Asterophora parasitica (Bull.) Singer (1951)

BN: on the pileus of *Russula nigricans*, at Vinului Valley from Rodnei Mountains; 17 IX 1961; X–XI; **Em**; HM§ 769 under *Nyctalis parasitica* (Bull. ex Fr.) Fr.; 2 ex.


***Calocybe gambosa* (Fr.) Donk** (1962)

Without location: on the soil, on shrubbery, on grassy places, on sunny places, in gardens and at the edges of the forests; 23 IV 1959; IV–VI; **Gs**; ; ; ; HM§ 764; 8 ex.

Lyophyllum connatum (Schumach.) Singer (1939)

CJ: in the wet deciduous forests, especially on the clayey soils, in connates clusters, at Făgetul Clujului, under Coasta Mare; 25 X 1963; VIII–X; **Gs**; ; HM§ 762 under *L. connatum* (Schum. ex Fr.) Sing.; 6 ex.


Lyophyllum decastes (Fr.) Singer (1951)

CJ: on the soil, in clusters, shrubbery and in deciduous forests, at Făget, nearby Cluj-Napoca; 2 X 1957; IX–XI; **Gs**; ; HM§ 763 under *L. decastes* (Fr.) Sing.; 8 ex.

Ossicaulis lignatilis (Pers.) Redhead & Ginns (1985)

BN: on the deciduous and coniferous tree, at Vinului Valley from Rodnei Mountains; 28 IX 1962; VII–IX; **EPx**; HM§ 671 under *Pleurocybella lignatilis* (Pers.) Singer; 2 ex.

Rugosomyces carneus (Bull.) Bon (1991)

CJ: on the wet soil, through willows, on the Someș riverside, at Cluj-Napoca; 24 VIII 1958; X–XI; **Gs**; ; HM§ 766 under *Calocybe carnea* (Bull. ex Fr.) Donk; 4 ex.

Rugosomyces chrysenteron (Bull.) Bon (1991)

CJ: on the fallen leafneedles of Picea, in the coniferous forest, at Băișoara, in Gilăului Mountains, under Buscat Hill; 29 VIII 1962; VIII–X; **Gs**; HM§ 765 under *Calocybe chrysenteron* (Bull. ex Fr.) Sing.; 4 ex.

Rugosomyces ionides (Bull.) Bon (1991)

CJ: on the soil of the coniferous forests, in Gilăului Mountains, at Băișoara, under Buscat Hill; 29 VIII 1962; VII–IX; **Gs**; ; HM§ 767 under *Calocybe ionides* (Bull. ex Fr.) Donk; 1 ex.

Tephrocye atrata (Fr.) Donk (1962)

CJ: on the spot of fireplaces, at Făget, at Plecica Valley, nearby Cluj-Napoca; 25 IX 1960; IX–X; **Gs**; HM§ 761; 10 ex.

Tephrocye rancida (Fr.) Donk (1962)

BH: on the soil of the deciduous and coniferous forests, at Vadul Crișului; 27 X 1964; IX–XI; **Gs**; HM§ 760; 3 ex.

Marasmiaceae Family

Clitocybula lacerata (Scop.) Métrod (1952)

BN: on the decaying tree of *Picea*, in the coniferous forests, at Vinului Valley from Rodnei Mountains, under Corongiș Peak; 28 IX 1962; VIII–X; **EPx**; HMș 752 under *C. Lacerata* (Scop. ex Lasch) Métz.; 8 ex.

Crinipellis scabella (Alb. & Schwein.) Murrill (1915)

SM: on grassy roots and stems, especially *Bromus*, at Săuca village; 17 XI; VI–XI; **E**; HMș 675 under *Crinipellis stipitaria* (Fr.) Pat.; 3 ex.

Gymnopus androsaceus (L.) J.L. Mata & R.H. Petersen (2004)

CJ: on decaying leafneedles, under *Picea*, in the coniferous forests, on Mount Vlădeasa; 4 IX 1959; V–XI; **Gs**; HMș 679 under *Marasmius androsaceus* (L. ex Fr.) Fr.; 4 ex.

Gymnopus brassicolens (Romagn.) Antonín & Noordel. var. *brassicolens* (1997)

MM: on the soil with plant residues in putrefaction, in the spruce fir and beech forests from Lăpușului Mountains, on Toria stream, nearby Băiuț; 26 VII 1965; VI–VIII; **Gs**; HMș 687 under *Micromphale brassicolens* (Romagn.) Orton; 4 ex.

Gymnopus confluens (Pers.) Antonín, Halling & Noordel. (1997)

MM: in connates clusters, in the deciduous and coniferous forests from Lăpușului Mountains, at Băiuț Valley; 26 VIII 1962; VII–XI; **Gs**; HMș 750 under *Collybia confluens* (Pers. ex Fr.) Kumm.; 15 ex.

Gymnopus dryophilus (Bull.) Murrill (1916)

CJ: on the soil of *Quercus* forests, on Galicer Hill, at Cluj-Napoca; 31 VIII 1958; V–XI; **Gs**; **☉**; HMș 744 under *Collybia dryophila* (Bull. ex Fr.) Kumm.; 6 ex.

Gymnopus erythropus (Pers.) Antonín, Halling & Noordel. (1997)

CJ: on the decaying tree, in the deciduous forests, at Făgetul Clujului; 30 IX 1959; VI–X; **Ex-EPx**; HMș 743 under *Collybia bresadolae* (Kühn. & Romagn.) Sing.; 10 ex.

Gymnopus foetidus (Sowerby) J.L. Mata & R.H. Petersen (2004)

BH: in the deciduous forest, on the decaying tree, at Vadul Crișului, Oradea; 27 X 1964; VI–VIII; **EPx**; HMș 686 under *Micromphale foetidum* (Sow. ex Fr.) Sing.; 5 ex.

Gymnopus fuscopurpureus (Pers.) Antonín, Halling & Noordel. (1997)

CJ: in the *Fagus* forests, in the places with decaying leaves, at Făget, nearby Cluj-Napoca; 19 VIII 1964; IX–X; **Gs**; HMș 745 under *Collybia fuscopurpurea* (Pers. ex Fr.) Kumm.; 6 ex.

Gymnopus fusipes (Bull.) Gray (1821)

CJ: in connates clusters, on decaying tree, at Cluj-Napoca, in Hoia Forest; 29 VIII 1957; VI–XI; **EPx-Ex**; HMș 740 under *Collybia fusipes* (Bull. ex Fr.) Quél.; 5 ex.

Gymnopus hariolorum (Bull.) Antonín, Halling & Noordel. (1997)

AB: on decaying leaves, in deciduous forests, under *Fagus*, at Belioara-Scărișoara from Apuseni Mountains; 1 VII 1962; V–IX; **Gs**; HMș 751 under *Collybia hariolorum* (DC. ex Fr.) Quél.; 4 ex.

Gymnopus impudicus (Fr.) Antonín, Halling & Noordel. (1997)

CJ: on the soil, under *Picea*, on Craiului Hill, nearby Mănăstur, Cluj-Napoca; 26 VII 1959; VIII–XI; **Gs**; HMș 749 under *Collybia impudica* (Fr.) Sing.; 8 ex.

Gymnopus perforans (Hoffm.) Antonín & Noordel (2008)

CJ: in the coniferous forests, on *Picea* and *Abies* decaying leaves, in Gilăului Mountains, at Băișoara; 6 VIII 1961; I–XII; **Gs**; HMș 685 under *Micromphale perforans* (Hoffm. ex Fr.) Sing.; 10 ex.

Gymnopus peronatus (Bolton) Antonín, Halling & Noordel. (1997)

BN: on decaying leaves and leafneedles in Rodnei Mountains, in the deciduous and coniferous forests, under Corongiș Peak; 17 IX 1963; VII–XI; **Gs**; HMș 748 under *Collybia peronata* (Bolt. ex Fr.) Sing.; 5 ex.

Marasmius epiphyllus (Pers.) Fr. (1838)

CJ: on decaying leafs, in the deciduous forests, at Făgetul Clujului from Cluj-Napoca; 12 X 1957; X–XI; **Gs**; HMŞ 678 under *M. epiphyllus*(Pers. ex Fr.) Fr.; 6 ex.

Marasmius graminum (Lib.) Berk. (1860)

CJ: on grassy stems and leafs, on Craiului Hill from Cluj-Napoca 16 VI 1959; VII–IX; **E**; HMŞ 677 under *M. graminum* (Libert) Berk.; 5 ex.

Marasmius oreades (Bolton) Fr. (1836)

CJ: on sandy soil, in the meadows, at Fânațele Clujului, Cluj-Napoca; 24 VII 1954; V–XI; **Gp**; ; HMŞ 682 under *M. oreades* (Bolt. ex Fr.) Fr.; 6 ex.

Marasmius rotula (Scop.) Fr. (1838)

CJ: on the decaying tree, in the deciduous forests, on Galicer Hill, at Cluj-Napoca; 17 VIII 1962; V–X; **EPx-Gs**; HMŞ 676 under *M. rotula* (Scop. ex Fr.) Fr.; 8 ex.


Marasmius wynneae Berk. & Broome (1859)

BN: on decaying leaves and leafneedles, at Vinului Valley from Rodnei Mountains; 13 IX 1965; IX–X; **Gs**; HMŞ 683 under *M. globularis* Quél.; 8 ex.

Marasmiellus ramealis (Bull.) Singer (1946)

CJ: on decaying deciduous tree, in Hoia Forest, at Cluj-Napoca; 30 VII 1956; VI–X; **EPx**; HMŞ 684 under *Marasmius ramealis* (Bull. ex Fr.) Sing.; 40 ex.


Megacollybia platyphylla(Pers.) Kotl. & Pouzar (1972)

BN: on decaying tree, in the deciduous and coniferous forests, at Vinului Valley from Rodnei Mountains; 19 IX 1963; VI–X; **EPx**; ; HMŞ 753 under *M. platyphylla* (Pers. ex Fr.) Kotl. et Pouz.; 2 ex.

Mycetinis alliaceus (Jacq.) Earle ex A.W. Wilson & Desjardin (2005)

BN: on fallen and decaying leafs and pieces of wood, in the deciduous and coniferous forests, at Vinului Valley from Rodnei Mountains; 19 IX 1960; VIII–X; **Gs**; HMŞ 681 under *Marasmius alliaceus* (Fr.) Fr.; 3 ex.

Mycetinis scorodonius (Fr.) A.W. Wilson & Desjardin (2005)

BN: on decaying stumps and small branches, on roots and on graminosis plants, at Vinului Valley from Rodnei Mountains; 13 VIII 1958; VI–XI; **Gp**; ; HMŞ 680 under *Marasmius scorodonius* (Fr.) Fr.; 6 ex.


Omphalotus olearius (DC.) Singer (1946)

Sălaj district: on stumps and roots, in connates clusters, in the deciduous forests, especially in the oak forests, at Năpradea, nearby Jibou; 17 VII 1957; VIII–IX; **Ex-EPx**; +++; HMŞ 736 under *O. Olearius*(DC. ex Fr.) Sing.; 3 ex.

Pleurocybella porrigens (Pers.) Singer (1946)

BN: in clusters, on coniferous tree, in Rodnei Mountains, under Corongiș Peak, in the forests from Vinului Valley; 28 IX 1962; VII–X; **EPx**; HMŞ 670 under *Phyllotus porrigens* (Pers. ex Fr.) P. Karst.; 2 ex.

Rhodocollybia butyracea (Bull.) Lennox (1979)

BN: on the soil of the coniferous and deciduous forests, at Vinului Valley from Rodnei Mountains; 17 IX 1963; VII–XI; **Gs**; ; HMŞ 739 under *Collybia butyracea* (Bull. ex Fr.) Quél.; 8 ex.

Rhodocollybia maculata (Alb. & Schwein.) Singer (1939)

CJ: on the soil, under Picea, in spruce fir forests, at Băișoara, in Gilăului Mountains, under Buscat Peak; 5 IX 1962; IX–X; **Gs**; HMŞ 741 under *Collybia maculata* (A. et S. ex Fr.) Quél.; 2 ex.

Rhodocollybia prolixavar. distorta (Fr.) Antonín, Halling & Noordel. (1997)

AB: on the soil of the coniferous forests, in Apuseni Mountains, at Detunata; 29 IX 1967; VIII–IX; **Gs**; HMŞ 742 under *Collybia distorta* (Fr.) Quél.; 2 ex.

Mycenaceae Family

Mycena aetites (Fr.) Quél.(1872)

CJ: in the meadows, at Plecica Valley from Făgetul Clujului; 21 IX 1960; VII–XI; **Gs-EPx**; HMȘ 703; 10 ex.

Mycena alcalina (Fr.) P. Kumm. (1871)

BN: in big clusters, on the decaying tree, in the deciduous and coniferous forests, at Vinului Valley from Rodnei Mountains; 31 X 1964; VII–X; **EPx**; HMȘ 701 under *M. alcalina* (Fr.) Kumm.; 10 ex.

Mycena atromarginata (Lasch) P. Kumm. (1871)

BN: on the decaying tree, in the coniferous and deciduous forests, at Vinului Valley from Rodnei Mountains; 15 VII 1962; IX–XII; **EPx**; HMȘ 697 under *M. atromarginata* (Lasch) Kumm.; 1 ex.

Mycena crocata (Schr.) P. Kumm. (1871)

BN: on the soil of the deciduous forests, at Vinului Valley from Rodnei Mountains; 29 VIII 1964; IX–XI; **Gs**; HMȘ 689; 8 ex.

Mycena epipterygia (Scop.) Gray (1821)

CJ: on Picea roots, in Gilăului Mountains, at Băișoara, under Buscat Peak; 23 IX 1957; IX–XI; **Gp**; HMȘ 692 under *M. viscosa* Secr. ex Maire; 10 ex.

CJ: in clusters, on the decaying tree, in the beech and spruce fir forests, at Răcadului Valley from Mount Vlădeasa; 20 X 1962; IX–XI; **EPx**; HMȘ 693; 8 ex.

Mycena flavoalba (Fr.) Quél. (1872)

CJ: on grassy soils, in Craiului Forest, at Cluj-Napoca; 21 X 1958; VIII–XI; **Gs**; HMȘ 698; 6 ex.

Mycena galericulata (Scop.) Gray (1821)

CJ: in big and connates clusters, on stumps and trunks, in Hoia Forest, at Cluj-Napoca; 28 X 1956; IV–XII; **Ex-EPx**; HMȘ 706 under *M. galericulata* (Scop. ex Fr.) S. F. Gray; 5 ex.

Mycena inclinata (Fr.) Quél. (1872)

CJ: on the deciduous tree, in connates clusters, in Hoia Forest, at Cluj-Napoca; 12 X 1957; IX–XII; **Ex-EPx**; HMȘ 705; 6 ex.

Mycena pelianthina (Fr.) Quél.(1872)

CJ: on the grassy soil, at Făget, from Cluj-Napoca; 21 X 1960; IV–X; **Gs**; HMȘ 699; 1 ex.

Mycena polygramma (Bull.) Gray (1821)

CJ: on the decaying tree, in the oak forest, in Lomb Forest from Cluj-Napoca; 3 XI 1955; VIII–XI; **Gs-EPx**; HMȘ 702 under *M. polygramma* (Bull. ex Fr.) S. F. Gray; 1 ex.

Mycena pura (Pers.) P. Kumm.(1871)

CJ: in the deciduous forests, among decaying leafs, on Hoia Hill, at Cluj-Napoca; 28 X 1956; VII–XI; **Gs**; HMȘ 700 under *M. pura* (Pers. ex Fr.) Kumm.; 8 ex.

Mycena rosella (Fr.) P. Kumm.(1871)

CJ: on Picea leafs, in the coniferous forests, at Răcadului Valley from Mount Vlădeasa; 21 X 1962; VIII–XI; **Gs**; HMȘ 696 under *M. rosella* (Fr.) Kumm.; 6 ex.

Mycena sanguinolenta (Alb. & Schwein.) P. Kumm. (1871)

BN: among moss, in the deciduous and coniferous forests, at Vinului Valley from Rodnei Mountains; 28 VIII 1964; VI–XI; **Gs**; HMȘ 690 under *M. sanguinolenta* (Alb. et Schw. ex Fr.) Kumm.; 10 ex.

Mycena stylobates (Pers.) P. Kumm. (1871)

SM: on Quercus fallen leafs, in the deciduous forest from Săuca village; 22 VII 1957; IX–X; **Gs**; HMȘ 695 under *M. stylobates* (Pers. ex Fr.) Kumm.; 2 ex.

Mycena vitrea (Fr.) Quél.(1872)

CJ: pe on the soil of the coniferous forests, on Mount Vlădeasa, nearby hut Vlădeasa; 18 X 1957; VI–IX; **Gs**; HM§ 704; 6 ex.

Mycena vulgaris (Pers.) P. Kumm. (1871)

CJ: on Picea fallen leafs, in the coniferous forests, in Gilăului Mountains, at Băișoara; 5 X 1962; IX–XI; **Gs**; HM§ 694 under *M. vulgaris* (Pers. ex Fr.) Quél.; 6 ex.

Panellus mitis (Pers.) Singer (1936)

BN: on the coniferous tree, in the forests from Vinului Valley, in Rodnei Mountains; 1 X 1964; X–III; **Ex-EPx**; HMI 673 under *P. mitis* (Pers. ex Fr.) Sing.; 1 ex.

Panellus stipticus (Bull.) P. Karst. (1879)


CJ: on deciduous stumps and trunks, at Făget and at Hoia, Cluj-Napoca; 5 X 1957; I–XII; **EPx-Ex**; HM§ 672 under *P. stipticus* (Bull. ex Fr.) Karst.; 10 ex.

Xeromphalina campanella (Batsch) Maire (1934)


BN: on decaying coniferous tree, in the forests from Vinului Valley, at Rodnei Mountains; 29 VIII 1964; VII–X; **EPx**; HM§ 674 under *X. Campanella* (Batsch ex Fr.) Mre.; 6 ex.

Physalacriaceae Family


Armillaria mellea (Vahl) P. Kumm. (1871)

BN: in clusters, on trunks and roots, in the deciduous and coniferous forests, at Vinului Valley from Rodnei Mountains; 28 IX 1962; VIII–XII; **Ex-EPx**; ; HM§ 737 under *Armillariella mellea* (Vahl ex Fr.) Karst.; 2 ex.

Armillaria tabescens (Scop.) Emel (1921)

SJ: in clusters, on Quercus roots and trunks, at Năpradea, nearby Jibou; 18 IX 1965; VIII–X; **Ex-EPx**; ; HM§ 738 under *Armillariella tabescens* (Scop. ex Fr.) Sing.; 6 ex.


Flammulina velutipes (Curtis) Singer (1951)

CJ: in big clusters, on deciduous stumps and roots, on Galicer Hill, nearby Cluj-Napoca; 18 XII 1955; X–IV; **Ex-EPx**; ; HM§ 754 under *F. velutipes* (Curt. ex Fr.) Sing.; 10 ex.

Oudemansiella mucida (Schrad.) Höhn. (1910)

CJ: on trunks and branches, especially on Fagus, at Făget, nearby Cluj-Napoca; 20 VIII 1956; VIII–XI; **Ex**; HM§ 756 under *O. mucida* (Schrad. ex Fr.) v. Hoehn.; 8 ex.


Strobilurus esculentus (Wulfen) Singer (1962)

CJ: on Picea excelsa buried cons, at Băișoara, in Gilăului Mountains, in the coniferous forests; 26 V 1956; III–V; **Gs**; ; HM§ 758 under *S. esculentus* (Wulf. ex Fr.) Sing.; 10 ex.


Strobilurus tenacellus (Pers.) Singer (1962)

CJ: Pinus silvestris buried cons, on Craiului Hill, at Cluj-Napoca; 22 IV 1959; III–V; **Gs**; HM§ 759 under *S. tenacellus* (Pers. ex Fr.) Sing.; 3 ex.

Xerula pudens (Pers.) Singer (1951)


BN: on the roots of the deciduous and coniferous tree, at Vinului Valley from Rodnei Mountains; 28 VIII 1962; VIII–X; **Ex-EPx**; ; HM§ 755 under *X. longipes* (Bull. ex St.-Am.) Mre.; 9 ex.


Xerula radicata (Relhan) Dörfelt (1975)

CJ: on the roots of the deciduous tree, at Făget, nearby Cluj-Napoca; 2 IX 1955; VI–X; **Gp**; ; HM§ 757 under *Mucidula radicata* (Relh. ex Fr.) Bours.; 4 ex.

Pleurotaceae Family

Hohenbuehelia petaloides (Bull.) Schulzer (1866)




CJ: on the wet soil, in Hoia Forest from Cluj-Napoca; 12 VIII 1962; VIII–XI; **Gs**; ; HM§ 666 under *Acanthocystis geogenius* (DC. ex Fr.) Gill.; 1 ex.

CJ: on the deciduous tree, frequently in the oak forests, at Făgetul Clujului; 6 X 1956; VIII–XI; **EPx**; ; HMș 667 under *Acanthocystis petaloides* (Bull. ex Fr.) Kühn.; 2 ex.

Pleurotus dryinus (Pers.) P. Kumm. (1871)


BN: on *Aces pseudoplatanus* trunks, at Vinului Valley from Rodnei Mountains, under Corongiș Peak; 28 IX 1962; VI–XI; **Ex**; HMș 641 under *P. dryinus* (Pers. ex Fr.) Kumm.; 2 ex.

Pleurotus ostreatus (Jacq.) P. Kumm. (1871)


BN: on *Fagus silvatica* trunks, at Vinului Valley from Rodnei Mountains, under Corongiș Peak; 31 X 1954; IX–XII; **Ex-EPx**;   ; HMș 642 under *P. ostreatus* (Jacq. ex Fr.) Kumm.; 4 ex.

Pluteaceae Family

Pluteus atromarginatus (Konrad) Kühner (1935)

CJ on *Picea* stumps, in the coniferous forests, in Gilăului Mountains, at Băișoara, under Buscat Peak; 14 VIII 1960; V–X; **EPx**; ; HMș 819; 1 ex.




Pluteus cervinus (Schaeff.) P. Kumm. (1871)

BN: on decaying tree, in the deciduous and coniferous forests, at Vinului Valley from Rodnei Mountains; 28 IX 1962; V–XI; **EPx**; ; HMș 820 under *P. cervinus* (Schff. ex Fr.) Kumm.; 1 ex.

Pluteus nanus (Pers.) P. Kumm. (1871)

CJ: on decaying tree, in the deciduous forests, at Făgetul Clujului; 29 VIII 1959; VIII–IX; **EPx**; HMș 818 under *P. nanus* (Pers. ex Fr.) Kumm.; 1 ex.

Volvariella bombycina (Schaeff.) Singer (1951)

CJ: on a decaying trunk, on the Someșul Mic riverside, nearby Parcul Babeș, at Cluj-Napoca; 8 VII 1960; VI–X; **Ex-EPx**;   ; HMș 817 under *V. bombycina* (Pers. ex Fr.) Sing.; 1 ex.

Volvariella gloiocephala (DC.) Boekhout & Enderle (1986)

CT: on the sand dunes from Agigea reservation; 20 V 1970; V–VII; **Gs**; ; HMș 815 sub *V. speciosa* (Fr.) Sing.; 1 ex.

Volvariella surrecta (Knapp) Singer (1951)

BH: on the *Clitocybe nebularis* fruit-bodies, in the beech and hornbeam forests, at Vadul Crișului; 27 X 1964; VIII–XI; **Em**; HMș 816 under *Volvariella surrecta* (Knapp) Sing.; 1 ex.

Schizophyllaceae Family

Schizophyllum amplum (Lév.) Nakasone (1996)

CJ: on decaying *Populus* tree, in Someșului Mic river meadow, at Cluj-Napoca; 18 X 1964; I–XII; **EPx**; HMș 550 under *Auriculariopsis ampla* (Lév.) Mre.; 40 ex.

Schizophyllum commune Fr. (1815)

CJ: especially on the deciduous tree, among shrubbery, at Cluj-Napoca; 21 IX 1954; I–XII; **Ex-EPx**; HMș 636; 10 ex.

Tricholomataceae Family

Arrhenia epichysium (Pers.) Redhead, Lutzoni, Moncalvo & Vilgalys (2002)

BN: on *Picea excelsa* decaying tree, in the coniferous forests, at Vinului Valley from Rodnei Mountains; 28 IX 1962; VII–X; **EPx**; HMș 714 under *Omphalina epichysium* (Pers. ex Fr.) Quél.; 2 ex.

Arrhenia griseopallida (Desm.) Watling (1989)

CJ: in the meadows with moss, on Someșului Mic riverside, at Cluj-Napoca; 17 XI 1960; VI–X; **Gs**; HMș 712 under *Omphalia griseopallida* (Desm.) Quél.; 4 ex.

Arrhenia onisca (Fr.) Redhead, Lutzoni, Moncalvo & Vilgalys (2002)

CJ: in the peat bogs, on the peat moss, at Călățele, in Apuseni Mountains; 3 XI 1962; VI–IX; **EPbr**; HM§ 715 under *Omphalina oniscu* (Pers. ex Fr.) Quél.; 2 ex.

Cantharellula umbonata (J.F. Gmel.) Singer (1936)

CJ: among moss, in the coniferous forests, in Gilăului Mountains, at Băișoara, under Buscat Peak; 5 X 1962; VIII–XI; **Gs**; ; HM§ 735 under *Cantharellula umbonata* (Gmel. ex Fr.) Sing.; 3 ex.


Clitocybe candicans (Pers.) P. Kumm. (1871)

CJ: in grassy places, at the edges of the forests, on Craiului Hill, at Cluj-Napoca; 11 IX 1963; IX–XI; **Gs**; HM§ 724 under *C. gallinacea* (Scop. ex Fr.) Lge.; 10 ex.

Clitocybe dealbata (Sowerby) P. Kumm. (1871)

AB: in the meadows, at the edges of the forests, in Apuseni Mountains, at Detunata; 20 IX 1968; IX–XI; **Gs**; +++; HM§ 725 under *C. dealbata* (Sow. ex Fr.) Kumm.; 5 ex.

Clitocybe infundibuliformis Quél. (1872)

BN: on the soil, in clusters, in the deciduous and coniferous forests, at Vinului Valley from Rodnei Mountains; 29 VIII 1964; VI–IX; **Gs**; ; HM§ 733 under *C. infundibuliformis* (Schff. ex Fr.) Quél.; 5 ex.


Clitocybe inornata (Sowerby) Gillet (1874)

BN: on the limestone soils, in the coniferous and deciduous forests, at Vinului Valley from Rodnei Mountains, under Corongiș Peak; 15 IX 1965; IX–X; **Gs**; HM§ under 729 sub *C. inornata* (Sow. ex Fr.) Gill.; 2 ex.

Clitocybe nebularis (Batsch) P. Kumm. (1871)

CJ: on the soil of the deciduous forests, in shrubbery, in Hoia Forest, at Cluj-Napoca; 2 X 1960; IX–XI; **Gs**; +; HM§ 727 under *C. nebularis* (Batsch ex Fr.) Kumm.; 2 ex.

Clitocybe odora (Bull.) P. Kumm. (1871)

BN: on the soil, in the deciduous and coniferous forests, at Vinului Valley from Rodnei Mountains, under Crăciunel Peak; 18 IX 1963; VIII–XI; **Gs**; ; HM§ 726 under *C. odora* (Bull. ex Fr.) Kumm.; 3 ex.

Clitocybe phyllophila (Pers.) P. Kumm. (1871)

CJ: on decaying leafneedles, in Craiului Forest, at Cluj-Napoca; 8 X 1960; IX–XI; **Gs**; +++; HM§ 723 under *Clitocybe pithyophila* (Secr.) Gill.; 6 ex.

Clitocybe radicellata Godey (1884)

CJ: on the sandy soil, in the oak and hornbeam forests, at Corus-Baciu, nearby Cluj-Napoca; 7 V 1965; VIII–XI; **Gs**; HM§ 731 under *C. radicellata* Gill.; 6 ex.

Clitocybe suaveolens (Schumach.) P. Kumm. (1871)

BN: on the soil, in the deciduous and coniferous forests, at Vinului Valley from Rodnei Mountains, under Corongiș Peak; without collecting data; VII–XI; **Gs**; HM§ 721 sub *C. suaveolens* (Schum. ex Fr.) Kumm.; 8 ex.

Clitocybe vermicularis (Fr.) Quél. (1872)

CJ: on the soil of the coniferous forests, under Picea, at Băișoara, in Gilăului Mountains, under Buscat Peak; 30 V 1960; III–IV; **Gs**; ; HM§ 732; 1 ex.

Collybia cirrhata (Schumach.) Quél. (1872)

CJ: on the decaying rests of fruit-bodies, at Făgetul Clujului; 18 X 1964; VIII–XI; **Gs**; HM§ 746 under *C. cirrhata* (Schum. ex Fr.) Kumm.; 4 ex.




Collybia tuberosa (Bull.) P. Kumm. (1871)

CJ: on the soil, at Craiului Hill, at Cluj-Napoca; 21 X 1958; VIII–XI; **Gs**; HM§ 747 under *C. tuberosa* (Bull. ex Fr.) Quél.; 6 ex.



Delicatula integrella (Pers.) Fayod (1889)

CJ: on the tree and on the decaying leaf, in Mănăstur Forest, at Cluj-Napoca; 18 VII 1957; VI–IX; **Gs-EPx**; HMș 707 under *Delicatula integrella* (Pers. ex Fr.) Fay.; 5 ex.

Infundibulicybe geotropica (Bull.) Harmaja (2003)

CJ: in the forests with clearings, in the shrubbery and in the meadows, in circles, at Cluj-Napoca, at Făget; 13 X 1960; VIII–XI; **Gs**;   ; HMș 730 *Clitocybe geotropica* (Bull.) Quél.; 4 ex.

Laccaria amethystina Cooke (1884) **Gs**;  ;

BN: on the soil of the deciduous and coniferous forests, at Vinului Valley from Rodnei Mountains; 19 IX 1963; V–XI; **Gs**;  ; HMș 718 under *L. amethystina* (Bolt. ex Hoker) Murr.; 4 ex.

Laccaria laccata (Scop.) Cooke (1884)

CJ: on the sandy soils, at Făgetul Clujului; 28 VIII 1959; V–XI; **Gs**; ; HMș 720 under *L. laccata* (Scop. ex Fr.) Berk. et Br.; 6 ex.




Laccaria tortilis (Bolton) Cooke (1884)

CJ: on the wet soil, without letter box, at Făget-Cluj; 12 VIII 1960; VI–IX; **Gs**; HMș 719 under *L. tortilis* (Bolt. ex S. F. Gray) Cke.; 6 ex.




Lepista flaccida (Sowerby) Pat. (1887)

BN: on the soil, in the deciduous and coniferous forests, at Vinului Valley, in Rodnei Mountains, under Ineuș Peak; 18 IX 1963; VIII–X; **Gs**; HMș 722 under *Clitocybe inversa* (Scop. ex Fr.) Quél.; 6 ex.



Lepista nuda (Bull.) Cooke (1871)

BN: on the soil of the coniferous and deciduous forests, at Vinului Valley, in Rodnei Mountains, under Corongiș Peak; 28 VIII 1964; IX–XI; **Gs**;   ; HMș 791 sub *L. nuda* (Bull. ex Fr.) Cook.; 2 ex.

Lepista personata (Fr.) Cooke (1871)

CJ: in the meadows, shrubbery or in the deciduous forests, at Hoia from Cluj-Napoca; 25 XI 1964; X–XI; **Gs**;   ; HMș 790 under *L. personata* (Fr. ex Fr.) Cook.; 4 ex.

Lepista sordida (Schumach.) Singer (1951)

CJ: in species united through the stipe of fungi, at the edge of the forest, at Făget, nearby Cluj-Napoca; 30 X 1960; VII–IX; **Gs**;  ; HMș 792 under *L. sordida* (Fr.) Sing.; 2 ex.

Leucopaxillus amarus (Alb. & Schwein.) Kühner (1828)

CS: on the soil of the coniferous forests, in Semenicului Mountains, at Trei Ape; 3 IX 1960; VIII–X; **Gs**; HMș 789 under *L. amarus* (Alb. et Schw. ex Fr.) Kühn.; 2 ex.



Leucopaxillus lepistoides (Maire) Singer (1939)

CJ: in grassy places, in the gardens and orchards, at Cluj-Napoca; 14 V 1956; HMș 788 under *L. lepistoides* (Mre.) Sing.; 1 ex.


Melanoleuca brevipes (Bull.) Pat. (1900)

CJ: in the parks, gardens and shrubbery, at Cluj-Napoca; 12 VIII 1964; IV–XI; **Gs**; ; HMș 786 under *M. brevipes* (Bull. ex Fr.) Pat.; 1 ex.

Melanoleuca evenosa (Sacc.) Konrad (1927)

CJ: in the meadows, in Gilăului Mountains, at Băișoara; 1 VIII 1962; IV–VIII; **Gs**;  ; HMș 784 under *Melanoleuca evenosa* (Sacc.) Konr.; 1 ex.

Melanoleuca grammopodia (Bull.) Murrill (1914)

CJ: in the shrubbery, at the edge of the forest, on Craiului Hill, at Cluj-Napoca; 16 VI 1959; IV–VIII; **Gs**; ; HMș 785 under *M. grammopodia* (Bull. ex Fr.) Pat.; 2 ex.

Melanoleuca melaleuca (Pers.) Murrill (1911)

CJ: in grassy places, at the edge of the forests, on Plecica Valley, nearby Cluj-Napoca; 11 VIII 1962; IV–X;

Gs; ; HMş 787 sub *M. melaleuca* (Pers. ex Fr.) Mre.; 2 ex.


Myxomphalia maura (Fr.) Hora (1960)

BN: on extinguished fireplaces, in association with *Funaria hygrometrica*, at Vinului Valley, in Rodnei Mountains; 2 XI 1964; IX–X; **Gs**; HMş 717 under *Fayodia maura* (Fr.) Sing.; 5 ex.

Omphalina pyxidata (Bull.) Quél. (1886)

CJ: through grassy and ruderal places, with moss and sandy soil, in Babeş Park from Cluj-Napoca; 15 X 1967; IX–XI; **Gs**; HMş 713 under *O. pyxidata* (Bull. ex Fr.) Quél.; 4 ex.

Pseudoclitocybe cyathiformis (Bull.) Singer (1956)

BN: on the soil and on the decaying tree, in the meadows with moss and in the coniferous and deciduous forests, at Vinului Valley from Rodnei Mountains; 28 IX 1962; X–XI; **Gs-EPx**; ; HMş 734 under *P. cyathiformis* (Bull. ex Fr.) Sing.; 4 ex.

Tricholoma acerbum (Bull.) Vent. (1872)

CJ: on the soil of the deciduous forests, at Făget, aproape de Cluj-Napoca; 24 VIII 1968; VIII–X; **Gm**; HMş 770 under *T. Acerbum* (Bull. ex Fr.) Quél.; 2 ex.

Tricholoma album (Schaeff.) P. Kumm. (1871)

CJ: on the soil of grassy places, especially under *Betula*, on Plecica Valley, at Cluj-Napoca; 27 XI 1960; VIII–X; **Gm**; HMş 780 under *T. Album* (Schff. ex Fr.) Quél.; 4 ex.

Tricholoma lascivum (Fr.) Gillet (1874)

CJ: on the soil, in the deciduous forests, on Hoia Hill from Cluj-Napoca; 22 XI 1960; IX–X; **Gm**; HMş 781 under *T. lascivum* (Fr.) Gill.; 6 ex.

Tricholoma populinum J.E. Lange (1933)

CJ: on the soil, under *Populus*, in Babeş Park from Cluj-Napoca; 1 XI 1967; X–XI; **Gm**; ; HMş 771 under *T. populinum* Lge., 2 ex.


Tricholoma resplendens (Fr.) P. Karst. (1876)

CJ: on the soil, in the deciduous forests, among decaying leafs, in Hoia Forest, at Cluj-Napoca; 6 X 1957; IX–XI; **Gm**; HMş 777 under *T. resplendens* (Fr.) Quél.; 2 ex.

Tricholoma saponaceum (Fr.) P. Kumm. (1871)

CJ: on the soil of the deciduous and coniferous forests, at Băişoara from Gilăului Mountains; 30 VIII 1959; IX–XI; **Gm**; HMş 782 under *T. saponaceum* (Fr.) Kumm.; 10 ex.

Tricholoma scalpturatum (Fr.) Quél. (1872)

CJ: on the soil of the deciduous forests, in the oak and hornbeam forests, in grassy places, in Hoia Forest, at Cluj-Napoca; 12 IX 1958; VII–XI; **Gm**; ; HMş 775; 2 ex.


Tricholoma sejunctum (Sowerby) Quél. (1872)

BN: on the soil of the deciduous and coniferous forests, in Rodnei Mountains, at Vinului Valley, under Corongiș Peak; 28 IX 1969; IX–X; **Gm**; HMş 778 under *T. sejunctum* (Sow. ex Fr.) Quél.; 4 ex.

Tricholoma sulphureum (Bull.) P. Kumm. (1871)

BN: on the soil of the deciduous and coniferous forests, in Rodnei Mountains, at Vinului Valley; 19 IX 1963; VII–X; **Gm**; HMş 779 sub *T. sulphureum* (Bull. ex Fr.) Kumm.; 4 ex.

Tricholoma terreum (Schaeff.) P. Kumm. (1871)

BN: on the soil of the deciduous and coniferous forests, among moss, in Rodnei Mountains, at Vinului Valley; 1 XI 1964; VIII–XI; **Gm**; ; HMş 776 under *T. terreum* (Schff. ex Fr.) Kumm.; 5 ex.

Tricholoma ustale (Fr.) P. Kumm. (1871)

CJ: on the soil of the deciduous forests, at Făget, nearby Cluj-Napoca; 22 VIII 1968; VIII–XI; **Gm**; HMş 772 under *T. ustale* (Fr. ex Fr.) Kumm.; 2 ex.

Tricholoma vaccinum (Schaeff.) P. Kumm. (1871)

CJ: on the soil of the coniferous forests, on Mount Vlădeasa, at Răcadului Valley; 20 X 1962; VII–X; **Gm**; HMș 773 under *T. vaccinum* (Pers. ex Fr.) Kumm.; 4 ex.

Tricholoma virgatum (Fr.) P. Kumm. (1871)

CJ: on the soil of the coniferous forests, in Gilăului Mountains, under Buscat Peak, at Băișoara; 30 VIII 1959; IX–X; **Gm**; +; HMș 774 under *T. virgatum* (Fr.) Kumm.; 5 ex.

Tricholomopsis rutilans (Schaeff.) Singer (1939)

CJ: 30 VIII 1959; VII–XI; **EPx**; HMș 783 under *T. rutilans* (Schff. ex Fr.) Sing.; 4 ex.

Typhulaceae Family

Macrotyphula juncea (Alb. & Schwein.) Berthier (1974)

CJ: on the decaying leaf, in the deciduous forests, on Hoia Hill, at Cluj-Napoca; 17 X 1957; X–XI; **Gs**; HMș 506 under *Clavariadelphus junceus* (A. et S. ex Fr.) Corner; 2 ex.

Typhula phacorrhiza (Reichardt) Fr. (1818)

CJ: on the limestone soils, among fallen and decaying leaf, in Rodnei Mountains, under Corongiș Peak; 5 X 1962; IX–XI; **Gs**; HMș 504 under *T. phacorrhiza* Fr.; 2 ex.

Not assigned

Plicaturopsis crispa (Pers.) D.A. Reid (1964)

BN: in the decaying beech tree, among moss, in the beech and spruce fir forests, in Rodnei Mountains, at Vinului Valley; 1 XI 1964; IX–XII; **EPx**; HMș 552 under *P. crispa* (Pers. ex Fr.) Reid; 5 ex.

Conclusions

The collection has an important value, first of all, because it emphasizes a part of the patrimony of our museum, secondly, due to the fact that it completes the knowledge concerning the ecology and chorology of some macromycetes from Romania and finally, because of the antiquity of some species (for more than half a century) and the collector's notoriousness.

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Abbreviations

ex. – number of specimens
HMş – the Herbarium of the Natural Science Museum from Târgu-Mureș
E – mycetoendocormophyta
Em – mycetoendomycophyta
EPx – mycetoepixilophyta
Epbr – mycetoepibryophyta
Ex – mycetoendoxilophyta
Gm – mycetogeophyta mycorrhiza
Gp – mycetogeophyta parasitica
Gs – mycetogeophyta saprophytica

Conventional signs

☉ = species edible at a minimum value
☉☉☉ = species edible at a high food value
☉☉☉☉☉ = species edible at a very high food value
+ = species toxic (causes gastric and intestinal poisoning)
+++ = species very toxic (causes deadly intoxications)
Without mark = species cannot be eaten

MACROMICETE DIN ORDINUL AGARICALES ÎN COLECȚIA „GHEORGHE SĂLĂGEANU” A MUZEULUI DE ȘTIINȚELE NATURII DIN TÂRGU-MUREȘ (II) (Rezumat)

Lucrarea de față prezintă o parte din colecția de macromicete „Gheorghe Sălăgeanu”, din herbarul Muzeului de Științele Naturii din Târgu-Mureș, adică 133 de taxoni de macromicete, aparținând la 12 familii din ordinul Agaricales: Clavariaceae, Fistulinaceae, Lyophyllaceae, Marasmiaceae, Mycenaceae, Physalacriaceae, Pleurotaceae, Pluteaceae, Schizophyllaceae, Tricholomataceae, Typhulaceae, Incertae sedis.

Pentru fiecare specie, s-a indicat denumirea științifică, locul colectării, data colectării, fenofaza, forma biologică, gradul de comestibilitate sau de toxicitate (prin semne convenționale), numărul sub care se regăsește în registrul de inventar „Plante inferioare” al Muzeului de Științele Naturii din Târgu-Mureș și numărul de exemplare.

Colecția este valoroasă, pe de o parte, datorită faptului că pune în valoare o parte din patrimoniul muzeului mureșean, pe de altă parte, datorită faptului că ea completează cunoștințele asupra ecologiei și corologiei unor specii de macromicete din România și nu în ultimul rând, datorită vechimii unora dintre piesele sale (peste 50 de ani), precum și a renumelui colecționarului.

ZOOLOGY

SOME SOIL INVERTEBRATES (COLLEMBOLA, INSECTA) OF THE REPUBLIC OF MOLDOVA AS ELEMENTS OF ECOSYSTEMS BIODIVERSITY

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Abstract. This paper includes the analysis of species diversity of some soil invertebrates: Collembola, Coleoptera and Aphidoidea from Moldova. At the present time in the country a total of invertebrate species: 223 Collembola, 2400 beetles and 39 soil inhabiting aphids are revealed. All Collembola and some beetles species are pedobionts and very important for the processes of organic matter decomposition and maintenance of soil fertility. Between studied insects 8 species of aphids and several genera of beetles are harmful – phytophagous. The role of invertebrates in ecosystems is varied, but all of them are important for the biodiversity and are the links of food chains.

Keywords: biodiversity, Collembola, Coleoptera, Homoptera, invertebrates, importance, Republic of Moldova.

Introduction

The future of humanity depends on our ability to skillfully combine scientific knowledge and modern technology with the “wisdom of the wild nature”. We must cooperate with it and learn from it, and not to conquer, the nature, to preserve its resources.

This is particularly important for the forest, where the biodiversity is high, and biocenotic regulation is significant. However, in textbooks and monographs on forest entomology and forest protection the mass tree pests and their entomophagous are generally considered. Fauna of insects and other invertebrates, including those living on shrubs and herbaceous plants (terrestrial and soil), is not taken into account. But it is an important component of biocenotic regulation and therefore – stabilization. The ecologization of agriculture and forestry is needed [25]. The soil is the habitat of a wide variety of invertebrates, which have an important role – not only as pests but also in soil formation. They take part in the transformation of organic matter, in its humification and mineralization, in biological cycle of substances, in formation of the soil profile, in the creation of structure and porosity of the soil [11]. In nature, there are no “necessary” and “unnecessary” organisms, each of the group occupy its ecological niche and are important component of the food chains.

After all, any natural habitat, including forests, will function properly only if all trophic levels, from primary producers to decomposers, perform their separate but related roles. Forest

should be the territory where natural biodiversity, therefore the stability, are preserving and developing. Currently in Moldova the forests consist of 800 plots, ranging in size from 5 to 1500 ha [8] and together with the network of shelter belts [10], they contribute to the biological enrichment of the cultural landscape and its multi-functionality.

At the present time, unfortunately, the agrobiocenoses, and, to a lesser extent, the forests are increasingly losing the capacity for self-regulation. We have to mention that during a year in the forest huge quantities of leaf litter is forming, which annually is processed by various soil invertebrates. Between them Collembola are the second important group after mites.

Before this research in Moldova, the study were carried out only on such invertebrate groups as pest – beetles (Karpov and Neculiseanu) and nematodes (Nesterov), as well as earthworms (Cherevatov) in biocenotic oases and crops [10].

Material and methods

The studies of invertebrates (Collembola, Coleoptera, Homoptera) inhabiting the soil of Moldova permanently or temporarily, were carried out over many years, in all the natural areas. The collection of faunistic material was performed by classical methods: Collembola with metal frames 5×5 and 10×10 cm², the beetles using Barber traps and aphids by hand. The species of small invertebrates were identified by microscopic preparations, using the modified method of their preparation. The coleopterans were determined by morphological characteristics with binoculars.

The main identifying keys specific to each of the studied groups were used, as well as some recent work on the taxonomy, for the diagnosis of aphids the keys and also original polytomik tables were used.

Results and discussions

Springtails (Collembola) – are primarily wingless arthropods that live in all types of soil. Despite their small size (0.5–9 mm, depending on the species), they are important components of natural ecosystems, take an active part in the cycle of matter and the decomposition of plant remains. All species of springtails are saprophagous, living in soil and feed on algae, bacteria, protozoa, nematodes, decomposing plant residues etc. In Moldova are known 223 species [6].

The Collembola are classified according to morphological difference in groups depending on their vertical distribution in soil horizons and ecology [19]:

1. Atmobionts – group of species, including the largest representatives of the class, they are brightly colored, with well-developed eyes, 8 on each side of the head, that can rise on herbaceous plants, shrubs and trees – up to 2 meters high and more. They are often found in berries and inflorescence of trees and shrubs, are actively moving through jumps (species from the genus *Entomobrya*, having the size of 1 mm, has the ability to jump to a height of 16 cm) and move for a distance up to 300 meters per day [20]. This group includes species of the genera *Orchesella*, *Entomobrya*, *Willowsia*, *Sminthurus*, *Bourletiella* etc.
2. Hiperedaphic species can be found in the upper layers of the litter, they inhabit in abundance on decaying algae on the rivers banks and other water basins, on accumulations of organic matter or compost. This group includes mid-sized species, the antennae, legs and fork are well developed, and they also have eyes and pigment. Among hiperedaphics must be mentioned the species from genera *Hypogastruridae*, *Pseudachorutes*, *Brachystomella*, *Isotoma*, *Desoria*, *Sminthurinus* etc.

3. Hemiedaphic species inhabit lower-litter and litter-soil layers. The color of these species is much less bright, the number of eyes varies from 7+7 to 1+1, furcula, legs and antennae are short, adapted to the movement among litter and other plant remains. This group includes species of the genera *Neanura*, *Deutonura*, *Endonura*, *Lathriopyga*, *Anurida*, *Micranurida*, *Folsomia*, *Folsomides*, *Arrhopalites* etc.
4. Euedaphics or deep-soil species – the most small, colorless and blind species which are most often elongated (families Tullbergiidae and Onychiuridae) or spherical (family Neelidae) body shape, and are among the most important in soil formation, because they participate in humus formation.
5. Highly specialized forms including myrmecophilous species occurring with social insects ants and termites (family Cyphoderidae), and troglomorph species, or inhabitants of caves, belonging to the genera *Pseudosinella*, *Oncopodura*, *Arropalites* etc.

In addition to their primary function – processing of litter and other organic residues, Collembolans are important link in other food chains. They serve as food for a large number of invertebrates, including – beetles, centipedes, spiders, mites, pseudoscorpions, ants, birds, fish etc. For some of them Collembolans are a common source of nutrients in their daily diet, for others only a temporary source of energy or substitute in the absence of main trophic groups.

Beetles (Coleoptera) are one of the most important components of forest and agricultural ecosystems, including those living in the soil, litter and herbaceous plants in the woods, with a particular preference for certain biotic and abiotic factors.

According their trophic preference the soil-beetles (in imago stage) are divided into the following groups: saprophagous (xylophagous, detritophagous, necrophagous – feeding on carrion, coprophagous) mycetophagous, phytophagous and zoophagous [11].

Saprophagous species. This type of feeding is particular for soil-beetle larvae, but also occurs in adults.

1. Xylophagous are the beetles feeding on dead decaying wood. Among them are the species of the genera *Dorcus*, *Lucanus*, *Platycerus*, *Cerambyx*, *Carabus*, *Elatér* etc.
2. Detritophagous are the species feeding on decomposing organic remains and having an important role in humus formation. Larvae of species from subfamily Cetoninae are detritophagous and the adults are antrophagous or herbivores. Some species of the family Staphylinidae are detritophagous, including: *Tachyporus hypnorum* (Fab.), *T. nitidulus* (Fab.), *T. solutus* Erich., *Tachinus corticinus* Grav., *Anthobium atrocephalum* (Gyll.), *Ontholestes haroldi* (Eppe.), *Anotylus rugifrons* (Hoch.), *A. sculpturatus* (Grav.), *Drusila canaliculata* (Fab.), *Oxypoda opaca* (Grav.), *Omalium caesum* Grav., *Ocalea badia* Erich., *Parocyusa rubicunda* Erich., *Philonthus carbonarius* (Grav.), *Othius punctulatus* (Goeze.), *Quedius ochropterus* Erich., *Q. nitipennis* (Steph.), *Heterothops niger* Kraatz, *Carpelimus corticinus* (Grav.), *C. exiguus* (Erich.), *Stenus boops* Ljungh, *Sepedophilus testaceus* (Fab.) etc.
3. Necrophagous are beetles that feed on dead animals, and they are a necessary element in the biological cycle of substances. These are the species of genera *Nicrophorus*, *Silpha*, *Trox*, some staphylinid beetles and others.
4. Coprophagous are beetles that feed on animal excrements. Subfamily Scarabaeinae includes coprophagous species, also coprophagous are some species of family Staphylinidae – *Philonthus corruscus* (Grav.), *Anotylus rugifrons*, *A. sculpturatus*, *Aleochara bipustulata* (L.), *A. curtula* (Goeze), *A. lata* Grav., *Ontholestes tessellatus* (Geoff.), *Philonthus tenuicornis* (Mulsant & Rey), *P. succicola* Th., gen. *Sphaeridium* of fam. Hydrophilidae etc.

5. Phytophagous are species adapted to feed on living tissues of higher plants, the majority of phytophagous are associated with flowering plants [11]. The species of families Curculionidae, Chrysomelidae, Tenebrionidae, Elateridae, genera *Amara*, *Ophonus* and *Harpalus* of family Carabidae etc. are also phytophagous.
6. Zoophagous are carnivorous organisms that feed on other animals or on their own species. These are representatives of fam. Carabidae, Coccinellidae, and some species of the family Staphylinidae, larvae of some species of fam. Elateridae etc.
7. Mycetophagous are species feeding on mushrooms and include some representatives of fam. Staphylinidae (*Anthobium fuscum* (Erich.), *Mycetoporus nigricollis* Steph., *Lordithon trinotatus* (Erich.), *L. lunulatus* (L.), Micetophagidae, Tenebrionidae etc.

The beetles feed in accordance with the environment, and in some species a part of the life cycle occurs in the soil. Among them the phytophagous species damaging the crops were studied more intense, including the soil fauna. Their positive role was less considered, particularly in limiting the number of pests and maintaining the relative balance in natural ecosystems.

In the Republic of Moldova the representatives of soil beetles from fam. Carabidae, Scarabaeidae, Silphidae, Staphylinidae, Meloidae, Tenebrionidae and Elateridae were studied more profound [18].

Among fam. Carabidae are known 510 species [17], Scarabidae – 122 [7], Silphidae – 21 [2]. Within fam. Staphylinidae are known about 300 species [1, 3, 4, 9, 13, 15, 16], in fam. Meloidae – 26 [5], Tenebrionidae – 34 species [1].

In some special studies there are also reported the soil-beetles species from other groups [21, 13, 14, 18 etc.]. At present, in the fauna of the Republic of Moldova there are about 2400 species of beetles, of which only a several species (some representatives of fam. Cerambycidae and Ipidae) depend only on decaying wood or agricultural products (Tenebrionidae and Curculionidae).

In general, the role of soil-beetles is huge; they are involved in different processes: loosening and aerating of the soil, the decomposition of detritus, manure and dead organisms in food chains. However, the most important thing is that they reduce the number of many pests, thus maintaining the balance of ecosystems without contamination.

Aphids (Aphidoidea) are known to quickly respond to unbalanced transformation of ecosystems and climate, particularly by changing their spreading ranges. For example, such representative is the Mediterranean region species *Pterochloroides persicae* Cholodk., recently was recorded in Moldova too. For aphids the ecological polymorphism is also particular. In total in Moldova are registered about 350 species of aphids, and in the world around 4700.

We have to mention that the disturbance occurring in agricultural landscapes, cause changes not only in the spreading range, but also in the population structure of aphids, and this process is rather quick, due to their parthenogenesis. Thus, there is a simplification of the life cycle of holocyclic aphid populations, as result of loss of sexual generation and transition anholocyclic lifestyle. This leads to acceleration of variability, to selection of aggressive clones of aphids and this fact is reflected in the dynamics of their number, process which also occurs in Moldova [27].

Aphids are one of the components of soil inhabiting invertebrates, and in general, their role in the ecosystem is multifunctional. Although they are known as pests [27, 25, 12 etc.], in the deciduous forests of Moldova, however, all species of aphids are links of food chains, which contribute to biocenotic regulation of entomofauna, especially due to the emission of “honeydew” [22]. Many aphid species inhabit only on spontaneous plants, and only few on cultural

ones. Some of the “agrarian” aphids still belong to major pests [27, 12, 23 etc.], in Moldova they constitute about 9% of aphid fauna.

As for the soil inhabiting aphids in Moldova the following species were identified:

Fam. Phylloxeridae – *Viteus vitifoliae* (Fitch); Fam. Pemphigidae – *Eriosoma lanigerum* (Hausm.), *E. lanuginosum* (Hart.), *Forda marginata* Koch, *Paracletus cimiciformis* Heyd., *Patchiella reaumuri* (Kalt.), *Pemphigus borealis* Tullgr., *P. bursarius* L., *P. fuscicornis* (Koch), *P. phenax* Börn et Blunck., *Smynthuroides betae* Westw., *Tetraneura ulmi* (L.); Fam. Lachnidae – *Maculolachnus submacula* (Walk.), *Protrama flavescens* (Koch), *P. radialis* (Kalt.), *Trama rara* Mordv., *T. troglodytes* Heyd.; Fam. Aphididae – *Anuraphis farfarae* (Koch), *A. subterranea* (Walk.), *Aphis frangulae beccabungae* Koch, *A. gossypii* Glov., *A. lambersi* (Börn.), *A. sambuci* L., *A. seseli* Bozh., *Brachycaudus ballotae* (Pass.), *B. lamii* (Koch), *B. lychnidis* (L.), *B. mordvilkoii* H. R. L., *B. persicae* (Pass.), *B. rinariatus* Andr., *B. virgatus* Shap., *Dysaphis brancoi* (Börn.), *D. crataegi* (Kalt.) s.l., *D. lappae* (Koch), *D. ranunculi* (Kalt.), *Protaphis anuraphoides* Nevs., *P. elongata* Nevs., *Toxopterina vanderghooti* (Börn.), *Zinia veronicae* Shap. In addition to the above mentioned species of aphids, in Moldova were recorded, but so far only on the main host plants, some species which weren't found here in the soil (the intermediate host).

Soil inhabiting (root) aphids from Moldova mostly belong to the following groups [21]:

1. Dioecious aphids species in the period of their population inhabiting on intermediate plants – hosts. These are, for example, the species *Eriosoma lanuginosum*, *Dysaphis brancoi* and *Tetraneura ulmi*.
2. Constantly inhabiting the soil anholocyclic species, which completely lost their main host plants (aphids of gen. *Protrama* Bak., *Trama* Heyd.), or, just over a significant part of their range, including Moldova (*Forda marginata*, *Paracletus cimiciformis*).
3. Holocyclic species, which colonies are constantly living on roots and (or) the basal parts of plants (*Brachycaudus ballotae*, *B. rinariatus*, *Protaphis elongata*).
4. Anholocyclic or holocyclic species, large colonies of which develop on the upper parts of the plant only in the period of abundant vegetation of these parts (*Brachycaudus persicae*, *B. virgatus*).

In Moldova certain aphid species inhabiting the soil were registered as crop pests, namely – *Viteus vitifoliae* – pest of grapes, *Eriosoma lanigerum* – pest of Apple trees, *Pemphigus fuscicornis* – pest of beet [12], *Tetraneura ulmi* – pest of corn, *Dysaphis crataegi* – pest of carrots.

In the following ant species were found connections with root aphids in Moldova: *Formica cinerea* Mayr., *F. gagates* Latr., *F. pratensis* Retz., *Lasius affinis* Schenck., *L. alienus* Först., *L. brunneus* Latr., *L. emarginatus* Oliv., *L. flavus* F., *L. niger* L., *Myrmecina graminicola* Latr. and *Tetramorium caespitum* L. (out of 31 species of all registered in Moldova aphidophilous ants).

Ants are known to protect many plants against phytophagous insects, but they also “take care” of aphids feeding on plants, even transfer them from one root to another. The trophobiosis with ants allow to some aphid species to live in the soil on the roots of plants, where they can find favorable and stable living conditions [24]. The aphid “honeydew” is used in carbohydrate diet of many ant species. It was emphasized that “honeydew” stimulate soil microflora and accelerates the course of soil formation processes, involving various microorganisms

Conclusion

Only a small part of the invertebrates inhabiting the soil in the Republic of Moldova has been studied. A huge number of groups, including soil inhabiting mites, spiders, pseudoscorpions, myriapods, terrestrial crabs and others remain unexplored.

The invertebrates, including springtails, beetles and aphids are components of soil fauna. Collembola are primarily wingless arthropods, they inhabit all types of soils, both natural and anthropogenic modified. A total of 223 springtails species are known in Moldova and all of them inhabit the soil. Their importance in the processes of organic matter decomposition and maintenance of soil fertility is huge. In Moldova fauna are recorded about 2400 species of beetles. The role of soil inhabiting beetles is huge and versatile, particularly in reducing the number of pests. In Moldova 39 soil inhabiting aphid species were identified. Their value in ecosystems is also varied, among them 5 species of harmful aphids in varying degrees. The rest of the species are only links of food chains, elements of biodiversity, including their trophobiosis with ants, in Moldova – with 11 of ant species.

For biodiversity optimization in general, it is important the knowledge of its individual components and their role in ecosystems, as shown on the example of soil inhabiting Collembola and Insecta (Coleoptera, Aphidoidea) from Moldova.

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**UNELE NEVERTEBRATE EDAFICE (COLLEMBOLA, INSECTA) DIN REPUBLICA MOLDOVA,
CA PARTE COMPONENTĂ A BIODIVERSITĂȚII ECOSISTEMELOR
(Rezumat)**

Lucrarea include analiza diversității speciilor de nevertebrate Collembola, Coleoptera și Aphidoidea din Republica Moldova. În urma cercetărilor efectuate și analizei datelor din literatură au fost evidențiate 223 specii de colebole, 2400 specii de coleoptere și 39 specii de afide. Colebolele și unele specii de coleoptere sunt pedobionte și participă activ în procesul de descompunere a materiei organice și menținerea fertilității solului. Între insectele studiate, afidele și unele genuri de coleoptere sunt dăunători-fitofagi. Rolul nevertebratelor în ecosisteme este variat, dar toate grupele sunt importante pentru biodiversitate fiind parte componentă a lanțurilor trofice.

CONTRIBUTION TO THE KNOWLEDGE OF COPROPHAGOUS BEETLES (COLEOPTERA, SCARABAEINAE) FROM MEADOWS AND PASTURES IN THE REPUBLIC OF MOLDOVA

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Abstract: An updated study of the *Scarabaeinae* beetle fauna of meadows and pastures from the Republic of Moldova, their biodiversity, ecological peculiarities and distributions was provided. Altogether, 21 species of coprophagous beetles from *Scarabaeinae* subfamily have been revealed for meadow and pasture ecosystems in the Republic of Moldova. The largest genus proved to be *Onthophagus*, which includes 18 species, and by one single species for each genus *Caccobius* and *Pallipes*. The most abundant species in meadows and pastures were *Onthophagus ruficapillus*, followed by *O. vacca* and *O. taurus*. The lowest number of individuals was recorded for species *O. furciceps*, *O. furcatus*, *O. lemur*, *O. illyricus*, *O. nuchicornis*, *O. ponticus*, and *O. semicornis*. Also, as a result of our research conducted in meadows and pastures of the Republic of Moldova the presence of 21 *Scarabaeinae* beetle species on the investigated territory has been reconfirmed.

Keywords: *Scarabaeinae*, coprophagous beetles

Introduction

Coprophagous beetles are a highly specialized trophic group adapted to consumption of herbivore dung [12]. They play an important role in nutrient cycling in pastures and meadows; promote soil aeration and fertilization, thus maintaining the ecological balance of ecosystem [10; 3; 2]. Meadows and pastures cover 14,5 % of the agricultural area in the Republic of Moldova. Meadows and pastures are important also as the main components of the characteristic mosaic landscape over large parts of the republic. A large part of these meadows and pastures were used intensively during last time and also reversion for some period of pastures and meadows in arable fields was quite common. Despite their obvious importance, meadows and pastures, in the Republic of Moldova are still poorly studied ecosystems in terms of their biodiversity. From this point of view *Scarabaeinae* beetles in grasslands and pastures have been poorly studied. Information concerning studies on coprophagous *Scarabaeinae* beetles in these areas is fragmentary. Thus, some information concerning identified beetles on the researched region have been recorded by Miller and Zubowski, 1917 [15], Medvedev and Sapiro, 1957 [22] later by Cilipic, 1998, [6] but not all ecological data are available for cited species, and specimens are not deposited in the entomological collections of the republic.

The aim of the present study was to provide an updated data of the *Scarabaeinae* beetle fauna of meadows and pastures from the Republic of Moldova, their biodiversity, ecological peculiarities and distributions.

Material and methods

The main material was collected from following sites: Bacioi (46° 54' 44" North, 28° 53' 2" East), Braila (46° 54' 56" North, 28° 50' 33" East), Cociulia (46° 21' 28" North, 28° 24' 53" East), Colonita (47° 2' 16" North, 28° 57' 30" East), Durlesti (47° 1' 4" North, 28° 45' 45" East), Gratiesti (47° 5' 57" North, 28° 49' 0" East), Hancesti (46° 49' 33" North, 28° 35' 37" East), Leuntea (46° 39' 46" North, 29° 35' 16" East), Salcuta (46° 35' 42" North, 29° 14' 40" East), Tigheci (46° 23' 10" North, 28° 22' 35" East), Tomai (46° 34' 24" North, 28° 19' 29" East), Troita Noua (46° 47' 25" North, 29° 15' 54" East), in central and southern part of the Republic of Moldova between 2004 and 2011 years. Insects were collected using pitfall traps and direct survey of animal dung during each year seasonal activity. The contents of the traps were collected every 10 days at each site. For each species collected, the collection sites, number of specimens and collection dates (day.month.year) are given (Table 1). The identification of species was based on morphological characters, and employed the following keys: Panin, 1955 [16]; Crijanovschii, 1965 [21]; Kabakov, 2006 [20]. All specimens are deposited in the collection of the Entomological Museum, Institute of Zoology of the Academy of Science of Moldova.

Results and discussions

In total 21 species of coprophagous beetles from *Scarabaeinae* subfamily have been revealed for meadow and pasture ecosystems in the Republic of Moldova (Table 1). The largest genus proved to be *Onthophagus*, which includes 18 species, and by one single species for each genus *Caccobius*, *Copris* and *Pallipes*. Over the entire sampling period a total of 431 specimens of adult *Scarabaeinae* dung beetles were collected. The most abundant species were *Onthophagus ruficapillus* with 96 samples, followed by *O. vacca* with 77 collected samples and *O. taurus* with 43 exemplars. The lowest number of individuals was recorded for species *O. furciceps* and *O. furcatus* by one species, *O. lemur* with 2 exemplars and *O. illyricus*, *O. nuchicornis*, *O. ponticus*, *O. semicornis* by 3 exemplars for each species.

Therefore, historically up to date, 29 species from *Scarabaeinae* subfamily were documented in the Republic of Moldova. As a result of our research conducted in meadows and pastures of the Republic of Moldova the presence of only 21 species on the investigated territory has been reconfirmed. Among them, species *O. ponticus* and *O. nuchicornis* were not found by the Cilipic (1998), and *Oniticellus palipes*, were not recorded in our survey, being a rare species. Concerning following species *Sacarbaeus sacer*, *Gymnopleurus geoffroyi*, *G. mopsus*, *Sisyphus schaefferi*, *Onthophagus gibbulus*, *O. lucidus*, *Chironitis hungaricus* and *Onitis damoetas*, were not found on the territory of the Republic of Moldova by Cilipic (1998), and neither in our research. This can be explained by the fact that those species have restricted their area of distribution, or were collected in southern part of Moldova, territories that actually are part of neighboring country Ukraine, or were incorrectly identified. Species *Sacarbaeus sacer*, is distributed in southern parts of the Ukrainian steppe zone, the steppes of Crimea, Western Caucasus, in the western part of Georgia, Spain, South France, Yugoslavia, Albania, Bulgaria, Greece, Turkey, North Africa, Arabian Peninsula, Corsica, Sardinia, Sicily and Cyprus, this species could not be found in the Republic of Moldova, it was probably confounded with *Scarabaeus affinis* Brulle, 1832, a common species, recorded on the territory of neighboring country Romania [5]. Referring to other 8 species, it might exist on the territory of the Republic of Moldova, but were not confirmed for last 50 years.

Table 1: Scarabaeinae (Coleoptera: Scarabaeidae) species list associated with meadow and pasture ecosystems in the Republic of Moldova

Species	Collection Locality	Date	Number	Reference
<i>Onthophagus</i> Genus				
<i>O. (Euonthophagus</i> Balthasar) <i>amyntas</i> (Olivier, 1789)	Colonita	13.04.2011	12	Miller, Zubowski 1917;
	Gratiesti	14.04.2011	2	Medvedev, Sapiro 1957;
	Braila	29.04.2011	1	Cilipic 1998
<i>O. (Palaeonthophagus)</i> <i>coenobita</i> (Herbst, 1783)	Tigheci	16–24.06.2004	2	Miller, Zubowski 1917;
	Cociulia	31.05–10.06.2006*	10	Medvedev, Sapiro 1957;
	Cociulia	16–24.06.2006	2	Cilipic 1998
<i>O. (Palaeonthophagus)</i> <i>fracticornis</i> (Preysler, 1790)	Cociulia	13–23.06.2005	2	Medvedev, Sapiro 1957; Cilipic 1998
	Cociulia	31.05–10.06.2006*	1	
	Leuntea	26.06.2009	2	
	Durlesti	15.04.2011	2	
	Braila	29.04.2011	5	
	Bacioi	13.05.2011	1	
	Hancesti	15.05.2011	1	
<i>O. (Furonthophagus)</i> <i>furcatus</i> (Fabricius, 1781)	Colonita	13.04.2011	1	Miller, Zubowski 1917; Medvedev, Sapiro 1957; Cilipic 1998
<i>O. (Palaeonthophagus)</i> <i>grossepunctatus</i> Reitter, 1905	Durlesti	15.04.2011	20	Cilipic 1998
	Braila	29.04.2011	9	
	Hancesti	15.05.2011	3	
<i>O. illyricus</i> (Scopoli, 1763)	Braila	29.04.2011	2	Cilipic 1998
	Bacioi	13.05.2011	1	
<i>O. (Palaeonthophagus)</i> <i>furciceps</i> Marseul, 1869 = <i>kindermanni</i> Harold, 1877	Troita Noua	15–27.04.2010*	1	Medvedev, Sapiro 1957; Cilipic 1998
<i>O. (Palaeonthophagus)</i> <i>lemur</i> (Fabricius, 1781)	Cociulia	31.05–10.06.2006*	1	Miller, Zubowski 1917;
	Braila	29.04.2011	1	Medvedev, Sapiro 1957; Cilipic 1998
<i>O. (Palaeonthophagus)</i> <i>nuchicornis</i> (Linnaeus, 1758)	Braila	29.04.2011	3	Medvedev, Sapiro 1957
<i>O. (Palaeonthophagus)</i> <i>ovatus</i> (Linnaeus, 1767)	Cociulia	16.05–26.05.2004*	1	Miller, Zubowski 1917; Medvedev, Sapiro 1957; Cilipic 1998
	Cociulia	19–26.07.2004	1	
	Cociulia	31.05–10.06.2006*	6	
	Tomai	28.04.2010	10	
	Bacioi	1.04.2011	1	
	Bacioi	27.04–6.05.2011*	10	
	Colonita	29.04.2011	6	
	Bacioi	06–17.05.2011*	1	
<i>O. ponticus</i> Harold, 1883 = <i>furcicornis</i> Reitter, 1893	Bacioi	18–27.04.2011*	3	Miller, Zubowski 1917; Medvedev, Sapiro 1957;
<i>O. (Palaeonthophagus)</i> <i>ruficapillus</i> Brulle, 1832 = <i>ovatus</i> var <i>ruficapitullus</i> Reitter, 1893	Laguta	19–26.07.2004*	1	Cilipic 1998
	Cociulia	19–26.07.04	1	
	Cociulia	31.05–10.06.2006*	1	
	Tomai	28.04.2010	5	
	Colonita	13.04.2011	28	
	Durlesti	15.04.2011	2	
	Braila	29.04.2011	56	
	Bacioi	17–27.05.2011*	2	

<i>O. (Palaeonthophagus) semicornis</i> (Panzer, 1798)	Colonita	13.04.2011	3	Miller, Zubowski 1917; Medvedev, Sapiro 1957; Cilipic 1998
<i>O. taurus</i> (Schreber, 1759)	Cociulia	19–27.07.2004*	1	Miller, Zubowski 1917; Medvedev, Sapiro 1957; Cilipic 1998
	Gratiesti	14.04.2011	1	
	Braila	29.04.2011	39	
	Bacioi	13.05.2011	1	
	Hancesti	15.05.2011	1	
<i>O. (Palaeonthophagus) vacca</i> (Linnaeus, 1767)	Gradinita	14.05.2009	4	Miller, Zubowski 1917; Medvedev, Sapiro 1957; Cilipic 1998
	Leuntea	26.06.2009	4	
	Colonita	13.04.2011	4	
	Durlesti	15.04.2011	4	
	Braila	29.04.2011	51	
	Bacioi	13.05.2011	10	
<i>O. (Palaeonthophagus) verticicornis</i> Leicharting, 1781	Cociulia	31.05–10.06.2006*	2	Miller, Zubowski 1917; Medvedev, Sapiro 1957; Cilipic 1998
	Cociulia	16–24.06.2006*	1	
	Salcuta	25.05.2009	1	
<i>O. (Palaeonthophagus) vitulus</i> (Fabricius, 1776)	Cociulia	16–24.06.04*	1	Miller, Zubowski 1917; Medvedev, Sapiro 1957; Cilipic
	Cociulia	31.05–10.06.2006*	5	
	Bacioi	18–27.04.2011*	17	
	Bacioi	27.04–6.05.2011*	10	
<i>Caccobius</i> Genus				
<i>C. schreberi</i> (Linnaeus, 1767)	Bacioi	06.05.2011	2	Miller, Zubowski 1917; Medvedev, Sapiro 1957; Cilipic 1998
	Bacioi	13.05.2011	10	
	Gratiesti	16.06.2011	11	
<i>Copris</i> Genus				
<i>C. lunaris</i> (Linnaeus, 1758)	Braila	29.04.2011	5	Miller, Zubowski 1917; Medvedev, Sapiro 1957; Cilipic 1998
	Troita Noua	15–27.04.2010*	2	
<i>Oniticellus</i> Genus				
<i>O. pallipes</i> (Fabricius, 1781)				Miller, Zubowski 1917; Medvedev, Sapiro 1957; Cilipic 1998
<i>O. fulvus</i> (Goeze, 1777)	Tomai	28.04.2010	3	Miller, Zubowski 1917; Medvedev, Sapiro 1957; Cilipic 1998
	Gratiesti	14.04.2011	4	
	Durlesti	15.04.2011	3	
	Braila	29.04.2011	3	
	Bacioi	13.05.2011	2	
	Gradinita	14.05.2009	6	
<i>Chironitis</i> Genus				
<i>C. hungaricus</i> Herbst, 1789				Miller, Zubowski 1917; Medvedev, Sapiro 1957
<i>Onitis</i> Genus				
<i>O. damoetas</i> Steven, 1806				Miller, Zubowski 1917; Medvedev, Sapiro 1957

* Pitfall trap survey

Dung beetles community structure is determined by species' habitat preferences, by food source allocation in pasture, by migration ability of adults and by the size and quality of dung pats [7, 8, 9, 11, 13, 14, 17, 19]. According to the trophic preferences species from *Scarabaeinae* subfamily are mainly coprophagous, consuming dejections of large and small mammals such as: cattle, horses, donkey, sheep, goats, dogs, gophers and other small rodents [4, 16, 20]. Some species can also be found on the cadavers of mammals [1]. Thus, from the list of investigated dung

beetles, 27 species prefers dejections of large mammals, especially in spring time, when they need more food for egg-laying, the females lay their eggs in the balls of dung and bury them in the soil, but later, in fall some of those species can be also found on the feces of small mammals [18]. The following two species, *O. furciceps* and *O. ponticus* are typical for small mammal dejections, and commonly found in burrows of gopher. In our survey, these two species were collected in pitfall traps, namely, traps containing dead and high level decayed cadavers of mice, that have fallen accidentally.

Dung beetles are commonly regarded as a very important element of the entomological fauna of meadow and pasture ecosystems in Republic of Moldova. Nevertheless, the dung beetle fauna is still relatively poorly known, both from systematic and biogeographical points of view. The current literature offers very few general contributions dealing with the biogeographical analysis of the dung beetles in Republic of Moldova. Thereby, first geographical analyses of the *Scarabaeinae* beetles associated with meadow and pasture ecosystems in the Republic of Moldova revealed that most of the species are widely distributed throughout the palearctic region.

Table 2: Ecological and geographical features of *Scarabaeinae* beetles associated with meadow and pasture ecosystems in the Republic of Moldova

Species	Trophic preference	Ecological peculiarities	Geographical Distributions
<i>Scarabaeus sacer</i>	Cattle, horse dung	Populate sandy soils	South Ukraine, Crimea, western Caucasus, western Georgia, Spain, South France, Yugoslavia, Albania, Bulgaria, Greece, Turkey, North Africa, Arabian Peninsula, Corsica, Sardinia, Sicily, Cyprus
<i>Gymnopleurus geoffroyi</i>	Cattle, horse dung	Mesophilic species most commonly found on sandy soils, but also in forest ecosystems	Southern Russia to Voronezh and Samara, southern Urals, Ukraine, Crimea, Caucasus, Southern Europe to middle France, northern Italy, North Africa, Iran, Afghanistan
<i>G. mopsus</i>	Cattle, horse, sheep, small rodents dung, sometimes human feces	Inhabit arid biotopes, steppes and different kind of desserts	North Caucasus, western Ukraine, Georgia, Western Europe to Belgium, southern Germany, southern Poland, Algeria, Tunisia, Morocco, the islands of Sardinia and Sicily
<i>Sisyphus schaefferi</i>	Cattle, horse, sheep dung	Common species, widespread in the xerophytic stations	North Caucasus, western Ukraine, Georgia, Western Europe to Belgium, southern Germany, southern Poland, Algeria, Tunisia, Morocco, the islands of Sardinia and Sicily
<i>Onthophagus amyntas</i>	Cattle, horse dung	Common for all climate complexes of the republic	Europe, Asia Minor, Central Asia, Russia, Ukraine, Azerbaijan, Armenia
<i>O. coenobita</i>	Cattle, horse, sheep, dog, bird dung, human feces, small animals cadavers	Inhabit steppe and forest complex	Central and South Europe, Transcaucasia, Asia Minor, Transcaspia, Turkestan
<i>O. fracticornis</i>	Cattle, horse dung, human feces	Inhabit steppes with high dicotyledonous plants and sandy soils	Europe and Central Asia, Turkey, Spain, Iran

<i>O. furcatus</i>	Cattle, horse, sheep, dog dung, human faces	Common in the forest steppe zone, prefer xerophytic biotopes and sandy soil	South Europe, Asia Minor, Transcaucasia, Syria, Iraq, Arabia, Morocco
<i>O. gibbulus</i>	Cattle, horse dung	Euribiont species, inhabit grassland and sandy soils	Central Europe, Hungary, Balkan Peninsula, Ukraine, Asia Minor, Transcaucasia, Syria, Iraq, Turkestan, Mongolia, Siberia to Ussuri area, China, Korea, Japan
<i>O. grossepunctatus</i>	Cattle, sheep, dog	Common species in deciduous forests	Southwest Europe, Italy, Sicily, Balkan Peninsula, Hungary, Czech Republic, Slovakia
<i>O. illyricus</i>	Cattle, horse, sheep	Prefers limestone and sandy soil	Central and South Europe, Asia Minor, Syria, Iraq, Iran, Afghanistan, Turkestan
<i>O. furciceps</i>	Gopher and other small rodents dung	Inhabit burrows of gopher and other small rodents	Turkey, Bulgaria, Yugoslavia, Macedonia, Hungary, Romania, Ukraine, Libya, Syria, Iraq, Iran
<i>O. lemur</i>	Cattle, horse, sheep, goat dung, human faces	Inhabit steppes and forest-steppe zones	Central and South Europe, Transcaucasia, Asia Minor
<i>O. lucidus</i>	Cattle, horse, sheep dung	Inhabit forest-steppe zones and xerophytic biotopes	South-East Europe, Hungary, Slovakia, Ukraine, Crimea, Asia Minor, Syria, Transcaucasia, Iraq
<i>O. nuchicornis</i>	Cattle, horse, sheep dung	Forest ecosystems, xerophytic biotopes and sandy soils	Europe except extreme north, Asia Minor, Caucasus, Turkestan, Siberia, Mongolia, Introduced to Canada: Alberta, British Columbia, Newfoundland, Nova Scotia, Ontario, Quebec, USA: Connecticut, Idaho, Maine, Maryland, Massachusetts, Michigan
<i>O. ovatus</i>	Cattle, horse, sheep, dung	Copro-necrophagous species, common for all climate complexes, except alpine steppes	Europe except extreme north, Asia Minor, Transcaucasia, Turkestan
<i>O. ponticus</i>	Gopher and other small rodents dung	Inhabit steppe zones	South European Russia, Syria, Libya, Iran, Azerbaijan, Armenia, Turkey, Georgia, Romania, Greece
<i>O. ruficapillus</i>	Cattle, horse, sheep, dog dung	Common for all climate complexes of the republic	Europe, Asia Minor, Syria, Transcaucasia, Hungary, Austria, Slovakia, Israel
<i>O. semicornis</i>	Cattle, horse, sheep, gopher dung	Prefer steppe ecosystems, xerophytic biotopes	Central and South Europe, Transcaucasia, Turkestan, Portugal, Spain, France, Italy, Switzerland, Austria, Germany, Poland, Serbia, Macedonia, Hungary, Czech Republic, Romania, Bulgaria, South Russia, Ukraine, Greece, Turkey
<i>O. taurus</i>	Cattle, horse, sheep, dog dung	Common for all climate complexes of the republic	Europe, Morocco, Algeria, Tunisia, Syria, Iraq, Transcaucasia, Asia Minor, Iran, Afghanistan, Central Asia
<i>O. vacca</i>	Cattle, horse, sheep, dog dung	Common for all climate complexes of the republic	Central and South Europe, Morocco, Azores, Crete, Asia Minor, Syria, Transcaucasia, Iran, Transcaucasia
<i>O. verticornis</i>	Cattle, horse, sheep dung	Common for all climate complexes of the republic	Central and South Europe, Asia Minor, Transcaucasia, Syria, Turkestan

<i>O. vitulus</i>	Cattle, horse, sheep, gopher and other small rodents dung	Common for all climate complexes of the republic	Ukraine, Transcaucasia, Armenia, Balkan Peninsula, Hungary, Austria, Czech Republic, Slovakia, Greece, Kirgizstan, Poland, Bulgaria, Kazakhstan
<i>Caccobius schreberi</i>	Cattle, horse dung	Common for all climate complexes of the republic	Europe except the north, Asia Minor, Iran, Syria, Egypt, Morocco, Algeria, Tunisia, Libya
<i>Copris lunaris</i>	Cattle, horse, sheep dung	Inhabit steppe ecosystems	Europe, Russia: Moscow – Siberia, Ukraine, Caucasus, Kazakhstan, Turkey, Syria, Iran
<i>Oniticellus pallipes</i>	Horse, donkey dung	Inhabit steppe ecosystems	Europe and Asia Minor
<i>O. fulvus</i>	Cattle, horse, sheep, dog dung	Inhabit steppes and forest-steppe zones	Central and southern Europe, Asia Minor and North Africa
<i>Chironitis hungaricus</i>	Cattle, horse	Characteristic for steppe, desert and semi-desert	South Russia, south Ukraine, Crimea, Spain, south France, Italy, Hungary, Syria
<i>Onitis damoetas</i>	Cattle, horse	Inhabit steppe ecosystems	Balkan Peninsula, Asia Minor, Aegean Islands, Caucasus, Armenia, Iran, Syria, Libya

Coprophagous beetles play an important role in functioning of meadow and pasture ecosystems, they contribute to animal dejections degradation, enriching the soil structure. At the same time, their activity facilitates the access of other groups of organisms into the superficial soil layer, and maintains animal health by recycling manure. Incorporated manure into pasture soils by scarabaeidae beetles have a greater ability to hold and retain water in the soil, leading to better plant growth. *Scarabaeidae* beetles, also represents an important trophic source for birds and insectivorous mammals in grasslands and pastures, what is very important for ecological balance maintaining.

Conclusions

As a result of our research conducted in meadows and pastures of the Republic of Moldova the presence of only 21 species of *Scarabaeinae* beetles on the investigated territory has been reconfirmed. The initial list contained 29 species from this subfamily, but not all of them were reconfirmed for half a century, including species *Scarabaeus sacer*, mentioned by Miller and Zubovschi in 1917, Medvedev and Sapiro in 1957. The most abundant species in meadows and pastures were *Onthophagus ruficapillus*, followed by *O. vacca* and *O. taurus*. The lowest number of individuals was recorded for species *O. furciceps*, *O. furcatus*, *O. lemur*, *O. illyricus*, *O. nuchicornis*, *O. ponticus*, and *O. semicornis*.

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CONTRIBUȚII LA CUNOAȘTEREA COLEOPTERELOR COPROFAGE (COLEOPTERA, SCARABAEINAE) DIN PAJIȘTI ȘI PĂȘUNI DIN REPUBLICA MOLDOVA
(Rezumat)

Lucrarea prezintă studiul actual al subfamiliei *Scarabaeinae* în pajiștile și pășunile din Republica Moldova, incluzând unele date ecologice și aria de răspândire a speciilor, pe baza materialelor colectate în perioada anilor 2004–2011. În rezultat a fost reconfirmată prezența a 21 de specii pe teritoriul republicii, inclusiv în pajiști și pășuni. Subfamilia *Scarabaeinae* este reprezentată în fauna de coleoptere a Republicii Moldova prin 29 de specii din 9 genuri. Cele mai frecvente specii întâlnite în teritoriu au fost: *Onthophagus ruficapillus*, *O. vacca* și *O. taurus* în timp ce speciile: *O. furciceps*, *O. furcatus* și *O. lemur* au fost evidențiate în număr minim de exemplare.

AQUASCAPING AS ADVANCED ENVIRONMENTAL ENRICHMENT TOOL PRELIMINARY CONSIDERATIONS REGARDING THE DESIGN AND WORKING OF HEAVILY PLANTED AQUARIUM CLOSED SYSTEMS – AN EXPERIMENTAL MODEL FOR PHYTOPHILE FISH SPECIES EX-SITU CONSERVATION

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Abstract: Aquascaping model chosen for this study has the tropical plants association as focal point that is built and controlled in order to maintain a stable and healthy environment for fish and invertebrates. The paper shows the evolution of two closed aquarium systems through the results obtained from the monitoring and control of water physical and chemical parameters in close accordance with plants bioproductive features, health status of fish and breeding rate of aquatic invertebrates. The vegetal communities from the experimental tanks contain compatible species according to their ecological requirements (especially those referring to limiting physical, chemical parameters: temperature, pH, hardness). Algae invasive development is one of the risk factor in heavily planted aquaria working and several objectives were fixed in order to algae control: accurate dosing of macro- and micronutrients, weekly analysis and correction of them, a proper vegetal composition and populating of the tanks with some animal algae eater species: *Crossocheilus siamensis*, *Gyrinocheilus aymonieri*, *Caridina japonica*. Special equipments for special lighting, carbon dioxide supplying, biological filtering, simulating of vertical convection through the bottom substrate were described and used in order to built the artificial ecosystem. It was noticed the relevance of oxidation reduction potential for analysis of artificial ecosystem components status.

Keywords: aquascaping, aquarium plant growing, limitative factors, water dissolved oxygen content, oxidation reduction potential.

Introduction

Advanced planning techniques of natural aquatic biotope and vegetables biocoenosis were used in order to obtain a healthy and stable aquatic environment. The results of working of heavily planted aquaria encouraged us to promote some ex-situ conservation projects of some endangered phytophilic freshwater fish species in the next future.

Aquascaping represents a part of aquariology.

Aquascaping is the craft of arranging aquatic plants, as well as rocks, stones or drift-wood, in an aesthetically pleasing manner within an aquarium in effect, gardening under water. Aquascape designs include a number of distinct styles, including the gardenlike Dutch style applied in experimental tanks from this study.

The technical aspects of aquatic plant maintenance must also be taken into consideration. Many factors must be balanced in the closed system of an aquarium tank to ensure the success of an aquascape. These factors include filtration, maintaining carbon dioxide at levels sufficient to support photosynthesis underwater, substrate and fertilization, lighting, and algae control.

Materials and methods

Biotope elements

- two tanks, 650 l/tank.
- Special light: T5 fluorescent bulb AquaMedic/Plant Grow, 4500 K, 4 × 80 W per tank; metal halide lamp, 5000 k, 3 × 150 W/tank
- Under gravel heater that uniformly covers the bottom tank, 70 W.
- Bottom substrate (with fertile and inert composition too): JBL Manado (that filters and enhances plant grow) and JBL Aquabasis (containing all essential nutrients such as iron, minerals and trace elements).
- Water fertilizations methods and techniques: carbon dioxide injection with pH controller, daily and weekly adding of macronutrients (KNO_3 , KH_2PO_4) and micronutrients.
- External filter for mechanical and biological filtration, 2600 l/h recirculation flow.
- Continuously UV-C radiation sterilization.

Biotic components:

- Schooling Fish species
 - *Paracheirodon axelrodi* (Schultz, 1956), Fam. Characidae
 - *Hemigrammus rhodostomus* Ahl, 1924, Fam. Characidae
 - *Hyphessobrycon herbertaxelrodi* Géry, 1961
- Algae eater fish and shrimps species.
 - *Crossocheilus siamensis* (Smith, 1931), fam. Cyprinidae
 - *Gyrinocheilus aymonieri* (Tirant, 1883)
 - *Caridina multidentata* Stimpson, 1860, ord. Decapoda
- Other invertebrate species
- *Atyopsis moluccensis* De Hann, 1849, ord. Decapoda
- *Neocharidina heteropoda* Liang, 2002 ord. Decapoda
- Plant species grown into aquaria are recorded in table 1.

We used for water monitoring and control: a centralized, modular microprocessor for aquariums that includes an USB interface to connect to a PC, as well as a temperature sensor (for water thermoregulation), pH sensor, low range conductivity sensor, ORP (oxidation-reduction potential) sensor.

It was analyzed the level of some chemical water parameters: carbon dioxide, water hardness (KH), nitrate, phosphate, total iron (weekly) and ammonium/ammonia, dissolved oxygen, alkalinity (periodically) with HACH DR-890 colorimeter.

Tab. 1: Plants species list used during the experiment and main biological features.

Plant species	Family	Location	Tank number	Lighting requirements	Tank placement	Water hardness (°G)	pH	Water temperature (°C)	Can be grown emersed
<i>Alternanthera reineckii</i> 'lilacina'	Amaranthaceae	South America	1 st	Strong lighting	mid-ground	4-8	5.8-7	22-28	yes
<i>Anubias nana</i> var 'nana'	Araceae	Africa	1 st , 2 nd	low lighting	foreground	4-30	5.5-8	22-28	yes
<i>Bacopa caroliniana</i>	Scrophulariaceae	North America	2 nd	strong lighting	mid-ground	4-12	5-8	15-30	yes
<i>Blyxa aubertii</i>	Hydrocharitaceae	Asia	2 nd	strong lighting	foreground	4-6	5.5-7.5	22-28	no
<i>Bolbitis heudelotii</i>	Lomariopsidaceae	West Africa	1 st	low lighting	mid-ground	4-8	6-7.2	22-27	
<i>Ceratopteris pterides</i>	Peridaceae	tropical	2 nd	strong lighting	mid-ground	4-30	6.5-7.5	22-30	
<i>Didiplis diandra</i>	Lythraceae	North America	1 st , 2 nd	medium lighting	mid-ground	4-8	5.8-7.2	22-28	yes
<i>Eleocharis parvula</i>	Cyperaceae	tropical	1 st	strong lighting	foreground	4-8	5.5-7.5	18-25	
<i>Eusteralis stellata</i>	Lamiaceae	South-East Africa	2 nd	strong lighting	mid-ground	4-8	5-7.0	22-28	yes
<i>Glossostigma elatinoide</i>	Scrophulariaceae	Australia, New Zealand	2 nd	strong lighting	foreground	4-8	5.5-7	15-26	yes
<i>Hemianthus micranthemoides</i>	Scrophulariaceae	North America and West India	1 st , 2 nd	medium lighting	foreground	4-8	5.8-7.3	22-28	yes
<i>Heteranthera zosterifolia</i>	Pontederiaceae	Central and South America	1 st	medium lighting	mid-ground	4-8	6.2-7	22-26	yes
<i>Lilaeopsis novae-zealandiae</i>	Apiaceae	New Zealand	1 st	strong lighting	foreground	4-8	4-12	15-26	no
<i>Linnophila aromatica</i>	Scrophulariaceae	South-East Africa	2 nd	strong lighting	mid-ground	4-6	6.4-7	22-25	yes
<i>Linnophila sessiliflora</i>	Scrophulariaceae	South-East Africa	2 nd	medium lighting	background	4-8	6.5-7	20-25	yes
<i>Ludwigia arcuata</i>	Onagraceae	USA	2 nd	strong lighting	mid-ground	4-8	6-7.2	18-25	
<i>Marsilea angustifolia</i>	Marsileaceae	cosmopolitan	1 st	medium lighting	foreground	4-8	5.5-6.5	22-28	no
<i>Mayaca fluviatilis</i>	Mayacaceae	Central and South America	1 st	medium lighting	mid-ground	4-8	6.2-7	22-28	yes
<i>Microsorium pteropus</i>	Polypodiaceae	South-East Africa	1 st , 2 nd	medium lighting	mid-ground	4-30	5-8	18-30	
<i>Monosolenium tenerum</i>	Monoseleniaceae	Asia	1 st	low lighting	foreground	4-12			yes
<i>Pogostemon belferi</i>	Lamiaceae	Asia	1 st	medium lighting	foreground	4-8			yes
<i>Riccia fluitans</i>	Ricciaceae	cosmopolitan	1 st	strong lighting		4-12	5.5-7.5	20-30	
<i>Rotala indica</i>	Lythraceae	Asia	1 st	strong lighting	mid-ground	4-8	5.8-7	22-26	yes
<i>Rotala macrandra</i>	Lythraceae	Asia	1 st	strong lighting	mid-ground	4-12	6-7	22-28	yes
<i>Rotala rotundifolia</i>	Lythraceae	Asia	2 nd	medium lighting	background	4-8	5.8-7	22-26	yes
<i>Rotala wallichii</i>	Lythraceae	South-East Africa	1 st	medium lighting	background	4-6	5-7	20-26	yes
<i>Vesicularia dubyana</i> (<i>Taxiphyllum barbieri</i>), java moss	Hypnaceae	South-East Africa	1 st	medium lighting	background	4-12	6-7.5	22-28	

Results and discussions

In the life-environment unit, the develop of living organisms is limited by the medial factors. A factor has a limiting effect when it reaches too low or too high concentrations and it has an inhibitory effect. The action of these environment factors is expressed by several laws [2].

Several abiotic factors are responsible for photosynthetic capacity of cells plants and the rate of this process directly influences the developing and propagation of the plants.

The light, water temperature and water carbon dioxide content represent ones of the most important factors with limitative effect on the plants physiology and the excess or deficit of one factor inhibits optimal growth plants. Each of these factors acts as limiting only after it has reached the edge of the specific tolerance range. (fig. 1).

Aquarium light. Spectrum features of the light bulbs, color temperature, lighting time.

The design of lighting system was made having in view two criteria:

- Qualitative features of the light bulbs by choosing of a proper light spectrum according to plant photosynthetic demands.
- Quantitative features of light bulbs: the light power and intensity are in concordance with plants demands, tanks dimensions.

The light visible spectrum contains all the spectrum colors (ROGVAIV) between UV-A radiation (<400 nm) and infrared (>700 nm). The wavelengths range of visible light radiation is 380–780 nm and each spectrum color induces a certain effect on aquatic plants. The peaks of the photosynthetic response efficiency are situated on the boundary of red and blue radiations ranges that are mainly absorbed by the aquatic plants (fig.2).

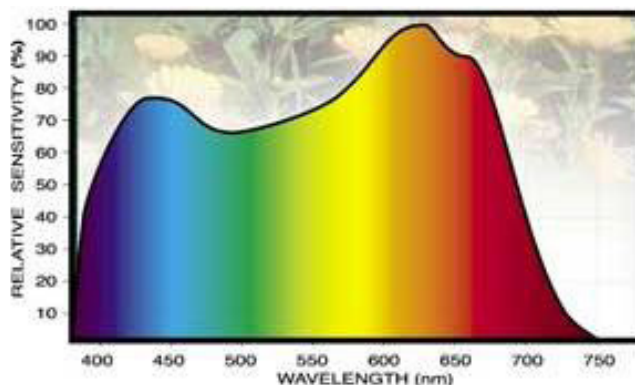


Fig. 1: Photosynthetic response of aquatic plants according to light wavelength

- wavelengths between 400–550 nm with a peak at 420 nm represents the absorption range of blue radiation by chlorophyll a (typical for plants), C2 (typical for algae) and peridinin (the main carotenoid pigment of photosynthetic algae species);
- Wavelengths between 620–700 nm with a peak of 670 nm represent the absorption range of red radiation by chlorophyll a and c2.
- A slope of photosynthetic efficiency curve occurs at 555 nm wavelength (which is the maximum visible point for human eye) typical for green – yellow radiation that is reflected by the plants leaves.
- Blue light is very important for leaves growing and red light promotes flowering and freshwater plants health.

Color temperature represents another qualitative light feature, the value of 6400 k corresponds to a peak of photosynthetic active radiation (typical summer light). Freshwater aquarium plants benefit from lighting with a Kelvin temperature in the range of 5500–6500 degrees.

Light radiation absorption into the water column differed with depth. Red light is the first to be filtered out and can only penetrate a short distance. As light waves penetrate deeper into the water, orange and yellow are lost next. Of all the colors of the spectrum blue light penetrates the deepest.

The light intensity is another important parameter that favors the photosynthesis. The minimum light intensity should be no less than 3,000-lux when it reaches the deepest part of the aquarium. The literature mentions that, having in view an optimal light intensity of 10,000–30,000 lx at the aquarium water surface, there is a loss of 69% in a 40 cm water column (Sauer, 1989 quoted by Kasselmann, 2003). Between different light sources, the using of metal halides is proper for freshwaters aquariums due to depth penetration, output, spectrum, very good lumen/watt ratio. The chosen model for our experiments also allows a high percentage of red radiation to reach the substrate, given water depth (52 cm).

Regarding the day lighting time applied during the experiment, we had in view the origin of the plant species: aquatic or marshy ecosystems with tropical and subtropical geographical range up to 30° latitude (tab. 2).

Tab. 2: Day light period according to geographical latitude

Geographic latitude	Day light (hours)
0°	12 constant
10°	11:30 – 12:40 (depending on season)
20°	11:00 – 13:20
30°	10:12 – 14:05

Therefore, the light/dark photoperiod was applied in concordance to this criteria: 12:12/L:D by a gradual daily increasing/decreasing of light intensity (tab. 3) and also a progressive growing of lighting time from 8 to 12 hours/day during the experiment according to balance of abiotic and biotic relationships.

Tab. 3: Lighting time used during the experiment.

Lighting time	Lighting device	
	Aqualine T5 bulb, 4×80 watt	Metal halide Aqualine 3×150 watt
Between 8 ⁰⁰ – 20 ⁰⁰	X	
Between 11 ³⁰ – 16 ⁰⁰		X

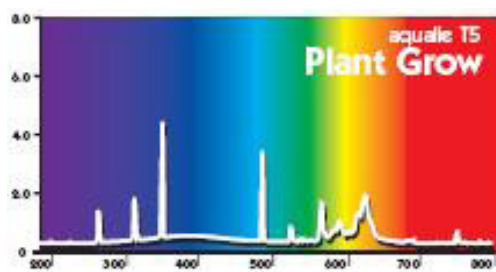


Fig. 2: Bulb light spectrum used during experiment (T5 type, high output)

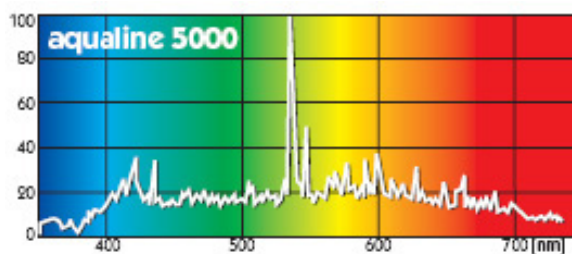


Fig. 3: Metal halid light spectrum (HQI)

The response of different plant species composing the aquarium phytocoenosis was difficult to assess because it is not pursued the effect of a single factor. In addition, beyond ensuring the ecological plants demands in connection with light quantity and quality, the studies have

shown that these plant species are able, within certain limits, to adapt to color light spectrum (chromatic adaptation) due to their assimilatory pigmentation (Kasselman, 2003) and this process can take several weeks.

However, the observations regarding the plants growing rate, leaves integrity, pigmentation system development (e.g. enhancement of brown and red coloring agents carotenoids) was made in order to assess the effect of light quantity and quality, daily and seasonally photoperiod on plants physiology. But many other factors (that partially will be discussed below) act on the plants photosynthesis, that's why this assumption may raise controversy and it was not treated exclusively.

A poor light leads to the deficient plants growing, increased internodes length or leaves decomposition.

Carbon dioxide content, alkalinity, water hardness.

The carbon represents a vital element for the nutrition of higher plants. The aquatic plants allow their carbon requirements from the different inorganic carbon compounds in water (CO_2 – carbon dioxide, H_2CO_3 – carbonic acid, HCO_3^- – hydrogen carbonate, CO_3^{2-} – carbonation, $\text{Ca}(\text{HCO}_3)_2$ – calcium hydrogen carbonate).

Carbon dioxide which transforms to carbonic acid by combining with water constitutes one of the most essential nutrients for the plants photosynthesis and this is extracted from the water through the plants assimilation process. As soon as the carbon dioxide in the water has been exhausted, the plants will behave very differently. Whereas in some species growth will cease, other aquatic plants are able to also assimilate and utilize the hydrogen carbonate ions (biogenic decalcification) and this is the case of aquatic tropical plants species that populate natural habitats with calcium – rich water and an alkaline pH value. We have in view some future studies for 'building' of these kind of phytocoenosis in order to obtain a good enrichment environment for ex-situ conservation of *Scardinius racovitzai*, a critically endangered fish from Petea thermal ecosystem.

The plants origin used during the present experiments live in weak acid, calcium and salt deficient water which contains an enough supply of free carbon dioxide and carbonic acid. Most of them have an extreme dependency on this gas and they are not or are only to a limited degree, able to extract hydrogen carbonate from the water. For their photosynthesis efficiency, an enough supply of carbon dioxide, above all, is essential in the aquarium because the CO_2 content. A small installation (with CO_2 reusable cylinder, solenoid valve, counter bubble, water/gas reactor, pH controller) allows an additional and optimum CO_2 supply and maintains the pH value between 6.5 – 6.55.

For the plants growing in aquariums, not only the relationship between pH value and carbon dioxide content is important but also the connection between carbonate hardness (also referred to as alkalinity or acid-binding capability) and carbon dioxide. The higher carbonate hardness the more carbon dioxide is required to maintain the calcium hydrogen carbonate in soluble form, in other words to prevent the precipitation of lime. That's way we use a RO filtration apparatus in order to remove the mostly high carbonate hardness from tap water. Aquarium water with a low KH has decreased pH stability. Our target is to have a basic water source with a KH between 3–5°G and we obtain good results in plants and fish welfare.

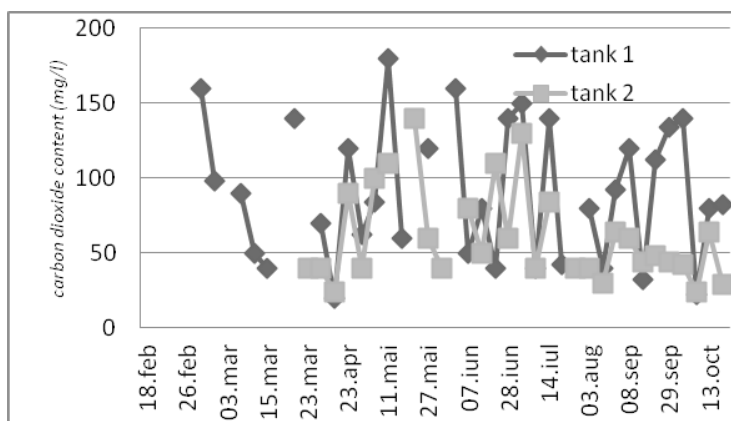


Fig. 4: The carbon dioxide content from water during the experiment.

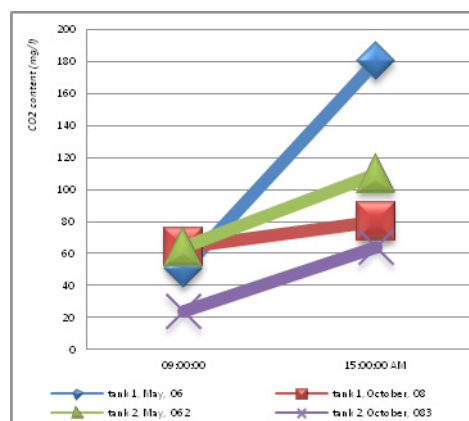


Fig. 5: The daily carbon dioxide content dynamic (mg CO₂/l)

Alkalinity is another important chemical water parameter for planted aquarium keeping. Alkalinity actually represents a carbon dioxide “reservoir” for plants and it has been linked to a “bicarbonate battery” that stores CO₂. During the day, plants draw on the “battery” and deplete the water of bicarbonates. Alkalinity goes down. At night, though, the “battery” is “recharged” with fresh CO₂ from the respiration of plants, fish and bacteria. Alkalinity goes back up.

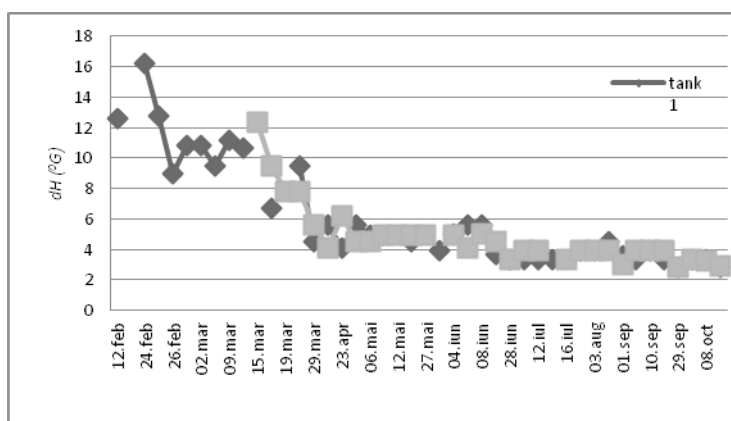


Fig. 6: The Carbonate hardness (dH) dynamic during the experimental period

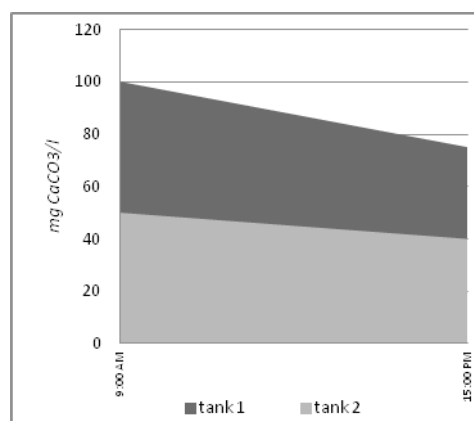


Fig. 7: The daily alkalinity dynamic (mg CaCO₃/l)

Temperature effect.

Keeping an optimum and constant level of water temperature corresponding to plants and animals ecological requirements is another important way that has a decisive influence on plant metabolism, its growing and development.

The target temperature range, between 23.9 – 25.8°C constitutes an optimum level for the all vegetable species chosen for our experiments.

There is a moderate difference in temperature between day and night that is conducive to plant growing (a gap of 1.70°C).

At the same time, considering a number of maintained aquarium plants from temperate and subtropical zone, we induce a reducing of maximum water temperature during winter by 10C.

However, the effect of water temperature on the plants physiology is strongly interconnected with other limitative factors, light and CO₂ content especially (fig. 8).

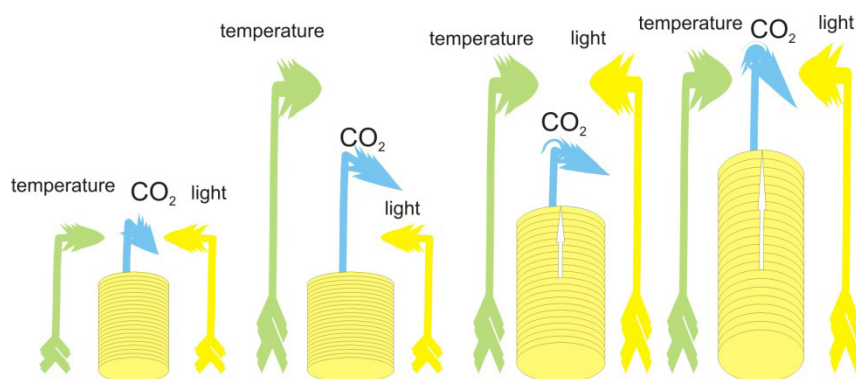


Fig. 8: The cumulative effect of temperature, light and CO₂ content on plants growing. Various combinations of factors with different levels lead to different rate of plants growing.

The aquarium substrate: chosen type, the nutrients content, convection waves.

The cultivated aquarium plants are both submerged species and marsh adapted species.

In the first group, nutrient absorption occurs through the root system as well as through the leaves surface area, their root system has a mainly fixing role. In contrast to this, the marsh plants develop a strong root system that extracts most of their nutrients demands from the substrate. That why, a special nutrient enriched substrate and a mathematical methods of water fertilization are essential for good results in plants growing.

The aquarium plants originate from tropical and subtropical areas where there is a big diversity of the soils but the laterite-containing substrates (red soils) are typical. These kinds of soils are identifiable by their red color and are poor in nutrient content, rich in iron/aluminum oxide, a pH value within the acid to neutral range. The rapid mineralization of the organic matter as well as the generally low water conductivity promotes quickly absorption of the released nutrients by the plants.

The plants species from these ecosystems with weak acid to neutral soils are ecologically stenotopes having a reduced adaptive potential to the aquarium water pH and hardness. In contrast, the plants species from typical aquatic living environments with alkaline soils (such are the great African lakes) display a large tolerance range and they can easily be cultivated into aquarium.

Having in view these considerations regarding the aquatic soils types from tropical and subtropical areas, the following features of the aquarium substrates were allowed in building of aquarium environment:

- Low or null content of decomposable matter (e.g. humic acids).
- Weak acid substrate.
- The lower substrate layer is a clay type enriched with essential nutrients such as iron, minerals and trace elements that are gradually released to the plants.
- The upper substrate layer has a dark color (allowing the heat absorption generated by light bulbs), coarse grained structure and low density (with an important role in the water and nutrients circulation, substrate aeration, adsorption of excess nutrients, allows a large colonization area for pollutant-adsorbing bacteria and favors negative phototropism of plants root system).
- A good aerated substrate guarantees an optimum rate of microbiological processes that develop at this level.

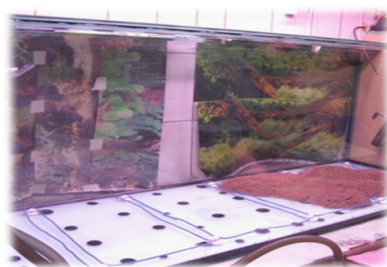


Fig. 9: Experimental aquarium with under gravel heater.

- Using of an undergravel heater integrates the substrate into the aquarium matter and energy flow by the way of convection (vertical) waves induction through it, similarly to mechanisms from natural aquatic ecosystems that allow a constant rate of nutrients supplying to root system, a solubilization of nutrients that are more accessible for plants. A constant and optimum temperature through the substrate is conducive to biochemical reactions that also supply nutrients avoiding the organic and toxic gases storages that could affect the aquarium balance. The inducing of convection waves is also conducive to substrate leaching by the inhibitory allelochemicals.



Fig. 10: Roots of two aquarium species (*Bacopa caroliniana*, left and *Limnophila aromatic*, right) with a healthy growing through the well aerated substrate.

So, importance of substrate as artificial ecosystem ecological factor was not neglected while a daily supplying with liquid macro- and micronutrients was applied in order to stimulate plants growing as a main way of inhibition and control of algae spreading. Trace elements: iron, potassium, calcium, magnesium, zinc, copper, manganese, molybdenum are weekly added in aquarium in favorable combination and plant-available form (chelated form, oxidizing protected and easily assimilated by plants). The micronutrients as non-chelated form are daily added in aquarium and quickly take up by plants otherwise they are unstable and its transform in unavailable plant-compound.

Macronutrients: nitrogen, phosphorus and potassium are daily supplied as KNO_3 and KH_2PO_4 solutions (1ppm nitrate/day and 0.1 ppm phosphate/day respectively). We weekly measured the nitrate, iron and phosphate levels in order to maintain the target concentrations.

Tab. 4: Target macronutrients and iron concentrations during start-up and maturation of artificial ecosystem (ppm)

Nutrient	NO_3^- (ppm)	PO_4^- (ppm)	Fe (ppm)
Target initial	5	0,5	0,1
Target intermediar	10	0,1	0,2
Target final	15	1,5	0,20 – 0,5

It was not noticed morphological modifications of plants duo to ions deficiencies.

Tab. 5: Some of the minerals required by plants and their function (Walstad, 1999)

Element	Nutrient form	Major function in plant
Carbon	CO ₂ , HCO ₃ ⁻	Structural component of all organic compounds
Calcium	Ca ²⁺	Enzyme activator, intracellular „secondary messenger”, essential for cell membrane permeability and cell wall structure.
Iron	Fe ²⁺ , Fe ³⁺	Component of enzymes for electron transport and other oxidation-reduction reactions.
Potassium	K ⁺	Enzyme activator, charge balance.
Nitrogen	NH ₃ , NH ₄ ⁺ , NO ₂ ⁻ , NO ₃ ⁻	Component of proteins, nucleic acids etc.
Phosphorus	PO ₄ ³⁻	Component of ATP, NADP, nucleic acids, membrane phospholipids.

Iron and magnesium deficiency induces leaves discoloration (chlorosis).

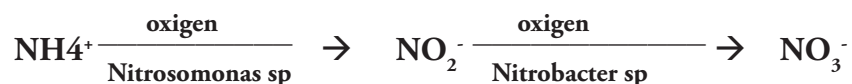
Bacterial processes. Nitrogen flow and nitrification. There are several microbiological processes that occur in aquatic ecosystems.

The aquarium is an artificial environment where we apply various methods and techniques and the bacterial metabolism depends on specific nutrients storage and it places between certain limits. But the beneficial action of these processes – that cannot all be assessed by usual methods – observes as the physical, biological and chemical balance stabilizes.

Heterotrophic bacteria met into an aquarium closed system use the organic matter as energy source while the chemoautotrophic bacteria use the inorganic substance. The most of the organisms use the oxygen to accept electron for their respiration.

Among the microbiological processes that occur in natural aquatic ecosystems (hydrogen sulfide or methane oxidizing, aerobic and anaerobic decomposition, anaerobic reducing of manganese, iron or sulphate ions, denitrification etc) two of them have a significantly development into an aquarium artificial ecosystem: aerobic decomposition of organic matter and nitrification.

Nitrification reactions are a part of aquatic natural nitrogen flow:



The toxic ammonia is transformed into a less toxic nitrate ion under the presence of bacteria and aerobic environment. The biological external filter is special built to fix the nitrification bacteria. But also the plants have a significant contribution to biological filtration of water, they take up the ammonium first and then the nitrate. Ammonium and nitrite levels decreased after the aquarium system start up as the ecological balance stabilizes.

The fig. 11 and 12 show the dynamics of ammonium and nitrite concentrations during the experiments. The ammonium level tends to 0 while the nitrite remains in water (even traces, at safe level for fish and invertebrates) that proves an imbalance between nitrification bacteria populations from the external filter probably caused by variable supplying of nutrients that are used by other competing biological processes or removed by maintenance operations, absolutely necessary to control organic matter, allelochemicals or nitrate level.

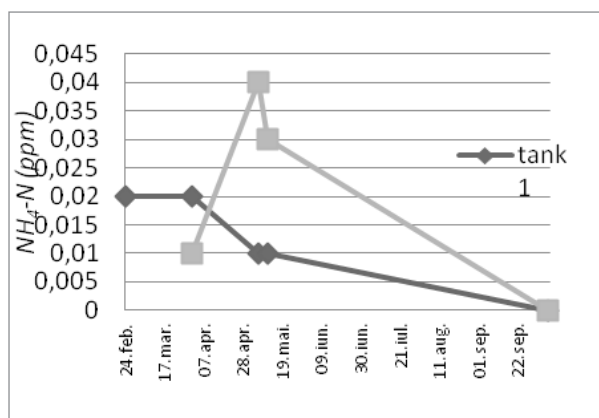


Fig. 11: The ammonium level dynamic during the experiments (ppm)

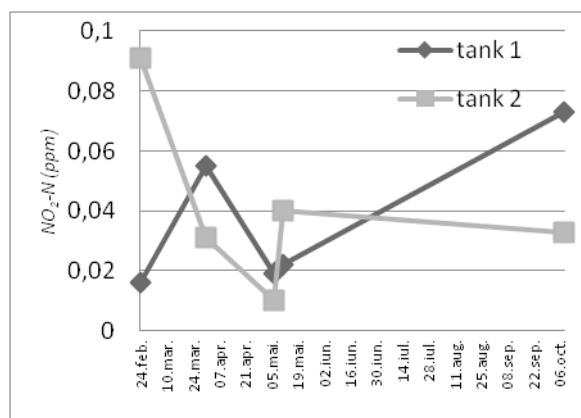


Fig. 12: The nitrite level dynamic during the experiments (ppm)

The importance of oxygen and oxidation-reduction potential.

The oxygen has undoubtedly an important function in aquatic ecosystem and there is a strong relationship between the oxygen producers and the consumers, past including animals, microorganisms and plants not least during the dark phase of their metabolism.

The dissolved oxygen demands of aquatic organisms and the respiration intensity increase with water temperature and water saturation in dissolved oxygen (DO) also depends on temperature.

The figures below show the dynamics of water dissolved oxygen content and oxygen saturation during the experiments. The results are in concordance with the mechanisms from natural densely planted aquatic environment from tropical and subtropical areas where DO content records values between 4 – 14 ppm with frequently exceeding of saturation point. A water saturation level between 70 – 130% represents an optimum range.

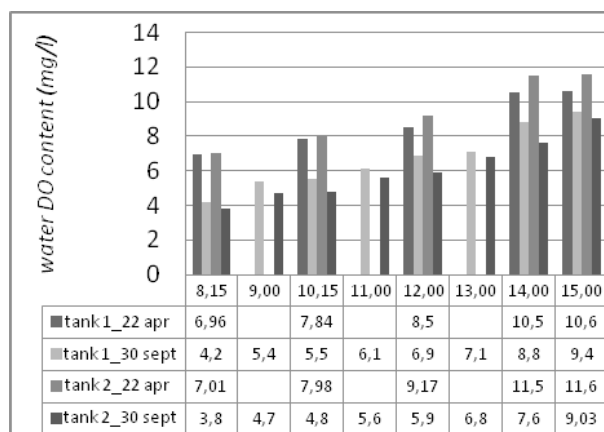


Fig. 13: Diurnal variation of water DO content (ppm)

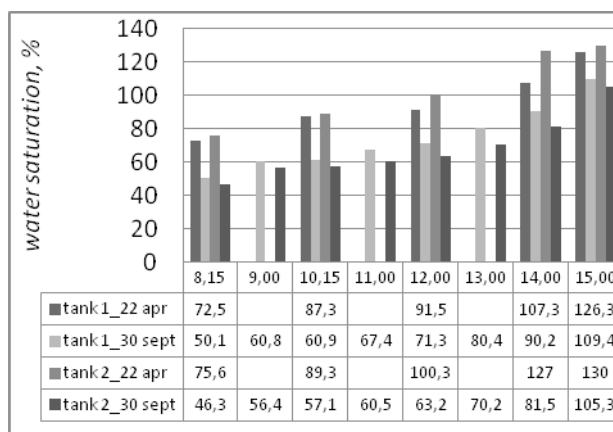


Fig. 14: Diurnal variation of water DO saturation (%)

As the DO consumers and biological processes DO consuming increase due to biological reactions, the DO water content during morning significantly decreases and increases during evening as result of plants photosynthesis.

There are controversial opinions regarding the optimum DO content for plants growing.

Krausse and others (1990) quoted by Kassermann (2003) refers to negative impact of high DO content (bigger as 4–5 ppm) on nutrients level from water and plants growing rate; he sustains this opinion by frequently depletion of DO content below 3.5–5.5ppm from tropical

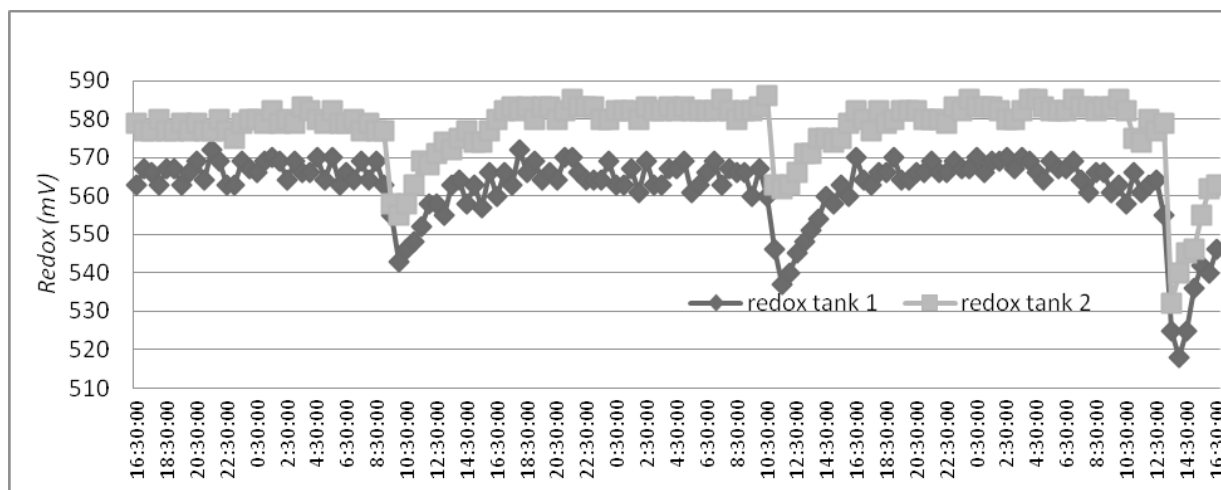


Fig. 16: The day-night dynamic of ORP (mV) after 7 months from the tanks start-up.

An optimum level of redox potential has a positive effect on fish respiration and osmoregulation, immunity and general health status. The recorded high values of water ORP from the experimental tanks indicate a low organic matter loading as result of proper mechanical filtration and high rate of mineralization reactions.

Conclusions

- No morphological changes in plants were observed due to mineral deficiency (leaves discoloration).
- Algae development at the beginning of the experimental period was immediately inhibited by competition induced with the adaptive response of fast-growing plants species *Heteranthera zosteripholia*, *Limnophila sessiliflora*, *Bacopa caroliniana*, *Ceratopteris pteriodes*.
- There is a complex of limiting ecological factors with strong interrelationships that influences adaptation and survival of plants and animals. As this factors system tends to ecological pessimum point, the strength of living organisms decreases.
- There are various combinations of analyzed ecological factors that can produce similar effects due to their ability to substitute each other. Therefore it is difficult to find an unitary pattern of ecological factors acting on vegetal association from the tanks and growing difficulties of plant species such as *Alternanthera reineckii* or *Rotala macrandra* (high demanding species) still remain under study.

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**AQUASCAPING – INSTRUMENT PERFORMANT DE ÎMBOGĂȚIRE MEDIALĂ
A ACVARIILOR. CONSIDERAȚII PRELIMINARE PRIVIND PROIECTAREA SI FUNCȚIONAREA
SISTEMELOR ÎNCHISE DE ACVARII DENS PLANTATE: MODEL EXPERIMENTAL PENTRU
CONSERVAREA EX-SITU A SPECIILOR FITOFILDE DE PEȘTI
(Rezumat)**

În prezent, acvariile publice din lume au un rol tot mai bine definit în programele privind *conservarea ex-situ* sau/și *in-situ* a diferitelor organisme acvatice cu diferite grade de periclitate.

Aquascaping este un capitol al acvaristicii în care biotopurile sau asociațiile vegetale acvatice reprezintă punctul focal contribuind la construcția unor ecosisteme acvatice artificiale cu rol important asupra bunăstării animalelor din colecția de animale menținută în acvariu.

Dintr-o mare varietate de posibilități de punere în spațiu a unui acvariu de aquascaping (tehnicile olandeză începută încă din 1930, precum și cea japoneză fiind recunoscute în domeniu), în lucrarea de față ne-am propus modelul olandez și respectiv reproducerea unor elemente naturale de biotop și biocenoză acvatice în strânsă interdependență în vederea obținerii unui sistem stabil.

Asociațiile vegetale sunt alcătuite în funcție de cerințele ecologice, similare ale speciilor (în special în privința factorilor hidro-chimici limitativi: duritate, pH, temperatură), fiind depășite barierele geografice ale zonelor de proveniență. Aceleași caracteristici abiotice dar și spectrul trofic (și mai ales rolul în combaterea algelor, unul din factorii critici în menținerea unui acvariu plantat) al diferitelor specii de nevertebrate și pești au fost avute în vedere în realizarea compoziției subacvatice.

Studiul urmărește evoluția unui astfel de sistem închis prin intermediul monitorizării și controlului parametrilor hidro-chimici în strânsă concordanță cu parametrii bioproductivi ai plantelor acvatice, starea sanitară a animalelor. Un aspect important și interesant în ecologia organismelor acvatice, respectiv interacțiunile alelopatiche dintre plante, alge, bacterii, nevertebrate și pești rămâne deschis.

THE USE OF NATURAL SHELTERS BY THREE DORMICE SPECIES IN TRANSYLVANIAN PLATEAU, ROMANIA

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Abstract: There have been presented the results of the research done between 2008 – 2010 concerning the manner in which the three species of dormice use natural shelters in deciduous forests from Transylvanian Plateau, Tarnave area. The nests of the dormice are placed in hollows, fat dormouse and forest dormouse preferring those chopped in oaks. Common dormouse builds round shaped arboreal nests, placed in shrubs near branche joints, at a medium height of 60 cm. The dormice make a selection of the habitat, being often encountered in the forests which have shrubs of different ages, with a rich arboreal stratum, which provides food through the year active life. Common dormouse is most often met in the arbustive level of the oak forests, which are coppiced from time to time, and forest dormouse in forests with old trees and numerous species of shrubs, while fat dormouse has a preference for high canopy tree forests which allow it to move better. The material used in making round shape nests by the common dormouse are the leaves of the shrub which they inhabit, to which it adds a great variety of soft materials.

Keywords: tree hollow, arboreal nests, undergrowth.

Introduction

In Romania, there have been reported four species of dormouse: common dormouse, *Muscardinus avellanarius* (Linnaeus, 1758), fat dormouse, *Glis glis* (Linnaeus, 1766), garden dormouse, *Eliomys quercinus* (Linnaeus, 1766), and forest dormouse, *Dryomys nitedula* (Pallas, 1778). Data come from different periods of time and it wasn't possible a systematic research of the whole territory, so in the meantime, some populations might have disappeared, ex. garden dormouse populations. Most data also come from more accessible areas: hills and low mountains. In the Carpathians, the data comes mainly from sites located in valleys or in protected areas, ex. national parks. Consequently, large areas of the Carpathian Mountains, covered with vast forests, have yet to be investigated. After analyzing the data, we believe that the fat dormouse is well spread in hilly areas and sub-Carpathian as shown by Seviănu [15], as well as the common dormouse [4], The forest dormouse, although spread everywhere, forms small isolated populations in some places, for example, forests from Dobruđa [12]. Garden dormouse, although previously reported in several villages belonging to the Carpathians and the hilly area of southern Romania [18, 2], has not been found presently, the last certain spotting occurring from over 25 years ago in the province of Oltenia [10]. In the Romanian Plain and the Western Plain (Pannonian) as in Dobruđa steppe, where forests are scarce, these animals have been reported only sporadically [11].

The question we ask ourselves: Is there a preference of dormouse in choosing the habitat? And if so, what determines this? We were also interested in the relation between different types of shelter/ housing natural that use each of the three species.

Our paper focuses on the personal data collected during three years 2008–2010 in Târnavelor Plateau, an area with hills of medium height 400–800 m, at the heart of Transylvania, central province of Romania, with a plateau aspect, filled with some earlier observations.

Materials and methods:

We see that the presence of dormice in deciduous forests from the Târnavelor Plateau is influenced by: the type of habitat, age composition of forest trees, solar exhibition and isolation of human settlements and human activities in the forest, for example – forest management and grazing. Dormice preferred forest habitats vary from species to species. Juškaitis & Šiožinytė (2003) have shown that common dormouse prefer young forests, understorey, resulting from coppiced. Rather than, fat dormouse prefers mature forests, with a high and continuous canopy. In the north of Europe, the dormice can be usually found in mixed forests as Juškaitis [5] pointed out, or even in coniferous forest. In Romania as well, big dormice can be found in coniferous forests, in Carpathian Mountains and forest dormouse in more arid forests of turkey oak and downy oak from South West territory, as Duma [1] pointed out. Hecker et al. [3] have shown that in Hungary the forest dormouse appeared very often in the vegetation types of arid character like sessile and turkey oak and also usually it appeared in common oak. The same, in Transylvania, forest dormouse prefer driest and multi-storey tree forests, together with a variety of trees and shrubs.

How can we know if in the forest living dormice? Besides usual methods such as to place the nest-boxes, in trees, at a variable height average of 1.5–4 m, and Sherman traps on the ground or on tree branches, looking bone debris night raptors (analysis of owl pellets), looking specifically gnawed hazelnuts, etc..., we are looking for natural nests placed in different natural shelters/abodes. These could be: tree hollows, arboreal nests in bracken of bushes, tangled wild clematis strings, and special shelters: under tree stumps, gaps behind old tree bark that exfoliate, nourisher for deer, in the buildings located within or forest edge, etc.

Natural hollows are preferred by all three species of dormice [16, 13, 14].

Pat Morris [9], have shown also that tree holes may be the main natural nests used by dormice, not the nest built for themselves. However, edible dormouse is the one which dwells there with predilection. Therefore, the species is present in old forests, natural, or the multi-year, secondary, but composed of different age trees.

Natural forests are very rare, and small area in the Târnavelor Plateau, which is a relatively well-populated area, so I looked for hollows in forests, composed of trees of different ages.

Here, there is even competition between the fat dormouse and forest dormouse in filling these shelters. Common dormouse uses hollows in young tree, with small diameter of the trunk, or small hollows of mature trees and behind old tree bark that exfoliate.

They took out the following habitat variables of trees hollows: the species of tree, tree trunk diameter, the state of vegetation shaft, height above ground in hollow entry, gallery type, horizontal or vertical: most are vertical, the degree of sunshine: sunny areas, forest edges or ridges of hills, along the forest roads, distance from forest edge and clearings: small, generally, marks: the presence of ammonia odor, the presence of droppings on the entry or on the base of the tree, the presence of hairs of fur flying around entry insects (flies in general).

Hollows in mature oaks occupied by edible dormouse. Moreover some authors as Juškaitis [5] show that wide canopies of oak-trees create good connections with canopies of other trees for

arboreal movement by dormice and forest stands with hollow trees should be preferred by fat dormouse. Since these trees are rare in secondary forests, most nests are found in trees with a diameter of less than 80 cm, in general attacked by fungi.

In rotten wood of trees trunk develops insect larvae and then woodpeckers each year excavate a new hole (by both parents) that create and submit nest eggs. Over time these holes become the natural shelters for dormice and birds. Natural evolution is towards increasing the diameter of hole with the dying tree and gradually infiltrating rainwater, leading to leave the shelters. But not all shelters are arranged in holes excavated by woodpeckers. Some are natural hollows resulting from drying of twigs, so the rot spreads to the trunk. Gradually forming a cavity whose entrance is enlarged by woodpeckers or even dormice.

Results and discussions

There have been found 39 hollows and holes occupied by dormice, most in the West and South of the territory (the number of hollows is obviously higher, those occupied representing about 1/4). Of the total, some of the hollows/hole were abandoned, at the entrance there were spider nets, or were occupied by bats, moth, insects such as wasps, social hornets, or ants. Most hollows were occupied permanently by dormice in summer – it provides great comfort. Their position was recorded using a GPS.

Report on the species of trees show as that many nests were built by dormice inside oak hollows (Fig. 1)

For the fat dormouse, it is obvious that the species used mainly hollows of oaks (Fig. 2), a tree which is widely used by woodpeckers in excavating holes used for nesting. The other two species are simpatrice rarely fail to use large hollows and small hollows are formed in other essences (Fig. 3 & 4). Common dormouse prefers to build their arboreal nest and the forest dormouse prefers underground shelters; many animals are caught in traps placed on the ground in young forests with high understorey, apparently devoid of hollows. Forest dormouse moves on the ground looking for animal feed.

Height which is hollow tree, from ground level is different. The average is 143 cm.

50% of hollows are placed under one meter of soil, 31.25% are between one and two meters, and 18.75% are over two meters. Of the 32 hollows in which we have data, the highest was 5 m in a 1.2m diameter oak, is occupied by a family of forest dormouse. There could not be verified hollows located at a height, although it is known that most woodpeckers, for example, great spotted-woodpecker, middle spotted woodpecker and green woodpecker excavate their nest holes at a height of less than 2 m. This fact to believe that the number of hollows is much higher than the one checked! To that effect, Pat Morris (2011) has shown that radio tracking also revealed that over 70 % of the natural nests of common dormouse were more than three meters above the ground.

Arboreal nests built in bracken of bushes of common dormouse. We founded 27 arboreal nests in the last three years, some with dormice, others empty. Most of them can be seen in August, when they become visible, but these are deserted en masse by the end of September or early October, after the first cold rains. In mid-October there are no longer nesting animals. No nests were collected while the animals were there.

Many arboreal nests were found in the hornbeam shrubs, and in maples, oaks and black-thorns, representing over 60% of the total (Fig. 5). The remaining nests – one in various other plants, is uncommon to build nests there. Nests are located at an average height of 60 cm above ground! We have generally inspected the stratum of the shrubs and tall grassy plants from the

interior of mature forests with coppiced canopy. Duma [1], shows that common dormice from SW of Romania build their arboreal at a height comprised between 0.6 and 1.5 meters, 68 % but the majority of the nests have been found in blackthorn trees which form in agricultural fields. Different types of arboreal nests for the common dormouse (Fig. 6)

Amongst the bracken (the fork of branches) and to be very well hidden – the vegetation consists of climbing plants around, and tendril and bramble, or twigs supporting the nest are very numerous, rich in leaves (Fig. 7 & 8).

What did they use in their construction: the leaves of plants that are nearby, especially those on the plant which is located the nest. Hanna Zaytseva [19] have shown that the leaves constituted the greatest part of the nest material 62% in Ukraina. Some other authors show that the leaves are constantly used to build arboreal nests from nest boxes, such as oak in Moldavia [7], beech in Ukrain [17], hazel in Great Britain [8]. Common dormouse usually uses the leaves of a single species of arbor to which it adds in small proportions herbal leaves, moss, tree bark, and internal chamber is built from very soft materials such as animal hair, feathers, feathery pappus of different *Cirsium*, etc. There are more elaborate than in nest-boxes.

The presence of dormice populations in Târnavelor plateau is directly related to the type of forest habitat. Wood and age composition of the forest trees are the most important factors involved. Regarding the age composition of forest trees, populations are more numerous in the multi-year forests (consisting of trees of different ages), where forest management is not hard. Natural forests are rare inside Târnavelor Plateau, but secondary/quite natural forests, resulting from natural regeneration following their coppiced (cutting bushes, for example: hazel, hornbeam, that are used for fire, and still stand mature). The forest takes on a youthful appearance. The solar exhibition is important for all species of dormice, but especially in the case of common dormouse, because all the arboreal nests have been found in places which could be heated at least few hours per day.

Forest habitat types found in the Târnavelor Plateau (according to the classification system NATURA 2000) are the following:

91IO* Euro-Siberian steppic woods with *Quercus* spp. Sessile oak, oak, ash, lime, cherry – form the upper (canopy). Common maple, tatar maple, wild apple and wild pear – form the second floor. Shrub level is very rich, for example: hazel, common hawthorn, cornelian cherry, herbal and undergrowth are well developed.

91YO*Dacian oak & hornbeam forests. Sessile oak, oak, lime, norway maple, beech – form the upper (canopy). Hornbeam and common maple – form the second floor. Coverage is 80–90%. Shrub layer is poorly developed due to shading made of hornbeam, and the herbaceous undergrowth and is also poorly.

Both types of forests are generally present in the western plateau. It is characterized by small areas, often isolated from each other or connected by natural blackthorn bushes, hip, separating crops, or woody vegetation accompanying the valleys. It allows migration of animals from one forest to another.

The first two types of forest habitats are favorable to existence of all three species and the forest dormouse is often encountered, used to move the second floor of.

91G0* Pannonic woods with sessile oak and hornbeam. Sessile oak, beech, cherry, lime – form the canopy. Hornbeam, common maple, wild apple, wild pear – form the second floor. The bushes are variable and developed differently, depending on the shade. The coverage is about 80–100%. They can be found more in the South of the plateau where the hills are taller, up to

600 m and higher moisture (similar to the previous one, only more shady, due to the increase in the frequency of hornbeam).

9130* *Asperulo-Fagetum* beech forests. Beech with little hornbeam, little sessile oak, cherry, sycamore, elm, ash – form the upper level (canopy). The coverage is 80–100%. The second layer is generally missing, while the shrub and grassy is underdeveloped as a rule. It is present in South-eastern plateau, where the hills reach 700 m or more. In this type of forest habitat there do not develop the second floor of trees because the beech is a powerful shading and all the trees of other species are as tall as the beech. In the first three types of habitats, oak allows for the existence of a second layer of trees. There is a phenomenon of invasion of beech and hornbeam, which replace natural oak forests. There are forests with an intense forest management. Here, fat dormouse is very well spread and common dormouse appears only at the edge of the forests or where the forest has been cleared or coppiced.

91HO * Pannonian woods with downy oak. The canopy, are formed by pubescent oak, oak, tatar maple, wild pear, achieved coverage of 40–60% in the woods, and heights of 6–12 m in 100 years. Sometimes canopy is rennet. Bushes grow in clumps layer, alternating with steppe grasslands. Shrub layer consists of corn, carp, hazel, hawthorn, etc. Herbaceous layer is well developed, the plants grow on steep slopes, exposed to sun, adjacent bushes. Usually present in southern and western plateau with other woods. There is fat dormouse as well as common dormouse but their number is small, only 1–3 individuals / ha.

40A0 * Subcontinental peri-Pannonic scrub. Blackthorn and hawthorn bushes with dense coverage of 100%, it highlights the sometimes arboreal layer, consisting of acacia and wild hair, and one composed of blackberry undergrowth. Lianes as tendril are more common. It is found near forests in dry areas, and between crops. Common dormouse is often present, and the other two species, we suppose they use this habitat to migrate from one forest to another.

Thermophilous forests of western area allow the existence of three sympatric species, common dormouse, fat dormouse and forest dormouse.

Influence of forest management on forest look is very important for the presence of dormice. In old oak forest, hollows are present, there understorey result after coppiced in the form of GPS (cracks), so the habitat is good for the common dormouse jointly, but there are two other species. In some case undergrowth but with pre-existing trees, shrub layer is well developed yet, there are hollows and bushes with a height, which favors the movement of forest dormouse. Fat dormouse occupies hollows (Fig. 9) and holes, mainly excavated by woodpeckers and the other two species can be found both in the hollows, nest tree or underground galleries. Forest dormouse is a competitor of fat dormouse in filling hollows (Fig.10). In the young oak forest, regeneration results are missing hollows and trees were about the same size.

Among the species of trees, oak, poplar and cherry are forming hollows in which arranged their abodes dormouse/shelter. Common dormouse used primarily arboreal nests, camouflaged in the vegetation at low height, located at the junction of branches, with a complex structure consisting of an outer layer of leaf and one internal (core nest) finest, made from an amazing variety the fine material.

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UTILIZAREA ADĂPOSTURILOR NATURALE DE CĂTRE TREI SPECII DE PÂRȘI ÎN PODIȘUL TRANSILVÂNIEI, ROMÂNIA (Rezumat)

Sunt prezentate rezultatele cercetărilor care au avut loc între anii 2008–2011 legate de modalitatea în care trei specii de pârși utilizează adăposturile naturale în pădurile cu frunze căzătoare din Podișul Transilvaniei, zona Târnavelor. Cuiburile pârșilor sunt plasate în scorburi, pârșul mare și pârșul cu coadă stufoasă preferându-le pe acelea scobite în stejari. Pârșul comun își construiește cuiburi arboricole rotunde, plasate în arbuști, la îmbinarea crengilor și la o înălțime medie de 60 cm de sol. Pârșii realizează o selecție a habitatului, fiind cel mai adesea legați de pădurile care au arbori de vârste diferite și cu un strat arbustiv bogat, care le furnizează hrană pe întreg parcursul anului când sunt activi. Pârșul comun este cel mai adesea găsit în stratul arbustiv al pădurilor de stejar, care este tăiat din timp în timp și pârșul cu coadă stufoasă, în pădurile cu arbori vechi și numeroase specii de arbuști, în timp ce pârșul mare manifestă o preferință pentru coronamentul înalt al arborilor din păduri, care îi permite să se miște cel mai bine. Materialul utilizat în construcția cuiburilor circulare de către pârșul comun este reprezentat de frunzele arbuștilor în care ei trăiesc, la care adaugă o mare varietate de materiale fine.

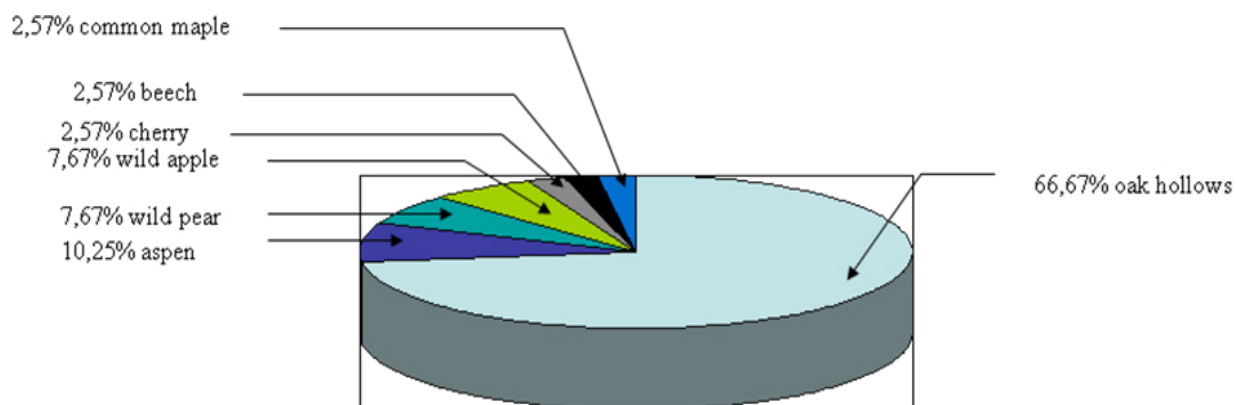


Fig. 1: % hollows/holes from different trees occupied by dormice

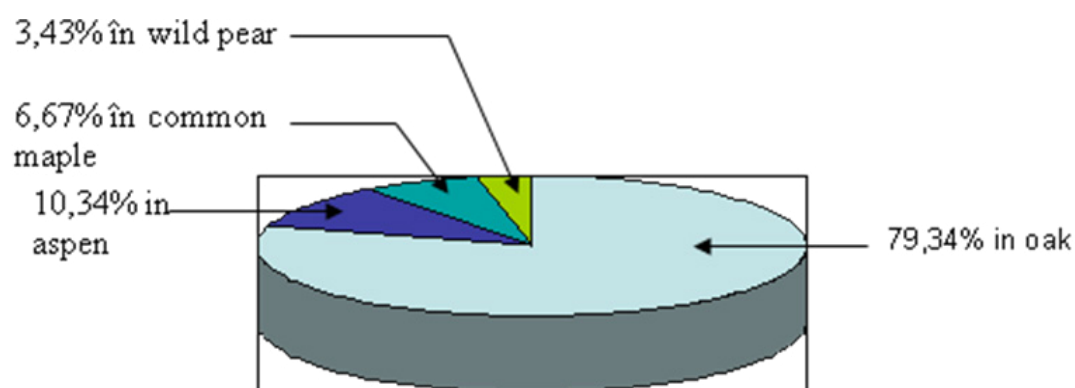


Fig. 2: Occurrence rate of fat dormouse in different hollow/hole trees

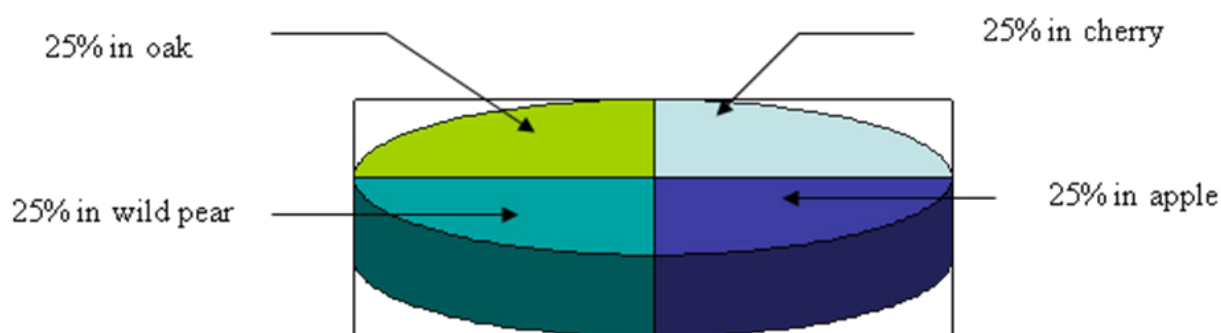


Fig. 3: Occurrence rate of common dormouse in different hollow/hole trees

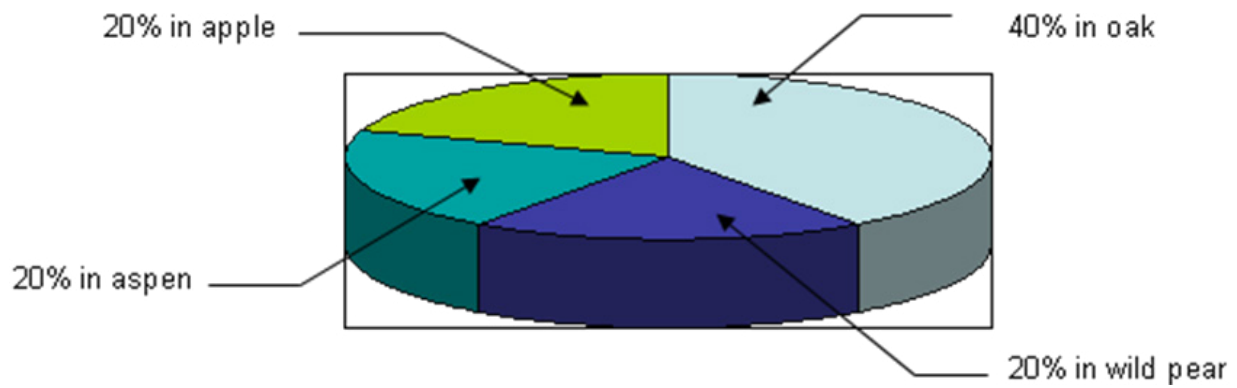


Fig. 4: Occurrence rate of forest dormouse in different hollow/hole trees

25.92% in hornbeam
 14.81% in yoke/common maple
 11.11% in oak
 11.11% in blackthorn
 3.70% in common elder
 3.70% in dog rose
 3.70% in common hawthorn
 3.70% in hazel
 3.70% in wild clematis
 3.70% in beech
 3.70% in tatar maple
 3.70% in herbal stem

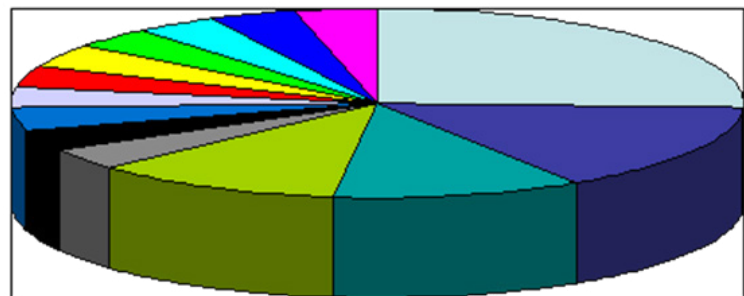


Fig. 5: Occurrence rate of common dormouse nests for different arboreal species

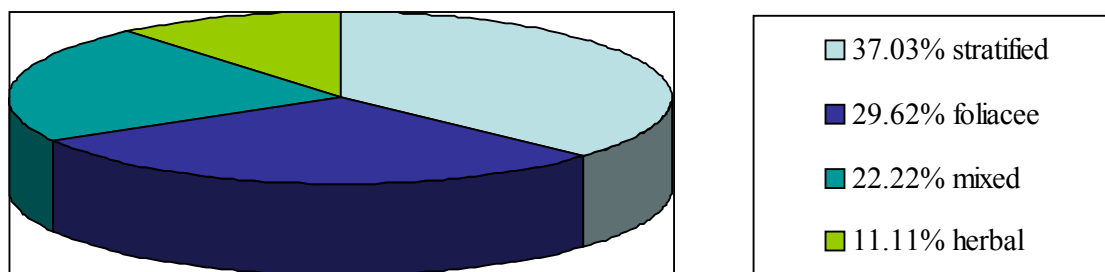


Fig. 6: Occurrence rate of different arboreal nest types for common dormouse



Fig. 7: Petru Vasile Istrate. Arboreal nest of a common dormouse in a small shrub of common maple



Fig. 8: Petru Vasile Istrate. Arboreal nest of common dormouse masked by the strings of clematis liana.



Fig. 9: Petru Vasile Istrate. Fat dormouse in a hollow of sessile oak



Fig. 10: Petru Vasile Istrate. Garden dormouse in a hollow of wild pear.

THE CATALOG OF THE BIRD OOLOGIC COLLECTION OF THE MUREȘ COUNTY MUSEUM, NATURAL SCIENCE DEPARTMENT TÂRGU-MUREȘ

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Abstract: The oologic collection of the Museum of Târgu Mureș consists of six parts (Table 2) and is composed of 382 clutches, counting 1879 eggs, representing 82 bird species. Over 90% of the eggs were collected between 1960 and 1964 and come from subsequent purchases or donations. In addition, during 1958–2011 (54 years), 46 nests, received, or collected and prepared by us, were also recorded. Table 4 shows that 370 clutches were collected from Mureș county, and only 12 nests come from elsewhere.

The publication of these historical data enrich our knowledge of the areas mentioned, and it is a true, verifiable inventory, which preserves and completes the picture of the yesteryear avifauna, along with the other catalogs of collections, published in the yearbook of our museum [33, 34].

Keywords: oologic collection, birds, Mureș County Museum

Introduction

The importance of a museum depends largely on the size and the scientific value of collections. Preservation and valorisation of patrimony is a permanent concern of the specialized staff. Preparation and publication of a collection catalog gives the opportunity to those interested to know not only exhibits, but all the values stored in the museum storehouse. After the publication of ornithological collection inventory and partial skeletons of birds [33, 34], this paper is the third catalog, which presents ornithological material existing in 2011 at the museum.

The question is “Why the need for such a collection?”

- It is an undeniable physical evidence of the existence of old ornithofauna.
- It shows followers should strive towards the rehabilitation of the local avifauna.
- It is a true database on species diversity area.
- Provides valuable information about reproducing species.
- The chemical analysis of eggshells [7] one can see unwanted consequences of chemicalization agriculture (charging with DDT, HCH and so on, as well as negative effects on bird reproduction). It is an incriminating evidence of our responsibility towards nature, towards future generations.
- “The mere existence of egg is documenting a lot the bird and zoogeographic studies” – says Mr. Thomas L.Béczy in his book [3]. “It is a valuable document of the past,

containing historical, genetic, biochemical information, and data on natural habitats from which they were collected.” [17]

- The largest oologic collection in the world is in the Museum of Natural History in Britain, containing over a million samples [42].

Oologic collection in Romania

Table 1 gives some data about oologic collections in Romania. This knowledge has been obtained from the cited references [3, 9, 17, 19, 37, 38, 40], and data on oologic collection of the Museum of Timișoara were obtained from dr. Kiss András [10], whom we thank in this way. Most of them are in museum collections. In addition to these, there are other collections in various institutions or individuals, unpublished yet. At country level, a full situation could only be made after the publication of all existing data on these collections.

Table 1: Oologic collections of România

Owners	Species	Clutches	Eggs
Muzeul Țării Crișurilor – Oradea	659	3573	13812
Muzeul Banatului – Timișoara	198	537	2184
Kalabér Ladislau – Reghin (private collection)	116	413	2009
Mureș County Museum	82	382	1879
Complexul Muzeal de Științe ale Naturii “Răsvan Angheluță” Galați	101	592	1670
Muzeul Vrancei. Secția Științele Naturii – Focșani	107	?	432
Lupean Dorin – Sibiu (private collection)	100	?	400
Muzeul Olteniei – Craiova	158	?	352
Institutul de Cercetări Eco-Muzeale Tulcea, Centrul Muzeal Eco-Turistic Delta Dunării	55	320	?

Material analysis

The oologic collection of the Museum of Târgu Mures consists of six distinct collections of 382 clutches, counting 1879 eggs, representing 82 bird species (!). (Table 2)

Table 2: Oologic collection of Mureș County Museum

Collection	No of species	No of clutches	No of eggs	Observations
Bartha Tibor	49	115	560	donation
Bujanovics Ede	52	123	635	acquisition
György István	24	30	141	acquisition
Mureș County Museum	25	46	217	collected
Stoia Vasile	1	5	18	donation
Szombath Ștefan	33	63	308	acquisition
Total	82	382	1879	

The first clutch (*Pica pica*) reached in the museum collection on May 22nd, 1958, and the last one (*Buteo buteo*) on June 26th, 2006. Over 90% of the eggs were collected between 1960 and 1964 and come from subsequent purchases or donations. In addition, during 1958–2011

(54 years), 46 nests, received, or collected and prepared by us, were also recorded. (Note that although the Museum staff did not encourage collecting eggs and nests, however, nests brought by different people – the result of “Sunday family or holiday expeditions” – were accepted, but not without an environmental education made as “thanksgiving”).

Preparation

We share this minimal knowledge about preparation with the thought that novice restaurateurs should not refuse any nests torn because of unwanted human intervention.

Piercing shell is made with a triangular needle (used for sewing leather), or a thin bar of iron, sharpened at the top, similar to a star-point screwdriver. Emptying content can be performed through a single hole made on the circumference line drawn by the small diagonal of the egg. A too wider hole weakens the egg resistance. A glass tube with a thinner end (hand-blown), or a syringe fitted with a needle bent at 45 degrees can be used to empty it.

No chemicals were used during preparation, the eggs being emptied using air jet, and washed with clear water afterwards. To our knowledge, no other collectors used chemicals such as KOH, NaOH, formalin, Hg biclorat [9] for preparation.

In the case of incubated eggs, the drilling was done with the egg submerged in water; otherwise it may explode due to increased internal pressure (method dictated by the first failure). The eggs are left to dry on blotting paper, with the hole facing down, in the shade, and at a constant temperature. After drying, the egg is numbered (inventory no., or code). The eggs are kept in the boxes lined with wool, or in tubes, in the dark, in controlled environment.

The origin of the material (Table 3)

For this table we used the existing data and the personal knowledge about collectors or owners. “Unknown” title is used for the person who brought an unprepared clutch to the museum, and XY fisherman is a suggested person from whom Bartha Tibor acquired a great bustard egg, poorly drilled with a nail and emptied. The introduction of it in the collection is motivated by the rarity of the species, almost extinct from the country fauna today.

It is known that in some cases the name of the owner and of the collector is not the same (the above example), due to exchanges performed between them; some eggs were received as a gift or inherited, as reflected in our table. The important fact is that, once in the museum, the material became public collection, part of the national heritage. Its maintenance is ensured by conservatives, it can be studied by specialists and their published data contribute to enlarge our knowledge of the avifauna of past periods.

Table 3: The origin of the oologic material

Collector's name	No. of clutches	No. of eggs	Collecting period
Bartha Tibor	114	559	1959.04.01 – 1964.06.08
Bujanovics Ede	61	344	1960.04.19 – 1963.04.07
Cseresznyés Szilárd	1	4	1961.05.21
Deák Attila	1	1(+1)	2006.06.26
Godan Elena	1	4	1996.05.04
György István	33	155	1960.04.24 – 1964.05.12

Keszeg Arnold	5	18	1998.03.14 – 2001.04.15
Kónya István	6	40	1958.05.22 – 1967.05.06
Necunoscut	1	5	1995.03.27
Orbán Albert	1	5	1968.04.25
Sincraian Marcu	1	2	1987.05.06
Szentkirályi Miklós	59	283	1960.04.24 – 1963.04.21
Szilágyi Alexandru	5	33	1968.04.17 – 21
Szombath Zoltán	92	425	1960.06.14 – 1995.05.21
XY fisherman	1	1	1963.04.28

Table 4 shows that 370 clutches were collected from Mureş county, and only 12 nests come from elsewhere.

Table 4: Oologic material distribution by county of origin

County	Clutches	Eggs
AB – Alba, RO	5	18
CT – Constanţa, RO	1	3
BH – Bihor, RO	2	14
HR – Harghita, RO	2	9
MS – Mureş, RO	370	1830
TL – Tulcea, RO	1	1
BK – Bács-Kiskun, HU	1	4

Table 5 is useful to those who collect zoological data to complete faunal lists of localities, and to those who compile lists of nesting birds in the named counties. We find that much of the material comes from the surroundings of Târgu Mureş city, an area with a highly human impact. The correct spelling of localities was revised according to the dictionary of localities [20].

Table 5: Oologic material distribution by locality

No	Locality	Clutches	Eggs	Species
1	Acăţari, MS	4	24	4
2	Bălăuşeri, MS	1	7	1
3	Berghia, MS	2	7	2
4	Beşa, MS	3	12	3
5	Bistra Mureşului, MS	1	6	1
6	Bozed, MS	1	1	1
7	Brâncovenişti, MS	1	4	1
8	Budiu Mic, MS	4	27	4
9	Câmpeniţa, MS	2	11	2
10	Cipău, MS	8	25	3
11	Cristeşti, MS	6	33	4
12	Cuci, MS	2	15	2
13	Curteni, MS	22	104	5
14	Dumbrăvioara, MS	20	94	13

15	Ernei, MS	1	9	1
16	Fărăgău, MS	6	31	4
17	Fülöpháza, HU	1	4	1
18	Găiești, MS	1	5	1
19	Glodeni, MS	2	8	2
20	Gornești, MS	1	4	1
21	Gurghiu, MS	2	8	2
22	Icland (Ernei), MS	5	38	3
23	Lechința, MS	1	2	1
24	Livezeni, MS	1	4	1
25	Lodroman, AB	5	18	1
26	M.ții Harghita, HR	1	4	1
27	Miheșu de Câmpie, MS	17	79	2
28	Morești, MS	32	152	13
29	Mureșeni, MS	1	3	1
30	Murgești, MS	4	26	3
31	Pădureni, MS	1	5	1
32	Pănet, MS	1	3	1
33	Periș, MS	1	5	1
34	Petelea, MS	1	4	1
35	Răstolița, MS	1	5	1
36	Reghin, MS	7	45	5
37	Remetea, MS	2	11	2
38	Săbed, MS	24	93	11
39	Sărmașu, MS	1	5	1
40	Sfântu Gheorghe, TL	1	1	1
41	Sâncraiu de Mureș, MS	1	6	1
42	Sângeru de Pădure, MS	3	15	2
43	Sângeorgiu de Mureș, MS	3	16	3
44	Sânmartin, HR	1	5	1
45	Sinoe, CT	1	3	1
46	Sântana de Mureș, MS	3	13	3
47	Sântioana de Mureș, MS	2	12	2
48	Tarcea, BH	1	11	1
49	Târgu Mureș, MS	153	775	49
50	Valea lui Mihai, BH	1	3	1
51	Vălenii, MS	4	30	4
52	Vălureni, MS	3	14	3
53	Voivodeni, MS	1	5	1
54	Zau de Câmpie, MS	7	29	3
	Total	382	1879	82

Table of species (Table 6) reflects the data of 81 species tested, plus one doubled, but questioned. It is the case of a *Strix aluco*, found in a nest of *Corvus cornix* sat on an oak tree, at 16 meters high, visited by the author on November 4th, 1974. In the nest there were four fluffy chicks and two incubated eggs, which have been collected for collection. Egg dimensions are: 40 × 30.8 and 40.6 × 32.7 mm respectively. The egg color is white, but with points, lines and brown freckles splattered all over. This aspect of the egg was preserved under a protective layer of nitro, as water wiped the stains. Judging by size and aspect, these two egg look more like the last egg (slightly colored) of *Falco tinnunculus* and *F. subbuteo*, species that hatch in the months of May-June. We believe that the lack of data requires a reserved attitude towards determining species.

The seven species of 24 raptor nests collected may seem today a crime against nature, but their destruction was once mandatory for hunters throughout the year. Their appearance was not tolerated at the newly established pheasantry near Târgu Mureș either. The history of a crow's nest (*Corvus corax*) in the *Stejăriș* forest, eloquently demonstrates this managing trend of the game:

- February 25th, 1962 – 5 raven eggs in the nest
- March 20th – male killed by the poison meant for wolves and foxes
- March 27th – 2 adult ravens rotate and chicks can be heard in the nest
- April 3rd – a pair of black kite – *Milvus migrans* robbed the nest
- April 20th – 4 black kite eggs are taken out of the nest
- May 11th – 3 black kite eggs are taken out of the nest
- May 18th – 2 small booted eagle eggs – *Hieraaetus pennatus* are taken out of the nest and the female is shot.

Today the three clutches are kept at the museum in Târgu Mureș.

Stork eggs were collected from destroyed nests when changing thatched roof with tiles. A part of reed bird nests were collected during desiccation of wetlands, before burning reed, or when flooding ponds. The museum staff was announced by the fisheries engineer at Cipău about the mowing of aquatic plants. So we managed to harvest some great crested grebe clutches (*Podiceps cristatus*), but dozens of nests were chopped by the floating mower. In the case of collected abandoned nests, the clutches are not always complete, however we believe that they are valuable because they provide important data.

In the Cuckoo (*Cuculus canorus*) case, eggs were inventoried with the same number as the parasite species, using the letters / a, / b, (see 11 / a, 11 / b, and 98 / a, 98 / b) to differentiate them, and the third cuckoo egg (inv. No. 356) remained single because the eggs of the parasitized species – Great Reed Warbler – (*Acrocephalus arundinaceus*) were broken.

In 1963–64, in Morești, there was a colony of Rook (*Corvus frugilegus*) of about 500 nests, which was destroyed in the following years. 14 nests were collected from here. On May 5th, 1960, the bank of Mureș River collapsed, where there was a colony of Sand Martin (*Riparia riparia*). 18 clutches were saved from here for collection and dozens of other nests were washed away by water. Sterile or incubated Lanner Falcon (*Falco biarmicus*) eggs were received from an aviary, courtesy to Keszeg Arnold [31]. We have listed these cases to demonstrate that a collection can be gathered over time, without causing primary damages to nature.

Uncontrolled human interventions affecting most nesting avifauna are:

- Logging during vegetation without preliminary observations made for inventorying hatching fauna of the land and reporting protected species.
- Spring derating carried on defense embankments of watercourses
- Trimming trees in cities during April-August, under the pretext of sanitation and cleaning

- Pruning hedges during the incubation period of passeriforms
- Destruction of raptors nests by the poachers
- Mowing aquatic vegetation in ponds during hatching
- Burning reeds during spring
- Flooding of fish ponds from April to July
- Sand and gravel excavation regardless of the location of colonies of *Riparia riparia*
- Destruction of Grebe and Tern nests in ponds
- Agricultural works performed regardless of the annual biorhythm of nesting species
- Disinfection of crops, forests and settlements
- Demolition of old houses without taking measures to protect nesting birds found here
- Cleaning the old chimneys, inhabited by birds etc.

These are just some destructive activities, hidden in silence, during which many bird nests are destroyed. If one cannot avoid these damages, why not then donate the destroyed nests to museums, where they can be prepared and properly stored, being valued by museum pedagogy? Protection laws are clear, but they are violated in areas with conflict of interests. On one hand, they force the letter of the law, and on the other hand, there is the old adage “an uncaught thief is an honest merchant”. Isn’t it possible to free much of this sense of hidden guilt by a closer cooperation between institutions? Let’s not bury our fauna riches in the pit of indifference! The moral responsibility strengthens the spirit of the law, and it is superior to every paragraph written by people.

Table 6: Situation of the collection species

No	Species (in alphabetical order)	No of clutches	No of eggs
1	<i>Accipiter gentilis</i>	3	7
2	<i>Acrocephalus arundinaceus</i>	11	49
3	<i>Acrocephalus palustris</i>	1	4
4	<i>Acrocephalus scirpaceus</i>	3	12
5	<i>Actitis hypoleucos</i>	1	3
6	<i>Alcedo atthis</i>	1	7
7	<i>Anas platyrhynchos</i>	5	45
8	<i>Aquila pomarina</i>	1	2
9	<i>Ardea cinerea</i>	1	3
10	<i>Asio otus</i>	6	24
11	<i>Buteo buteo</i>	4	6
12	<i>Caprimulgus europaeus</i>	1	1
13	<i>Carduelis carduelis</i>	4	19
14	<i>Carduelis chloris</i>	6	29
15	<i>Charadrius dubius</i>	4	15
16	<i>Ciconia ciconia</i>	2	9
17	<i>Cinclus cinclus</i>	1	4
18	<i>Coccothraustes coccothraustes</i>	10	48
19	<i>Columba oenas</i>	6	11
20	<i>Columba palumbus</i>	3	5
21	<i>Corvus corax</i>	5	27
22	<i>Corvus cornix</i>	7	32

23	<i>Corvus frugilegus</i>	16	75
24	<i>Corvus monedula</i>	9	36
25	<i>Coturnix coturnix</i>	3	30
26	<i>Crex crex</i>	1	8
27	<i>Cuculus canorus</i>	3	3
28	<i>Dendrocopos medius</i>	2	11
29	<i>Dendrocopos minor</i>	1	5
30	<i>Emberiza citrinella</i>	1	3
31	<i>Erithacus rubecula</i>	3	18
32	<i>Falco biarmicus</i>	5	18
33	<i>Falco tinnunculus</i>	9	45
34	<i>Fringilla coelebs</i>	6	29
35	<i>Fulica atra</i>	2	12
36	<i>Galerida cristata</i>	5	23
37	<i>Gallinula chloropus</i>	5	27
38	<i>Garrulus glandarius</i>	16	95
39	<i>Hieraaetus pennatus</i>	1	2
40	<i>Hirundo rustica</i>	3	14
41	<i>Ixobrychus minutus</i>	4	18
42	<i>Jynx torquilla</i>	2	16
43	<i>Lanius collurio</i>	16	77
44	<i>Lanius minor</i>	4	21
45	<i>Larus ridibundus</i>	1	3
46	<i>Limosa limosa</i>	1	4
47	<i>Luscinia luscinia</i>	1	5
48	<i>Merops apiaster</i>	2	12
49	<i>Milvus migrans</i>	3	10
50	<i>Motacilla alba</i>	5	26
51	<i>Motacilla cinerea</i>	1	6
52	<i>Muscicapa striata</i>	1	4
53	<i>Nycticorax nycticorax</i>	1	2
54	<i>Oenanthe oenanthe</i>	2	10
55	<i>Oriolus oriolus</i>	1	4
56	<i>Otis tarda</i>	1	1
57	<i>Parus caeruleus</i>	6	59
58	<i>Parus major</i>	7	62
59	<i>Parus palustris</i>	2	21
60	<i>Passer domesticus</i>	28	134
61	<i>Passer montanus</i>	9	40
62	<i>Perdix perdix</i>	1	11
63	<i>Phasianus colchicus</i>	5	59
64	<i>Phoenicurus phoenicurus</i>	1	5
65	<i>Pica pica</i>	16	96
66	<i>Picus viridis</i>	1	5
67	<i>Podiceps cristatus</i>	6	18
68	<i>Riparia riparia</i>	21	98

69	<i>Sitta europaea</i>	2	11
70	<i>Streptopelia decaocto</i>	2	4
71	<i>Streptopelia turtur</i>	4	8
72	<i>Strix aluco</i>	1	3
73	<i>Strix aluco</i> (?)	1	2
74	<i>Sturnus vulgaris</i>	6	29
75	<i>Sylvia atricapilla</i>	3	16
76	<i>Sylvia borin</i>	1	5
77	<i>Sylvia communis</i>	1	3
78	<i>Tachybaptus ruficollis</i>	1	3
79	<i>Troglodytes troglodytes</i>	2	13
80	<i>Turdus merula</i>	15	71
81	<i>Turdus philomelos</i>	16	65
82	<i>Vanellus vanellus</i>	1	3
	Total	382	1879

The publication of these historical data enrich our knowledge of the areas mentioned, and it is a true, verifiable inventory, which preserves and completes the picture of the yesteryear avifauna, along with the other catalogs of collections, published in the yearbook of our museum [33, 34].

For the classification of species we have used the multilingual dictionary of bird species in Romania [15], the Nomenclature of Birds in Romania [22] and the website *Fauna europaea* [36]. Of course, none of these is forever true because of the continuing development of molecular biology, which always brings new changes in bird taxonomy, accepted or ignored by ornithologists. This classification should be seen as a true reflection of the situation.

Abbreviations used in the catalog:

1. Collector's name (Legit)

Name	Initials
Bartha Tibor	B. T.
Bujanovics Ede	B. E.
Cseresznyés Szilárd	CS. SZ.
Deák Attila	D. A.
Godan Elena	G. E.
György István	GY. I.
Keszeg Arnold	K. A.
Kónya István	K. I.
Necunoscut	X
Orbán Albert	O. A.
Sincraian Marcu	S. M.
Szentkirályi Miklós	SZ. M.
Szilágyi Alexandru	SZ. A.
Szombath Zoltán	SZ. Z.
XY unidentified fisherman	XY

2. Notes on some characteristics of eggs (column “Phase”, abbreviations)

Phase I – fresh: the egg is translucent without blood network.

Phase II – incubated: the egg with visible blood network.

Phase III – very incubated: the egg in which cartilaginous skeleton occurs.

Phase 0 – sterile: the egg unfertilized, remained in the nest after the incubation period. They are worn, have pale color and more fragile skin.

The first three phases can not be expressed in days because they differ greatly between species.

Oologic catalog

Podicipediformes Order

Podicipedidae Family

Inventory No.	Collecting site	Collecting date	Legit	No. of eggs	Phase
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Tachybaptus ruficollis (Pallas)

370	Cipău, MS	1989.05.27	Sz. Z.	3	I
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Podiceps cristatus (Linnaeus)

364	Cipău, MS	1988.06.20	Sz. Z.	3	I
365	Cipău, MS	1988.06.20	Sz. Z.	3	I
366	Cipău, MS	1988.06.20	Sz. Z.	3	I
367	Cipău, MS	1989.05.27	Sz. Z.	3	I
368	Cipău, MS	1989.05.27	Sz. Z.	3	I
369	Cipău, MS	1989.05.27	Sz. Z.	3	I

Ciconiiformes Order

Ardeidae Family

Ixobrychus minutus (Linnaeus)

5	Cristești, MS	1960.06.01	B. E.	7	II
154	Târgu Mureș, MS	1963.04.17	B. T.	5	I
155	Târgu Mureș, MS	1964.05.04	B. T.	3	I
277	Fărăgău, MS	1961.05.27	Sz. Z.	3	II

Nycticorax nycticorax (Linnaeus)

363	Zau de Câmpie, MS	1987.05.06	S. M.	2	I
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Ardea cinerea Linnaeus

214	Morești, MS	1960.04.28	Gy. I.	3	II
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Ciconiidae Family

Ciconia ciconia (Linnaeus)

1	Voivodeni, MS	1960.04.19	B. E.	5	I
168	Dumbrăvioara, MS	1961.05.21	B. T.	4	II
229	M.ții Harghita, HR	1963.07.01	Gy. I.	4	II

Anseriformes Order

Anatidae Family

Anas platyrhynchos Linnaeus

2	Cuci, MS	1962.04.23	B. E.	10	I
263	Târgu Mureș, MS	1962.05.06	K. I.	10	II
269	Fărăgău, MS	1963.05.05	Sz. Z.	5	I
334	Fărăgău, MS	1968.04.12	Sz. Z.	9	I
338	Tarcea, BH	1968.05.02	Sz. Z.	11	II

Falconiformes Order

Accipitridae Family

Milvus migrans (Boddaert)

158	Târgu Mureș, MS	1962.04.20	B. T.	4	I
159	Târgu Mureș, MS	1962.05.11	B. T.	3	I
179	Pănet, MS	1962.04...	B. E.	3	II

Accipiter gentilis (Linnaeus)

157	Târgu Mureș, MS	1959.04.10	B. T.	3	I
281	Săbed, MS	1961.04.16	Sz. Z.	3	II
372	Bozed, MS	1995.05.01	Sz. Z.	1	0

Buteo buteo (Linnaeus)

161	Beșa, MS	1959.04.01	B. T.	2	I
180	Târgu Mureș, MS	1962.05.02	B. E.	2	I
371	Săbed, MS	1995.05.21	Sz. Z.	1	0
374	Sângeorgiu de Mureș, MS	2006.06.26	D. A.	1	I

Aquila pomarina C. L. Brehm

162	Săbed, MS	1960.06.05	B. T.	2	II
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Hieraaetus pennatus (Gmelin)

160	Târgu Mureș, MS	1962.05.18	B. T.	2	II
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Falconidae Family*Falco tinnunculus* Linnaeus

163	Dumbrăvioara, MS	1960.05.27	B. T.	4	I
164	Dumbrăvioara, MS	1960.06.26	B. T.	5	III
165	Săbed, MS	1961.05.14	B. T.	6	II
166	Săbed, MS	1961.05.23	B. T.	4	III
167	Săbed, MS	1961.05.23	B. T.	5	II
213	Morești, MS	1960.05.19	Gy. I.	6	I
282	Săbed, MS	1961.04.30	Sz. Z.	5	I
283	Săbed, MS	1961.05.14	Sz. Z.	5	II
284	Săbed, MS	1961.05.23	Sz. Z.	5	II

Falco biarmicus Temminck

376	Lodroman, AB	1998.03.14	K. A.	2	0
377	Lodroman, AB	1998.04.28	K. A.	5	0
378	Lodroman, AB	1998.04.08	K. A.	3	0
379	Lodroman, AB	2001.03.20	K. A.	4	0
380	Lodroman, AB	2001.04.15	K. A.	4	0

Galliformes Order
Phasianidae Family

Perdix perdix (Linnaeus)

4	Murgești, MS	1961.07.13	B. E.	11	II
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Coturnix coturnix (Linnaeus)

131	Târgu Mureș, MS	1961.06.11	B. T.	12	I
178	Vălenii, MS	1962.06.22	B. E.	9	III
358	Ernei, MS	1960.06.07	B. E.	9	I

Phasianus colchicus Linnaeus

172	Târgu Mureș, MS	1963.05.09	B. T.	14	II
173	Târgu Mureș, MS	1963.05.11	B. T.	13	I
183	Acățari, MS	1961.07.01	B. E.	8	II
212	Budiu Mic, MS	1960.06.10	Gy. I.	12	I
280	Târgu Mureș, MS	1964.05.19	Sz. Z.	12	II

Gruiformes Order
Rallidae Family

Crex crex (Linnaeus)

3	Vălenii, MS	1962.06.13	B. E.	8	III
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Gallinula chloropus (Linnaeus)

223	Târgu Mureș, MS	1960.05.?	Gy. I.	4	II
267	Târgu Mureș, MS	1964.05.12	Gy. I.	7	III

275	Sântioana de Mureș, MS	1961.05.16	Sz. Z.	6	II
276	Sângeorgiu de Mureș, MS	1961.05.23	Sz. Z.	7	I
360	Valea lui Mihai, BH	1968.05.02	Sz. Z.	3	I

Fulica atra Linnaeus

273	Fărăgău, MS	1961.05.07	Sz. Z.	6	II
274	Sântioana de Mureș, MS	1961.05.16	Sz. Z.	6	I

Otididae Family

Otis tarda Linnaeus

174	Sfântu Gheorghe, TL	1963.04.28	X.Y.	1	-
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Charadriiformes Order

Charadrii Suborder

Charadriidae Family

Charadrius dubius Scopoli

181	Târgu Mureș, MS	1962.05.31	B. E.	4	III
270	Târgu Mureș, MS	1960.06.14	Sz. Z.	3	I
271	Târgu Mureș, MS	1961.06.19	Sz. Z.	4	I
272	Morești, MS	1964.04.26	Sz. Z.	4	I

Vanellus vanellus (Linnaeus)

170	Zau de Câmpie, MS	1962.04.18	B. T.	3	I
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Scolopacidae Family

Limosa limosa (Linnaeus)

6	Fülöpháza, HU	1961.05.21	Cs. Sz.	4	-
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Actitis hypoleucos (Linnaeus)

184	Târgu Mureș, MS	1962.05.31	B. E.	3	I
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Lari Suborder

Laridae Family

Larus ridibundus Linnaeus

169	Sinoe, CT	1964.04.14	B. T.	3	I
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Columbiformes Order

Columbidae Family

Columba oenas Linnaeus

141	Târgu Mureș, MS	1963.04.19	B. T.	2	I
142	Târgu Mureș, MS	1963.04.19	B. T.	2	I

143	Târgu Mureș, MS	1963.05.07	B. T.	2	II
144	Târgu Mureș, MS	1963.05.07	B. T.	2	II
145	Săbed, MS	1963.04.25	B. T.	1	I
216	Târgu Mureș, MS	1960.06.19	Gy. I.	2	I

Columba palumbus Linnaeus

278	Săbed, MS	1961.04.16	Sz. Z.	2	I
335	Săbed, MS	1968.04.27	Sz. Z.	1	0
336	Săbed, MS	1968.07.21	Sz. Z.	2	I

Streptopelia decaocto (Frivaldszky)

187	Târgu Mureș, MS	1961.05.07	Sz. M.	2	I
224	Târgu Mureș, MS	1962.05.?	Gy. I.	2	I

Streptopelia turtur (Linnaeus)

171	Târgu Mureș, MS	1961.04.19	B. T.	2	II
227	Târgu Mureș, MS	1963.06.12	Gy. I.	2	I
279	Lechința, MS	1963.05.26	Sz. Z.	2	I
350	Târgu Mureș, MS	1967.05.24	Sz. Z.	2	I

Cuculiformes Order
Cuculidae Family

Cuculus canorus Linnaeus

11/b	Târgu Mureș, MS	1960.06.01	Sz. M.	1	I
98/b	Târgu Mureș, MS	1960.05.02	B. T.	1	I
356	Morești, MS	1968.05.26	Sz. Z.	1	II

Strigiformes Order
Strigidae Family

Strix aluco Linnaeus

268	Târgu Mureș, MS	1964.04.06	Gy. I.	3	II
362	Berghia, MS	1974.04.11	Sz. Z.	2	0

Asio otus (Linnaeus)

156	Săbed, MS	1962.05.02	B. T.	3	I
175	Brâncovenești, MS	1962.04.27	B. E.	4	II
176	Târgu Mureș, MS	1962.05.20	Sz. M.	4	III
177	Curteni, MS	1963.04.21	Sz. M.	5	I
285	Săbed, MS	1963.04.21	Sz. Z.	4	II
286	Săbed, MS	1962.05.02	Sz. Z.	4	I

Caprimulgiformes Order
Caprimulgidae Family

Caprimulgus europaeus Linnaeus

220	Vălueni, MS	1960.05.?	Gy. I.	1	I
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Coraciiformes Order
Alcedinidae Family

Alcedo atthis Linnaeus

288	Morești, MS	1961.06.14	Sz. Z.	7	I
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Meropidae Family

Merops apiaster Linnaeus

85	Morești, MS	1964.06.08	B. T.	6	I
287	Morești, MS	1963.06.16	Sz. Z.	6	II

Piciformes Order
Picidae Family

Jynx torquilla Linnaeus

230	Vălueni, MS	1963.05.18	Gy. I.	10	I
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Picus viridis Linnaeus

239	Târgu Mureș, MS	1960.04.24	Gy. I.	5	I
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Dendrocopos medius (Linnaeus)

70	Târgu Mureș, MS	1960.05.05	B. E.	5	II
259	Târgu Mureș, MS	1961.05.01	B. T.	6	I

Dendrocopos minor (Linnaeus)

95	Târgu Mureș, MS	1961.05.01	B. T.	5	I
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Passeriformes Order
Alaudidae Family

Galerida cristata (Linnaeus)

32	Dumbrăvioara, MS	1960.06.24	B. E.	5	I
33	Târgu Mureș, MS	1962.04.22	Sz. M.	4	I
111	Dumbrăvioara, MS	1960.06.26	B. T.	4	I
112	Câmpenița, MS	1962.05.02	B. T.	5	II
326	Târgu Mureș, MS	1964.05.31	Sz. Z.	5	I

Hirundinidae Family*Riparia riparia* (Linnaeus)

241	Curteni, MS	1960.06.05	Sz. M.	5	I
242	Curteni, MS	1960.06.05	Sz. M.	4	I
243	Curteni, MS	1960.06.05	Sz. M.	5	I
244	Curteni, MS	1960.06.05	B. E.	4	I
245	Curteni, MS	1960.06.05	B. E.	5	I
246	Curteni, MS	1960.06.05	B. E.	5	I
247	Curteni, MS	1960.06.05	B. E.	4	I
248	Curteni, MS	1960.06.05	B. E.	4	II
249	Curteni, MS	1960.06.05	B. E.	4	II
250	Curteni, MS	1960.06.05	B. E.	5	I
251	Curteni, MS	1960.06.05	B. E.	4	I
252	Curteni, MS	1960.06.05	B. E.	5	II
253	Curteni, MS	1960.06.05	B. T.	6	II
254	Curteni, MS	1960.06.05	B. T.	5	II
255	Curteni, MS	1960.06.05	B. T.	5	II
256	Curteni, MS	1960.06.05	B. T.	5	II
257	Curteni, MS	1960.06.05	B. T.	5	II
258	Curteni, MS	1960.06.05	B. T.	5	I
323	Târgu Mureș, MS	1961.05.30	Sz. Z.	5	I
324	Târgu Mureș, MS	1964.05.31	Sz. Z.	4	I
353	Glodeni, MS	1967.06.26	Sz. Z.	4	I

Hirundo rustica Linnaeus

69	Dumbrăvioara, MS	1961.06.21	B. E.	4	I
96	Târgu Mureș, MS	1960.05.18	B. T.	5	I
97	Miheșu de Câmpie, MS	1960.06.29	B. T.	5	I

Motacillidae Family*Motacilla cinerea* Tunstal

348	Bistra Mureșului, MS	1970.05.31	Sz. Z.	6	I
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Motacilla alba Linnaeus

40	Acățari, MS	1961.06.07	B. E.	6	I
234	Târgu Mureș, MS	1962.05.06	Gy. I.	4	II
316	Târgu Mureș, MS	1961.05.26	Sz. Z.	6	II
317	Târgu Mureș, MS	1963.04.28	Sz. Z.	5	I
318	Pădureni, MS	1964.04.19	Sz. Z.	5	I

Troglodytidae Family*Troglodytes troglodytes* (Linnaeus)

68	Târgu Mureș, MS	1961.05.01	B. E.	7	I
93	Târgu Mureș, MS	1962.05.19	B. T.	6	I

Turdidae Family

Erithacus rubecula (Linnaeus)

12	Târgu Mureș, MS	1962.05.13	B. E.	6	I
13	Remetea, MS	1960.05.01	Sz. M.	6	I
98/a	Târgu Mureș, MS	1960.05.02	B. T.	6	I

Luscinia luscinia (Linnaeus)

94	Dumbrăvioara, MS	1960.05.13	B. T.	5	I
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Phoenicurus phoenicurus (Linnaeus)

61	Sânmartin, HR	1960.05.22	B. E.	5	I
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Oenanthe oenanthe (Linnaeus)

64	Cuci, MS	1962.04.28	B. E.	5	I
325	Morești, MS	1964.04.26	Sz. Z.	5	I

Turdus merula Linnaeus

135	Budiu Mic, MS	1960.04.15	B. T.	4	I
136	Târgu Mureș, MS	1960.05.24	B. T.	4	I
137	Târgu Mureș, MS	1961.04.24	B. T.	5	I
197	Târgu Mureș, MS	1960.04.28	B. E.	5	II
198	Remetea, MS	1960.05.01	Sz. M.	5	II
199	Târgu Mureș, MS	1961.04.25	B. E.	4	II
200	Târgu Mureș, MS	1961.04.25	B. E.	6	II
201	Târgu Mureș, MS	1962.04.20	Sz. M.	4	II
264	Târgu Mureș, MS	1964.05.03	K. I.	5	II
305	Târgu Mureș, MS	1961.05.02	Sz. Z.	5	I
306	Târgu Mureș, MS	1961.04.28	Sz. Z.	6	II
307	Târgu Mureș, MS	1961.05.21	Sz. Z.	4	I
308	Târgu Mureș, MS	1961.06.02	Sz. Z.	4	II
351	Târgu Mureș, MS	1967.05.30	Sz. Z.	5	I
352	Târgu Mureș, MS	1967.06.03	Sz. Z.	5	I

Turdus philomelos C. L. Brehm

116	Târgu Mureș, MS	1960.04.24	B. T.	4	I
117	Dumbrăvioara, MS	1960.04.27	B. T.	4	I
118	Beșa, MS	1960.05.12	B. T.	5	II
119	Târgu Mureș, MS	1960.05.08	B. T.	2	I
120	Târgu Mureș, MS	1961.05.01	B. T.	6	I
188	Târgu Mureș, MS	1960.04.31	B. E.	4	II
189	Târgu Mureș, MS	1960.05.02	Sz. M.	3	I
190	Târgu Mureș, MS	1960.05.02	B. E.	5	II
191	Târgu Mureș, MS	1961.04.25	Sz. M.	5	II
192	Târgu Mureș, MS	1961.05.01	B. E.	5	II
193	Târgu Mureș, MS	1962.05.02	Sz. M.	3	II

219	Livezeni, MS	1960.04.30	Gy. I.	4	I
302	Târgu Mureș, MS	1961.04.28	Sz. Z.	4	II
303	Târgu Mureș, MS	1961.04.30	Sz. Z.	2	I
304	Târgu Mureș, MS	1961.04.30	Sz. Z.	4	II
346	Vălenii, MS	1968.04.25	O. A.	5	II

Sylviidae Family

Acrocephalus palustris (Bechstein)

67	Târgu Mureș, MS	1960.06.09	Sz. M.	4	I
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Acrocephalus scirpaceus (Hermann)

100	Fărăgău, MS	1961.05.28	B. T.	4	I
321	Fărăgău, MS	1961.05.28	Sz. Z.	4	II
322	Târgu Mureș, MS	1963.05.29	Sz. Z.	4	I

Acrocephalus arundinaceus (Linnaeus)

7	Cristești, MS	1960.06.01	B. E.	5	I
8	Sântana de Mureș, MS	1960.05.31	Sz. M.	5	II
9	Cristești, MS	1960.06.01	B. E.	3	I
10	Târgu Mureș, MS	1960.06.14	Sz. M.	5	II
11/a	Târgu Mureș, MS	1960.06.01	Sz. M.	4	I
91	Târgu Mureș, MS	1960.05.22	B. T.	5	I
92	Târgu Mureș, MS	1960.05.29	B. T.	4	I
319	Târgu Mureș, MS	1961.05.26	Sz. Z.	5	II
320	Morești, MS	1961.06.14	Sz. Z.	4	I
347	Cipău, MS	1968.05.12	Sz. Z.	4	I
355	Morești, MS	1968.05.26	Sz. Z.	5	I

Sylvia communis Latham

115	Mureșeni, MS	1960.07.08	B. T.	3	I
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Sylvia borin (Boddaert)

65	Curteni, MS	1960.05.28	Sz. M.	5	II
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Sylvia atricapilla (Linnaeus)

39	Târgu Mureș, MS	1961.05.01	Sz. M.	5	I
110	Târgu Mureș, MS	1960.05.16	B. T.	6	I
231	Târgu Mureș, MS	1964.05.10	Gy. I.	5	II

Muscicapidae Family

Muscicapa striata (Pallas)

66	Târgu Mureș, MS	1961.05.13	Sz. M.	4	I
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Paridae Family

Parus palustris Linnaeus

62	Reghin, MS	1961.04.23	B. E.	10	I
63	Târgu Mureș, MS	1962.05.06	B. E.	11	I

Parus caeruleus Linnaeus

36	Târgu Mureș, MS	1962.05.02	B. E.	11	I
37	Târgu Mureș, MS	1962.05.06	B. E.	10	II
38	Târgu Mureș, MS	1962.05.06	Sz. M.	14	I
102	Târgu Mureș, MS	1960.05.02	B. T.	14	I
236	Târgu Mureș, MS	1962.06.02	Gy. I.	4	I
357	Budiu Mic, MS	1961.06.02	Sz. Z.	6	I

Parus major Linnaeus

34	Reghin, MS	1961.04.23	B. E.	10	I
35	Bălașeri, MS	1962.06.19	B. E.	7	I
103	Târgu Mureș, MS	1960.05.05	B. T.	9	I
104	Târgu Mureș, MS	1962.06.04	B. T.	12	I
240	Târgu Mureș, MS	1961.06.02	Gy. I.	5	I
345	Icland (Ernei) MS	1968.04.24	Sz. Z.	12	I
361	Târgu Mureș, MS	1961.05.28	Sz. Z.	7	I

Sittidae Family

Sitta europaea Linnaeus

53	Târgu Mureș, MS	1960.04.31	B. E.	5	III
54	Târgu Mureș, MS	1962.04.28	Sz. M.	6	II

Oriolidae Family

Oriolus oriolus (Linnaeus)

225	Morești, MS	1963.06.05	Gy. I.	4	I
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Laniidae Family

Lanius collurio Linnaeus

55	Curteni, MS	1960.05.27	Sz. M.	4	I
56	Târgu Mureș, MS	1960.06.09	Sz. M.	4	I
57	Târgu Mureș, MS	1960.05.21	B. E.	4	I
58	Acățari, MS	1961.05.19	Sz. M.	5	I
59	Târgu Mureș, MS	1961.06.18	Sz. M.	5	I
105	Dumbrăvioara, MS	1960.05.27	B. T.	5	I
106	Dumbrăvioara, MS	1960.05.27	B. T.	5	I
107	Gurghiu, MS	1960.07.05	B. T.	4	II
108	Târgu Mureș, MS	1960.07.08	B. T.	5	II
109	Târgu Mureș, MS	1960.07.08	B. T.	4	II
226	Morești, MS	1963.06.12	Gy. I.	5	I

238	Răstolița, MS	1960.06.21	Gy. I.	5	I
310	Târgu Mureș, MS	1963.06.04	Sz. Z.	5	I
311	Târgu Mureș, MS	1963.06.02	Sz. Z.	6	III
312	Târgu Mureș, MS	1963.06.08	Sz. Z.	5	II
349	Târgu Mureș, MS	1967.05.30	Sz. Z.	6	I

Lanius minor Gmelin

60	Curteni, MS	1960.05.28	Sz. M.	5	II
101	Periş, MS	1960.05.20	B. T.	5	I
313	Câmpenița, MS	1964.05.24	Sz. Z.	6	I
327	Târgu Mureș, MS	1963.05.22	Sz. Z.	5	I

Corvidae Family*Garrulus glandarius* (Linnaeus)

121	Beșa, MS	1960.05.15	B. T.	5	II
122	Dumbrăvioara, MS	1960.05.27	B. T.	6	I
123	Târgu Mureș, MS	1961.04.24	B. T.	6	I
124	Târgu Mureș, MS	1961.04.25	B. T.	5	II
125	Târgu Mureș, MS	1962.04.20	B. T.	6	I
126	Târgu Mureș, MS	1962.04.21	B. T.	7	I
127	Târgu Mureș, MS	1962.05.01	B. T.	5	II
128	Târgu Mureș, MS	1962.05.02	B. T.	7	I
129	Târgu Mureș, MS	1962.05.03	B. T.	4	I
202	Târgu Mureș, MS	1960.05.01	B. E.	6	III
203	Reghin, MS	1961.04.23	Sz. M.	6	I
204	Târgu Mureș, MS	1962.04.28	Sz. M.	6	I
218	Târgu Mureș, MS	1960.04.24	Gy. I.	6	I
266	Târgu Mureș, MS	1964.05.10	Gy. I.	5	I
297	Săbed, MS	1962.05.02	Sz. Z.	7	I
343	Vălenii, MS	1968.04.19	Sz. A.	8	I

Pica pica (Linnaeus)

132	Dumbrăvioara, MS	1960.05.16	B. T.	6	I
133	Dumbrăvioara, MS	1961.05.03	B. T.	6	I
134	Târgu Mureș, MS	1963.06.08	B. T.	5	I
209	Glodeni, MS	1960.04.19	B. E.	4	I
210	Cristești, MS	1960.05.18	Sz. M.	7	II
211	Târgu Mureș, MS	1960.05.24	Sz. M.	5	II
260	Cristești, MS	1958.05.22	K. I.	7	I
261	Morești, MS	1964.04.19	K. I.	6	III
262	Sângeorgiu de Mureș, MS	1964.04.26	K. I.	8	I
299	Săbed, MS	1961.04.16	Sz. Z.	4	I
300	Morești, MS	1964.04.26	Sz. Z.	7	I
301	Morești, MS	1964.04.26	Sz. Z.	6	II
340	Icland (Ernei), MS	1968.04.17	Sz. A.	7	I
341	Icland (Ernei), MS	1968.04.17	Sz. A.	7	I
342	Petelea, MS	1967.05.06	K. I.	4	II
354	Icland (Ernei) MS	1968.04.17	Sz. A.	7	I

Corvus monedula Linnaeus

138	Târgu Mureș, MS	1960.05.05	B. T.	3	II
139	Dumbrăvioara, MS	1960.05.16	B. T.	4	II
140	Dumbrăvioara, MS	1960.05.16	B. T.	4	I
185	Dumbrăvioara, MS	1960.05.16	B. E.	4	II
186	Murgești, MS	1960.05.06	B. E.	5	I
217	Morești, MS	1960.05.11	Gy. I.	5	I
298	Morești, MS	1961.04.23	Sz. Z.	4	I
359	Morești, MS	1961.04.23	Sz. Z.	3	I
373	Sântana de Mureș, MS	1996.05.04	G. E.	4	I

Corvus frugilegus Linnaeus

148	Morești, MS	1960.04.03	B. T.	5	I
149	Morești, MS	1961.04.23	B. T.	5	II
150	Morești, MS	1961.04.23	B. T.	4	II
205	Morești, MS	1961.04.23	Sz. M.	5	II
206	Murgești, MS	1961.05.02	B. E.	5	I
207	Murgești, MS	1961.04.23	B. E.	5	II
215	Morești, MS	1962.04.28	Gy. I.	5	I
265	Morești, MS	1964.04.19	Gy. I.	6	II
289	Morești, MS	1961.04.23	Sz. Z.	4	I
290	Morești, MS	1961.04.23	Sz. Z.	4	I
291	Morești, MS	1961.04.23	Sz. Z.	4	II
292	Morești, MS	1961.04.23	Sz. Z.	5	III
293	Morești, MS	1961.04.23	Sz. Z.	5	II
294	Morești, MS	1961.04.23	Sz. Z.	4	I
332	Morești, MS	1964.04.23	Sz. Z.	4	I
333	Morești, MS	1964.04.23	Sz. Z.	5	II

Corvus cornix Linnaeus

151	Săbed, MS	1961.04.30	B. T.	4	I
152	Săbed, MS	1961.05.30	B. T.	5	II
153	Săbed, MS	1961.05.30	B. T.	5	I
208	Sângeru de Pădure, MS	1962.05.14	B. E.	4	I
296	Săbed, MS	1963.04.21	Sz. Z.	4	II
339	Târgu Mureș, MS	1968.04.14	Sz. Z.	5	I
337	Icland (Ernei) MS	1968.04.24	Sz. Z.	5	II

Corvus corax Linnaeus

146	Sângeru de Pădure, MS	1962.03.04	B. T.	6	I
147	Găiești, MS	1962.03.11	B. T.	5	I
182	Sângeru de Pădure, MS	1963.04.07	B. E.	5	II
295	Sâncraiu de Mureș, MS	1962.03.05	Sz. Z.	6	III
375	Budiu Mic, MS	1995.03.27	X.	5	II

Sturnidae Family*Sturnus vulgaris* Linnaeus

130	Săbed, MS	1961.05.14	B. T.	5	I
194	Reghin, MS	1961.04.23	B. E.	4	II
195	Reghin, MS	1961.04.23	Sz. M.	5	II
196	Reghin, MS	1961.04.23	Sz. M.	5	I
221	Sântana de Mureș, MS	1960.05.21	Gy. I.	4	I
328	Săbed, MS	1963.04.21	Sz. Z.	6	I

Passeridae Family*Passer domesticus* (Linnaeus)

17	Târgu Mureș, MS	1960.06.14	Sz. M.	6	I
18	Târgu Mureș, MS	1960.06.13	B. E.	6	II
19	Miheșu de Câmpie, MS	1960.06.17	Sz. M.	4	II
20	Miheșu de Câmpie, MS	1960.06.17	Sz. M.	4	II
21	Miheșu de Câmpie, MS	1960.06.17	Sz. M.	5	II
22	Miheșu de Câmpie, MS	1960.06.17	Sz. M.	5	II
23	Miheșu de Câmpie, MS	1960.06.17	Sz. M.	5	II
24	Miheșu de Câmpie, MS	1960.06.17	Sz. M.	4	I
25	Miheșu de Câmpie, MS	1960.06.17	Sz. M.	4	II
26	Dumbrăvioara, MS	1960.06.19	Sz. M.	5	I
27	Târgu Mureș, MS	1960.06.28	B. E.	6	I
71	Dumbrăvioara, MS	1960.05.21	B. T.	4	I
72	Miheșu de Câmpie, MS	1960.06.05	B. T.	4	I
73	Miheșu de Câmpie, MS	1960.06.05	B. T.	4	II
74	Miheșu de Câmpie, MS	1960.06.06	B. T.	5	II
75	Miheșu de Câmpie, MS	1960.06.07	B. T.	5	I
76	Miheșu de Câmpie, MS	1960.06.08	B. T.	5	I
77	Zau de Câmpie, MS	1960.06.12	B. T.	6	I
78	Zau de Câmpie, MS	1960.06.12	B. T.	4	I
79	Zau de Câmpie, MS	1960.06.13	B. T.	6	I
80	Zau de Câmpie, MS	1960.06.14	B. T.	4	II
81	Zau de Câmpie, MS	1960.06.15	B. T.	4	II
82	Miheșu de Câmpie, MS	1960.06.16	B. T.	5	I
83	Miheșu de Câmpie, MS	1960.06.16	B. T.	6	II
84	Sărmașu, MS	1960.06.24	B. T.	5	II
233	Cristești, MS	1960.07.25	Gy. I.	4	I
329	Miheșu de Câmpie, MS	1960.06.16	B. T.	5	II
330	Miheșu de Câmpie, MS	1960.06.05	B. T.	4	I

Passer montanus (Linnaeus)

28	Târgu Mureș, MS	1960.05.26	Sz. M.	5	I
29	Târgu Mureș, MS	1960.05.28	Sz. M.	4	I
30	Reghin, MS	1961.04.23	B. E.	5	I
31	Târgu Mureș, MS	1962.05.06	Sz. M.	4	II
228	Târgu Mureș, MS	1963.07.04	Gy. I.	4	II
235	Târgu Mureș, MS	1960.06.23	Gy. I.	6	I
237	Berghia, MS	1960.06.10	Gy. I.	5	I
314	Târgu Mureș, MS	1961.05.26	Sz. Z.	4	I
315	Târgu Mureș, MS	1962.05.26	Sz. Z.	3	I

Fringillidae Family

Fringilla coelebs Linnaeus

46	Târgu Mureș, MS	1960.04.24	B. E.	5	I
47	Târgu Mureș, MS	1960.04.24	Sz. M.	5	I
48	Târgu Mureș, MS	1962.05.06	Sz. M.	5	III
49	Târgu Mureș, MS	1962.05.13	Sz. M.	5	II
113	Târgu Mureș, MS	1961.05.01	B. T.	5	II
114	Gurghiu, MS	1960.07.05	B. T.	4	II

Carduelis chloris (Linnaeus)

50	Târgu Mureș, MS	1960.06.06	Sz. M.	4	I
51	Târgu Mureș, MS	1961.05.05	Sz. M.	6	I
52	Târgu Mureș, MS	1961.05.13	Sz. M.	5	I
88	Târgu Mureș, MS	1960.06.28	B. T.	4	I
89	Târgu Mureș, MS	1961.06.22	B. T.	6	I
90	Târgu Mureș, MS	1961.06.22	B. T.	4	I

Carduelis carduelis (Linnaeus)

14	Târgu Mureș, MS	1961.05.12	Sz. M.	6	I
15	Târgu Mureș, MS	1961.05.28	Sz. M.	4	-
16	Acățari, MS	1961.06.02	B. E.	5	-
99	Dumbrăvioara, MS	1960.05.13	B. T.	4	I

Coccothraustes coccothraustes (Linnaeus)

41	Târgu Mureș, MS	1960.04.24	Sz. M.	5	I
42	Târgu Mureș, MS	1960.04.31	Sz. M.	4	I
43	Târgu Mureș, MS	1962.04.27	B. E.	4	I
44	Târgu Mureș, MS	1962.05.13	Sz. M.	4	II
45	Târgu Mureș, MS	1962.05.10	Sz. M.	5	II
86	Târgu Mureș, MS	1960.04.27	B. T.	6	I
87	Târgu Mureș, MS	1962.05.04	B. T.	6	II
232	Târgu Mureș, MS	1960.04.29	Gy. I.	5	I
309	Târgu Mureș, MS	1962.05.04	Sz. Z.	5	I
344	Gornești, MS	1968.04.21	Sz. A.	4	I

Emberizidae Family

Emberiza citrinella Linnaeus

222	Văluțeni, MS	1960.05.25	Gy. I.	3	II
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CATALOGUL COLECȚIEI OOLOGICE DE PĂSĂRI A MUZEULUI JUDEȚEAN MUREȘ, SECȚIA DE ȘTIINȚELE NATURII (Rezumat)

Colecția oologică a muzeului din Târgu Mureș este alcătuită din șase părți (Tabelul 2) și este compusă din 382 de ponte constând din 1879 de ouă, provenind de la 82 de specii de păsări. Peste 90% dintre piese au fost colectate între anii 1960 – 1964, iar restul provin din achiziții sau donații. În afară de acestea, în perioada 1958 – 2011 (54 ani) s-au mai înregistrat 46 de cuibare primite sau colectate și preparate de noi. Din tabelul 4 reiese că 370 de ponte au fost colectate din județul Mureș și doar 12 cuibare provin din altă parte.

Publicarea acestor date oferă informații despre corologia speciilor și îmbogățește cunoștințele despre biodiversitatea avifaunistică a acestor zone și este un inventar fidel, controlabil, care păstrează și completează imaginea avifaunei de odinioară, la fel ca și celelalte cataloage de colecții, publicate în anuarul muzeului nostru [33, 34].



Fig. 1: Nestle destroyed by crows



Fig. 2: Storage



Fig. 3: Tools for eggs conservation



Fig. 4: Ways to storage eggs collection



Fig. 5: Clutches with cuckoo eggs

PALEONTOLOGY AND MINERALOGY

ON THE PRESENCE OF FALLOW DEER (*DAMA DAMA* L., 1758) IN SOME TRANSYLVANIAN SITES (ROMANIA)

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Abstract: This paper discusses four extinct populations, those that had existed in Mureș, Alba and Satu Mare counties. Causes of extinction: the wolves, stray dogs or sheep flocks dogs, poaching, lack of quiet and water.

Keywords: Fallow Deer, Transylvania, Romania.

Introduction

The Fallow Deer was introduced in many counties from Romania [1] but, for various reasons, some of the populations have become extinct. Between 1966 and 1988, Fallow Deer nuclei kept forming, the specimens originating from the counties of Timiș, Alba and Arad. Therefore, colonizations took place among counties and inside counties, the animals being moved from capture to destination sites by lorry. In some places adjustment enclosures were built, in others the Fallow Deer were released directly into the wild.

Material and methods

In order to follow the formation, population dynamics and extinction of the Fallow Deer nuclei studied, field investigations have been conducted (also enquiries among foresters, hunters and some locals) and statistical materials identified in the archives of some forestry units, have been consulted.

Gurghiu nucleus (Mureș County)

The Fallow Deer was colonized in the neighborhood of Gurghiu Commune, on Orșova Hunting Fund (630–700 m alt.), Dosul Forest [1], Poiana Mănăstirii Sector (20 km east of Reghin Town), in the Orșova Valley, 2 km east of Orșova-Pădure Village, at the southern ending of the Reghin Hills.

In May 1966, several individuals were brought from Șarlota Park (Timiș County) along the Șarlota-Deva-Alba Iulia-Târgu Mureș-Gurghiu route, by charcoal fuelled lorry (over a 400 km distance). Among the 20 specimens, four were fawns under one year of age, the oldest individuals being 5–6 years old.

The animals were kept in an enclosure (Poiana Mănăstirii area) surrounded by a 2 m – high wire net. The vegetation of the two-hectare enclosure consisted mostly of common oak, but also of hornbeam and beech.

In autumn 1966 the inmates were released into the wild. No fawn had been born in the enclosure. As long as the animals had been enclosed, food was thrown over the fence lest they got used to man. Water was supplied by the Orșova Brook, as part of it ran through the enclosure. Two weeks after the animals had been released the enclosure was dismantled. In the beginning, Fallow Deer used to come back for food, but after a while they no longer did, spreading out in the surrounding forests as far as Mociar Forest (towards Reghin Town, at 15 km west from colonisation site) and farther towards Gurghiu. Some specimens were seen also towards the south-east, heading to Sovata spa-resort. In the following years, some does and fawns being observed.

In March 1967, Fallow Deer numbered about 20 individuals, from 1968 to 1970 there were constantly 25 (10 bucks and 15 does), subsequently decreasing steadily. Wolves and stray dogs account for the extinction of the species in 1980.

Iezerul Ighiel-Bărbant nucleus (Alba County)

In 1966, a one-hectare enclosure (enlarged to 6.5 ha in 1970) was built on Mount Vârtop (925–1,000 m alt.), Trascău Unit (Apuseni Mts) close to the Iezerul Ighiel Lake at 10 km from Ighiel Village (40 km north-east of Alba Iulia Town). The species was colonized beside other mammals. The region's annual mean air temperature 8°C, precipitation totalling 650 mm/year on average. Seventy per cent of the enclosure area was beech forest and thirty per cent meadow land.

In 1966, seven Fallow Deer were brought from Socodor Forest (Arad County), another 7 (2 bucks, 5 does) coming from Șarlota Park (Timiș County) in March 1968. The 2m-high enclosure was surrounded by wire and barbed wire net.

The population increased from 23 specimens at the end of 1968 to 39 (16 bucks, 23 does) in 1976 and to 43 (17 bucks, 26 does) in 1977, representing the largest effective. In 1973, three specimens were captured and transferred to the forests near Ungurei (Alba County). In 1978 all individuals from Iezerul Ighiel enclosure were captured, carried by lorry and released into the wild in Bărbant (Dumbrava Șardului) Forest (15 km to the south-east) close to Alba Iulia Town.

The long strip-like forest extends on the Dumbrava-Bilag Hills (286–427 m alt.). Annual mean temperature at Ighiu (1.5 km west) is 9.3°C, the average precipitation 568.7 mm. The forest (370 ha) has a *Quercus* vegetation (*Q. petraea*, *Q. robur*, *Q. pubescens*, *Q. cerris*).

The Bărbant Forest nucleus kept decreasing steadily: 15 in 1978 (7 bucks, 8 does), 14 in 1979 (6 bucks, 8 does), 12 in 1980 (5 bucks, 7 does) and 6 in 1981 (2 bucks, 4 does).

Poaching and water shortage led to the extinction of the species (1982–1983).

Ungurei nucleus (Alba County)

Attempts had been made to enclose the species in the central part of the Secaș Plateau, Livada Forest, west/southwest of Ungurei Village (Roșia de Secaș Commune), eastern ending of Alba County (Ohaba Hunting Fund). The name of the forest derives from the homonymous brook, a tributary of the Secașul Mic River. Dominant forest vegetation (335–492 alt): *Quercus petraea*.

In December 1973, a number of three Fallow Deer (an adult doe and two male fawns) were brought (85 km) from the Iezerul Ighiel enclosure (Alba County) in a light lorry and released into the wild (Livada Forest), feeding sites being stuffed with leaves and corn combs.

In 1976, there were five specimens (2 bucks and 3 does), next year there were two pairs, and in 1978 the last two specimens were seen in Gârdan Forest, 5–6 km away from the release site.

In the years 1975 and 1976, attempts were made (but failed) to capture a few individuals from Pianu Forest (near Sebeș Town) to increase the Ungurei nucleus. Later on, the idea was abandoned. What led to the species extinction in 1979 was the small number of individuals initially colonised and subsequently abandoned attempts to enlarge it; shepherd dogs and occasionally wolves came in, too.

Cerhat nucleus (Satu Mare County)

In 1988, at 20 km south of Satu Mare Town, Fallow Deer populated Giungi Hunting Fund, Cerhat Oak Forest (750 ha, 137–168 m alt. in the Someș Plain) between Ghirișa and Rătești villages. The specimens were brought by lorry from Chișineu-Criș Town (Arad County, 210 km) and released into the wild. From 1990 to 1992 there were 25 Fallow Deer (5 bucks and 20 does), 30 in 1993 and 1994 (10 bucks and 20 does), only 2 bucks were over 3 years old, 3 females were mature and 2 were old, the others being fawns. In 1995 and 1996 five pairs had remained and no more than 2 specimens were seen after 1997. In 1998 the species was extinct in this area [2].

A few Cerhat Forest individuals migrated 2 km north, to Ghiarmat oak forest (127–133 m alt.) between the settlements of Baba Novac and Ardud (Terebești Hunting Fund). The first animals (5 does) were seen in March 1991; subsequently in the spring of 1992, 1993 and 1994 there were 5 pairs each; a few specimens returned to Cerhat Forest in 1995. Causes of extinction: inability to adjust to local conditions and poaching.

Conclusions

The paper discusses four extinct populations in the counties of Mureș (Gurghiu), Alba (Iezerul Ighiel-Bărbant and Ungurei) and Satu Mare (Cerhat). Nuclei kept disappearing between 1979 and 1983 (Gurghiu, Iezerul Ighiel-Bărbant and Ungurei), as well as in 1998 at Cerhat.

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DESPRE EXISTENȚA CERBILOR LOPĂTARI ÎN UNELE LOCURI DIN TRANSILVANIA (Rezumat)

Colonizări cu cerb lopătar s-au realizat în numeroase județe din țară, dar din diferite cauze, unele populații ale acestui mamifer au dispărut. În lucrare ne-am oprit asupra a numai patru dintre nucleele extinse de pe teritoriile județelor: Mureș (Gurghiu), Alba (Iezerul Ighiel-Bărbant și Ungurei) și Satu Mare (Cerhat). Nucleele populaționale au fost create în perioada 1966–1988, exemplarele fiind aduse din județele Timiș, Alba și Arad. Transportul indivizilor de la locurile de capturare la cele de colonizare s-a realizat cu camioane. În unele locuri s-au construit țărcuri de acomodare, iar în altele, cerbii lopătari aduși s-au lăsat direct liberi. Extincția nucleelelor s-a înregistrat în intervalul 1979–1983 (Gurghiu, Iezerul Ighiel-Bărbant și Ungurei) și în 1998 la Cerhat. Cauzele extincțiilor au fost: lupii, câinii vagabonzi sau de la turmele de oi, braconajul, lipsa liniștii și a apei.

MAIN PLIOCENE COAL-GENERATING PHYTOCOENOSES IN DANUBE–MOTRU AREA (ROMANIA)

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Abstract: In the Danube–Motru area five main Pliocene biotopes were identified, which acted as coal-generating swamps in Oltenia. Documented by floristic analyzes, they are the following zones: marginal, seasonally flooded, almost permanently covered by water, permanently covered by water exceeding 2 m (≤ 2 m) in depth, permanently covered by water exceeding 3 m (≥ 3 m). In Pliocene the main coal-generating phytocoenoses of Danube–Motru area were generally dominated by one of these taxa: *Glyptostrobus europaeus*, *Byttneriophyllum tiliaefolium*, *Phragmites oeningensis*, *Salix* ssp., *Pandanus* ssp. Sometimes two of these taxa were associated, rarely three. In these paleophytocoenoses, *Carya denticulata*, *Platanus platanifolia*, *Acer tricuspidatum*, *Carpinus betulus*, *Typha latissima*, *Liquidambar europaeum* etc. were secondary elements.

Keywords: Pliocene, phytocoenoses, environments, Oltenia, Romania.

Introduction

The micro – and macrofloristical research of the vegetal fossil remains allow a reconstruction of the biotopes, phytocoenoses and climatic factors that favored the development of luxuriant vegetation in coal-generating swamps, where the parental vegetal material of coals accumulated. Thus, focusing the researches in the Danube – Motru area, mainly in the Husnicioara open pit and the related outcrops, based on new data and of the principle of actuality, according to living correspondents of plants and animal fossils, one can estimate and reconstruct the Pliocene environments.

Previous researches

The first attempts in reconstructing the Pliocene coal-generating vegetation from Oltenia based on macrofloras researches belonged to ȚICLEANU et al. [18, 19, 14]. After, ȚICLEANU [16, 17], ȚICLEANU & DIACONIȚĂ [20] outlined a detailed reconstitution of similar coal-generating vegetation, but for the first time these researchers integrated the vegetal communities in phytocoenoses. The importance of some Pliocene phytocoenoses coal-generating coals in the Danube–Motru area is emphasized also by DIACONU [2], identifying the dominant species of coal-generating flora recorded in Husnicioara open pit.

Based on spore-pollen studies, PETRESCU et al. [11] presented a reconstruction of the plant communities for the Late Pliocene (Romanian) in Roșia Jiu – Turceni area, i.e. from the central part of the coal basin, where these researchers outlined four plant assemblages. Similar

attempts were carried out in Zegujani, Husnicioara and Izvorul Aneștilor areas by PETRESCU et al. [12, 13].

Although previously in Husnicioara PETRESCU et al. [12] made a general environmental reconstruction, the one presented by DIACONU & ȚICLEANU [7] was the first to underline the coal-generating swamps where the parental vegetal material accumulated for the generation of coals from seams I–IV, with detailed analysis of biotopes and plant communities (phytocoenoses and vegetal assemblages).

The ecological study of the floristic repertory of the Mio-Pliocene macrofloras from Danube – Motru sector indicated [5] the presence of distinct biotopes: coniferous forests, deciduous forests, hygrophite deciduous forests, river meadows and marsh forests.

In her Ph.D. thesis, Diaconu [6] stressed out also a reconstruction of the Uppermost Miocene-Pliocene phytocoenoses in Danube – Motru area.

Geological and gitologic settings

Based on genesis, relationship to one of the three lithostratigraphic units and the extending area, the coal seams in Oltenia were grouped into three coal complexes [1]:

- Vișenilor Valley Complex (layers D and I–IV) in Berbești Formation (mainly psammitic; Early Dacian),
- Motru Complex, the most important (coal seams V–XIV), in Jiu-Motru Formation (pelite-psammite-humitic; Romanian – Parscovian),
- Bălcești Complex of the Căndești Formation (psammite-psephitic), developed only in the central area of the basin with minor importance (coal seams XV–XVIII; Middle Romanian – Early Pleistocene).

In Danube – Motru area there are only two of these coal complexes: Vișenilor Valley Complex, characteristic of this sector and Motru complex, weakly extended, in which occur only the coal seams V–VIII with coal mining levels in the northwestern sector (the Western Motru mining perimeter). For coal layers from the two complexes are delimited and exploited of the deposits in perimeters: Husnicioara (layers I, III and IV) Zegujani (layer I) and Western Motru (Layer V).

Between the coals deposits listed above, the most representative for the studied sector is one from Husnicioara, where they accessible for research, the main layers (I, III and IV) of the Complex of Vișenilor Valley. In the exploration drilling of coals for the Danube – Motru sector, DIACONU [5] highlights the lithological sequences of different types in the lithological succession of Romanian-Dacian deposits with coals.

This sequence shows the composition of the most common rhythms for the main coals layers from researched sector, like in all throughout Oltenia and reflects the phases sequence: telmatic, lacustrine, fluvial and fluvial-lacustrine. However, taking into account that between layer I and IV the deposits corresponding of the rhythms containing coal layers II and III are missing, we must accept that at the base of the sands with oblique stratification there is a discordance, it more so, since the layer III in perimeter of the Husnicioara occurs either as a distinct gitologic unit or associated to coal layer IV.

Material and methods

The method used in reconstructing the coal-generating vegetation relies on data provided by the fossil plants collected from the coal deposits and on the coal facies analysis in Husnicioara open pit. The results were compared to the previous geological, pollen and gitologic researches.

Fossil plants are originating from the roof of the coal seams IV and VI of Husnicioara, the yellowish grey marl on Balota Hill and Dedovița and of the clays and silt clays from Bâcleș.

It is considered that the fossil plants had nearly the same coenotic exigencies and ecological requirements as the living correspondents.

The reconstruction of the main pliocene coal-generating phytocoenoses

In the Pliocene deposits of the Danube–Motru sector were identified [18, 12, 2, 3, 21, 9, 10] the following taxa presented in the table 1.

Table 1: Pliocene plant genera and species recorded in Danube–Motru area

No.	Taxa	Husnicioara	Dedovița	Balota Hill	Bâcleș
1	<i>Sequoia abietina</i> (BRONGNIART) KNOBLOCH		+	+	+
2	<i>Pinus</i> sp.		+		
3	<i>Taxodium dubium</i> (STERNBERG) HEER				+
4	<i>Glyptostrobus europaeus</i> (BRONGIART) UNGER	+	+	+	
5	<i>Glyptostroboxylon tenerum</i>	+			
6	<i>Ceratophyllum</i> sp. aff. <i>C. demersum</i> LINNE	+			
7	<i>Platanus platanifolia</i> (ETTINGSHAUSEN) KNOBLOCH	+			+
8	<i>Liquidambar europaea</i> A.L. BRAUN		+	+	
9	<i>Alnus</i> cf. <i>gaudinii</i> (HEER) KNOBLOCH & KVACEK		+		
10	<i>Alnus</i> sp.		+		+
11	<i>Betula</i> cf. <i>macrophylla</i> (GOEPPERT) HEER		+		
12	<i>Carpinus grandis</i> UNGER		+		
13	<i>Carpinus betulus</i> LINNE – leaves	+	+		
14	<i>Carpinus betulus</i> LINNE – bracts	+		+	
15	? <i>Myrica lignitum</i> (UNGER) SAPORTA	+			
16	<i>Carpinus pyramidalis</i> GAUD		+		
17	<i>Fagus attenuata</i> GOEPPERT		+		
18	<i>Quercus roburoides</i> BERENGER		+		+
19	<i>Quercus</i> cf. <i>muehlenbergii</i> ENGELMAN				+
20	<i>Quercus</i> sp.	+			
21	<i>Ulmus laevis</i> LINNE				+
22	<i>Ulmus pyramidalis</i> GOEPPERT				+
23	<i>Acer</i> cf. <i>tricuspidatum</i> BRONN				+
24	<i>Acer</i> cf. <i>campestre</i> LINNE				+
25	<i>Acer</i> sp.	+			
26	<i>Carya denticulata</i> (WEBER) ILJINSKAIA	+			+
27	<i>Carya serraefolia</i> (GOEPPERT) KRAUSEL		+		
28	<i>Juglans acuminata</i> A.L. BRAUN		+		
29	<i>Salix integra</i> GOEPPERT		+		
30	<i>Salix stefănescui</i> LAURENT & MARION	+			
31	<i>Salix</i> sp. aff. <i>S. varians</i> AL. BRAUN		+		
32	<i>Salix</i> sp.	+			+
33	<i>Byttneriophyllum tiliaefolium</i> (AL. BRAUN) KNOBLOCH & KVACEK	+		+	
34	<i>Pandanus austriacus</i> ETTINGSHAUSEN	+			
35	<i>P. trinervis</i> ETTINGSHAUSEN	+			
36	<i>P. barbui</i> PETRESCU & DUȘA	+			
37	<i>Potamogeton</i> cf. <i>nodosus</i> POIR	+			
38	<i>Phragmites oeningensis</i> AL. BR.	+			

In the Danube – Motru area was identified the five main paleobiomes (Fig. 1) that formed the coal-generating swamps from Oltenia during the Pliocene.

1. The marginal zone – The Sequoia Forest is a marginal biome dominated of the forests with *S. abietina*, *Pinus* sp. *G. europaeus*, *Cedrus* and *Sciadopitys*.

2. The seasonally flooded zone – The deciduous forests is the biome in the central part of the coal-generating swamps, with herbaceous vegetation dominated by *Carex* species, various *Pandanus* species and probably *Myrica lignitum* bushes.

In same seasonal flooded areas, in a more advanced stage of vegetation, hygrophite deciduous forests with multi-plant assemblages dominated by *B. tiliaefolium* or various *Salix* species installed. *Salix* associations were probably related to the outside biome and *Myrica lignitum*, *Alnus* sp., *Liquidambar europaeum*, *Carya aquatica* type, *Juglans barbui*, probably *Nyssa* and *Acer tricuspidatum*.

3. The almost permanently covered by water zone – The swamp forest *Glyptostrobus* is a biome absolute dominated by *G. europaeus* assemblages, with *B. tiliaefolium*, *Taxodium dubium*, *Nyssa*. This plant community was characterized by the presence of a discontinuous bed of ferns, especially *Osmunda regalis*. Sometimes the distance between trees reached several meters allowing installing the beds of *Phragmites* and even meshes water with *Stratiotes dactylis*.

4. The permanently covered by water zone (≤ 2 m) – The swamp with *Phragmites* and *Pandanus* was a biome permanently covered with water, from a few centimeters to 2 m in depth, dominated by *Phragmites oeningsensis* plant assemblage with: *Typha latissima*, *Pandanus* div. sp., *Sparganium* sp. and occasionally other species.

5. The permanently covered by water zone (≥ 3 m) – The swamp with aquatic plants was dominated by assemblages with: *Stratiotes dactylis*, *Nelumbo protospeciosa*, *Nymphaea luteum*, *N. alba*, *Ceratophyllum demersum* and *Potamogeton* div. sp.

Each of the plant communities (phytocoenoses, associations) led to a distinct coal facies with specific environmental factors, forming different lithotypes [15, 20].

The Sequoia forest led to form the xylitic coal with many roots which; unfortunately, because of their marginal position these roots were eroded. The coal facies of the grassy swamps with *Carex*, *Pandanus* and *Myrica*, and all the forest swamps with hygrophite deciduous woods formed the detritic coals, but poor xylitic coal in small quantity.

The swampy forests with *Glyptostrobus* generated lithotypes as: coal xylitic and xylite, these two being genetically related. Țicleanu's [14, 15] researches showed that more than 80% of the fossil wood passed into xylite derived from *Glyptostrobus europaeus*, one of the trees that make an important contribution to the establishment of parental vegetal material of the coal from Oltenia.

The swamps with reed (*Phragmites*, *Pandanus* and *Typha*) were much extended when the coal seam IV formed, generating the detritic coal and very little weak xylitic coal. The detritic coal is the most widespread lithotype in the coals from Oltenia. The associations with aquatic plants, depending on their density and the input of suspended clayey minerals formed detritic coals, clayey coals and coal clay.

The changes in water depth due to the changes of the rate of subsidence or flooding, caused alternations in time of the phytocoenoses and formation of the genetic series reported [4] in Husnicioara open pit.

Conclusions

The main Pliocene coal-generating phytocoenoses in Danube-Motru sector were dominated by one of these taxa: *Glyptostrobus europaeus*, *Byttneriophyllum tiliaefolium*, *Phragmites oeningensis*, *Salix* ssp., *Pandanus* ssp. or by two, rarely three of them together. In these phytocoenoses *Carya denticulata*, *Platanus platanifolia*, *Acer tricuspidatum*, *Carpinus betulus*, *Typha latissima*, *Liquidambar europaeum* etc. were secondary elements.

Depending on each phytocoenose and vegetal association recorded in the coal seams I–IV from the Danube-Motru sector, the next coal facies may be outlined:

- The Forest with *Sequoia*, the swamps with *Carex* div. sp and *Pandanus*, replaced in time of the swamp with *Salix* and *Myrica*;
- The swamps with deciduous hydrophytes with tow variants (with *Salix* div. sp. and *Liquidambar europaeum*, *Acer tricuspidatum*, *Alnus* sp., *Carya aquatica*, *Juglans barbui* etc., or with *B. tiliaefolium*);
- The swampy forests with *Glyptostrobus* associated or not with *Taxodium dubium* and/or *Nyssa* sp.;
- The assemblages with *Phragmites* and *Pandanus*, with or without *Typha latissima*, *Sparganium* etc.
- The vegetal assemblages with monocoenoses dominated by taxa: *Stratiotes dacicus*, *Nymphaea*, *Ceratophyllum*, *Nelumbo*, etc.

Each of these facies generated different lithotype of coals. The dominance of the xylite and coal xylitic lithotype shows low values of the pH during the accumulation the parental vegetal material for the layer I and for the layer IV dominated the neutral environments to slightly alkaline that characterize swamps with *Carex*, especially the ones with *Phragmites*.

The dominant anaerobic environment of the coal-generating swamps that has accumulated the parental vegetal material of the layer 1 allowed the preservation of wood fossil, fact noted in the macro-petrographic profiles where the xylite mostly predominates. The parental vegetal material of the coal seam IV accumulated under anaerobic conditions, or less aerobe ones, evidence being the large amount of the coal originating from the detritic facies in swamps with *Phragmites* and less with xylitic coal with origins in the facies coal of the forest with *Glyptostrobus*.

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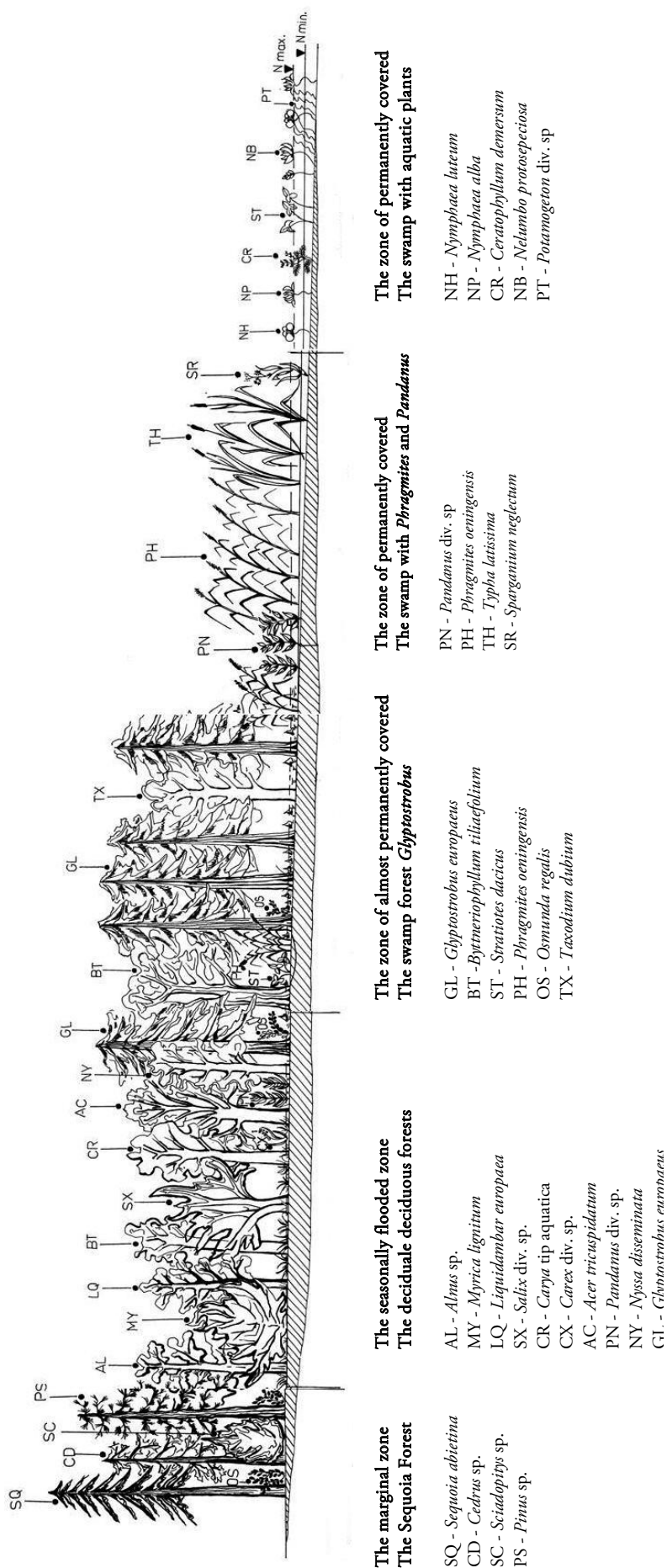


Fig. 1: The main Pliocene biotopes identified in the Danube – Motru area (original)

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**PRINCIPALELE FITOCENOZE CARBOGENERATOARE PLIOCENE
DIN SECTORUL DUNĂRE-MOTRU (ROMÂNIA)
(Rezumat)**

În sectorul Dunăre–Motru au fost identificate cele cinci paleobiotopuri principale care au existat în mlaștinile carbogeneratoare din Oltenia în timpul Pliocenului, fapt ce rezultă din analiza elementelor floristice: zona marginală, zona sezonier inundată, zona apropiată permanent acoperită de apă, zona permanent acoperită de apă (adâncime ≤ 2 m), zona permanent acoperită de apă (adâncime ≥ 3 m).

Principalele fitocenoze carbogeneratoare pliocene din sectorul Dunăre–Motru au fost dominate de unul din taxonii: *Glyptostrobus europaeus*, *Byttneriophyllum tiliaefolium*, *Phragmites oeningensis*, *Salix* ssp., *Pandanus* ssp. sau de doi, rar trei dintre ei. În aceste fitocenoze au fost următoarele elemente secundare: *Carya denticulata*, *Platanus platanifolia*, *Acer tricuspidatum*, *Carpinus betulus*, *Typha latissima*, *Liquidambar europaeum*, etc.

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