

MUZEUL JUDEȚEAN ARGEȘ

ARGESIS

Studii și comunicări
Seria Științele Naturii
XXI



EDITURA ORDESSOS
PITEŞTI
2013

ARGESIS
Series Science of Nature
Annals of the District Argeș Museum,
Pitești

General Manager: Associate professor Spiridon CRISTOCEA, PhD.

Founding director:

University professor Radu STANCU, PhD.

Editorial Board:

Editor in chief: Daniela Ileana STANCU, PhD.

Associated editors: Radu GAVA, PhD.

Valeriu ALEXIU, PhD.

Nicolae LOTREAN, PhD. – secretary

Magdalena ALEXE (CHIRIȚOIU), PhD.

Adrian MESTECĂNEANU, PhD.

Advisory Board:

University professor Dumitru MURARIU, PhD., Member of the Romanian Academy

University professor Thomas TITTIZER, PhD., University of Bonn, Germany

University professor Marin FALCĂ, PhD., University of Pitești

University professor Silvia OROIAN, PhD., University of Târgu-Mureș

University professor Anghel RICHITEANU, PhD., University of Pitești

Typing and Processing: Nicolae LOTREAN
Adrian MESTECĂNEANU

EDITED BY THE ARGEȘ COUNTY MUSEUM
WITH THE SUPPORT OF
THE ARGEȘ COUNTY COUNCIL

Editorial Office Address: Armand Călinescu Street, no. 44, 110047, Pitești.

Phone/fax: 0248/212561; e-mail: argesis.naturale@gmail.com
PITEȘTI – ROMANIA

I. S. S. N. 1453 - 2182

Responsibility for the content of scientific studies and communication belongs to the
authors.

ARGESIS
Seria Științele Naturii
Analele Muzeului Județean Argeș,
Pitești

Director General: Conferențiar universitar dr. Spiridon CRISTOCEA

Director fondator:

Profesor universitar dr. Radu STANCU

Colegiul de redacție:

Editor șef: dr. Daniela Ileana STANCU

Editori asociați: dr. Radu GAVA

dr. Valeriu ALEXIU

dr. Nicolae LOTREAN – secretar

dr. Magdalena ALEXE (CHIRIȚOIU)

dr. Adrian MESTECĂNEANU

Referenți științifici:

Profesor universitar dr. Dumitru MURARIU, Membru al Academiei Române

Profesor universitar dr. Thomas TITTIZER, Universitatea din Bonn, Germania

Profesor universitar dr. Marin FALCĂ, Universitatea din Pitești

Profesor universitar dr. Silvia OROIAN, Universitatea din Târgu-Mureș

Profesor universitar dr. Anghel RICHITEANU, Universitatea din Pitești

Tehnoredactare: Nicolae LOTREAN
Adrian MESTECĂNEANU

EDITAT DE: MUZEUL JUDEȚEAN ARGEŞ
CU SPRIJINUL CONSILIULUI JUDEȚEAN ARGEŞ
Adresa redacției: Str. Armand Călinescu, nr. 44, 110047, Pitești.
Tel./fax: 0248/212561; e-mail: argesis.naturale@gmail.com
PITEŞTI – ROMÂNIA

I. S. S. N. 1453 - 2182

Responsabilitatea conținutului științific al studiilor și comunicărilor revine autorilor.

SUMMARY

Botany and Microbiology

VALERIU ALEXIU - A floristic study of the vascular plants on the territory of commune Căteasca (Argeș County)	7
ROXANA COJOC, SIMONA NEAGU, MĂDĂLIN ENACHE - Extracellular proteolytic activity of halophilic microorganisms isolated from salt rock	27
ANDREEA NATALIA MATEI - The importance of conservation of Bilbor swamps	35
DANIELA ILEANA STANCU - Forest habitats in Râiosu and Buda Mountains, Făgăraș Massif	41

Zoology

DENISA CONETE - Brief historical review of ornithological research on the middle basin of the Argeș River	47
SORIN GEACU - The Great Bustard (<i>Otis tarda</i> Linnaeus, 1758) signalled in Brăila County after 1950	57
NICOLAE LOTREAN - Data on diurnal Lepidoptera fauna of Nature Reserve Spring from Corbii Ciungi (Dâmbovița)	61
ADRIAN MESTECANEANU, RADU GAVA - The avifauna from Vâlcele, Budeasa, Bascov, Pitești, and Golești basins observed in the prevernal season in 2013	71

Protecting the environment

CRISTIAN POPESCU - Polluter Pays Principle - a tool involved in environmental policy and legislation to promote environmental protection	87
--	----

Paleontology and Geology

FLORINA DIACONU, RAMONA ELIZA DIACONU - The Pontian paleontological sites in Mehedinți County (Romania)	93
ION STĂNOIU - The stratigraphy of the Valah Basin with biostratigraphic arguments (Romania)	105

Notes

VALERIU ALEXIU - The fund „Academician Nicolae Boșcaiu” (II)	143
--	-----

CUPRINS

Botanică și Microbiologie

VALERIU ALEXIU - Un studiu floristic al plantelor vasculare de pe teritoriul comunei Căteasca (județul Argeș)	7
ROXANA COJOC, SIMONA NEAGU, MĂDĂLIN ENACHE - Activitatea proteolitică extracelulară a unor microorganisme halofile izolate dintr-un zăcământ subteran de sare	27
ANDREEA NATALIA MATEI - Importanța conservării mlaștinilor Bilborului	35
DANIELA ILEANA STANCU - Habitatele forestiere din Munții Râiosu și Buda, Masivul Făgăraș	41

Zoologie

DENISA CONETE - Scurt istoric al cercetărilor ornitologice din bazinul mijlociu al râului Argeș	47
SORIN GEACU - Semnalări ale dropiei (<i>Otis tarda</i> Linnaeus, 1758) în județul Brăila după 1950	57
NICOLAE LOTREAN - Date asupra faunei de lepidoptere diurne din Rezervația Naturală Izvorul de la Corbii Ciungi (Dâmbovița)	61
ADRIAN MESTECANEANU, RADU GAVA - Avifauna lacurilor de acumulare Vâlcele, Budeasa, Bascov, Pitești și Golești observată în sezonul prevernal al anului 2013	71

Protecția mediului

CRISTIAN POPESCU - Prințipiu Poluatorul Plătește - un instrument implicat în politica și legislația de mediu pentru a promova protecția mediului	87
--	----

Paleontologie și Geologie

FLORINA DIACONU, RAMONA ELIZA DIACONU - Situri paleontologice ponțiene din județul Mehedinți (România)	93
ION STĂNOIU - Stratigrafia Bazinului Valah cu argumente biostratigrafice (România)	105

Note

VALERIU ALEXIU - Fondul „Academician Nicolae Boșcaiu” (II)	143
--	-----

**A FLORISTIC STUDY OF THE VASCULAR PLANTS ON THE
TERRITORY OF COMMUNE CĂTEASCA
(ARGEȘ COUNTY)**

VALERIU ALEXIU

Argeș County Museum, Armand Călinescu Street, no. 44, 110047, Pitești, Argeș, Romania,
e-mail: alexiuv@yahoo.com

ABSTRACT. This paper presents a description of the vascular plants from the Căteasca commune area. This village is located at 20 km away from Pitești, on the right bank of the river Argeș and extends from a side of the Bucharest-Pitești highway. In the studied area were identified 204 plant species, classified in 43 families. Were analyzed biological forms, phytogeographical elements and ecological affinities of these plants. Identification of thermophilic elements of Mediterranean origin, indicating the presence of warm climate microstate.

Key words: vascular plants, Căteasca, biological forms, phytogeographical elements.

REZUMAT. Un studiu floristic al plantelor vasculare de pe teritoriul comunei Căteasca (județul Argeș). Lucrarea prezintă o descriere a plantelor vasculare de pe teritoriul comunei Căteasca. Această comună este localizată la 20 km de Pitești, pe malul drept al râului Argeș, de o parte și de alta a autostrăzii București-Pitești. În teritoriul cercetat au fost identificate 204 specii de plante, încadrate în 43 de familii. Sunt analizate formele biologice, elementele fitogeografice și afinitățile ecologice ale acestor plante. Prezența unor elemente termofile, de origine mediteraneană, indică existența unor microstațiuni cu climat călduros. Sunt menționate în lucrare posibilitățile de valorificare rațională a potențialului vegetal regional.

Cuvinte cheie: plante vasculare, Căteasca, forme biologice, elemente fitogeografice.

INTRODUCTION

Căteasca commune is located 20 km away from Pitești, on the right bank of the river Argeș and extends from a side of the Bucharest-Pitești highway. It is located in the southern part of Romania, in the high plain of Pitești. It comprises five villages: Căteasca, Cireșu, Coșeri, Siliștea, Gruiu. Situated on an ancient Geto-Dacian fireplace housing, Căteasca commune, as the entire surrounding area, benefits of pedoclimatic and geological factors favor of life and human activity. It is situated at the intersection of important routes of communication and ancient trade routes that connects the hilly and plain between Wallachia and Transylvania and regions south of the Danube.

The area that is located Căteasca commune belongs, for the most part, at Argeș river floodplain and High Plaine of Pitești, included in Cotmeana Platform.

The area has a temperate-continental climate. Summer it is traversed by tropical air masses from North Africa, dry and scorching.

Flora and fauna are very rich represented are specific to all areas of contact between the hill and meadow. Flora is represented by forest hills, forest-steppes vegetation and of the meadow vegetation.

MATERIAL AND METHODS

Observations and field researches were performed from 2012 to 2013, during the plants vegetation period. Lists of the Vascular Plants were carried out of bibliographic data and from our own research data. For Căteasca commune we found only 5 to 10 information in the literature, and those due to the lists, especially. Vascular plants are presented in phylogenetic order, the classification adopted by Tutin et al. (Tutin et al., 1964-1980) and Ciocârlan (Ciocârlan, 2009). Within families, species are arranged alphabetically. Floristic list includes:

- scientific name and author (Flora Europaea - <http://rbg-web2.rbge.org.uk/FE/fe.html> - and Flora ilustrată a României. Pteridophyta et Spermatophyta - Ciocârlan, 2009);
- synonyms;
- biological forms (Sanda et al., 2003; Ciocârlan, 2009; Cristea et al., 2004): hemichryptophytes (H), therophytes (T), geophytes (G) and chamephytes (Ch);
- phytogeographical elements (Sanda et al., 2003; Ciocârlan, 2009; Cristea et al., 2004): Adv = Adventitious, Atl-Med = Atlantic-Mediterranean, Circ = Circumboreal, Cosm = Cosmopolit, Eur = European, Euc = Central-European, Eua = Eurasian, Med = Mediterranean, Pont = Pontic;
- the Humidity scale (Sanda et al., 1983; 2003): 1-1.5 = Xerophytes; 2-2.5 = Xeromesophytes; 3-3.5 = Mesophytes; 4-4.5 = Mesohygrophytes; 5-5.5 = Hygrophytes; 6 = Hydrophytes; 0 = Euryphytes;
- The heat scale (Sanda et al., 1983; 2003): 1-1.5 = Cryophytes; 2-2.5 = Microthermophytes; 3-3.5 = Micro-mesothermophytes; 4-4.5 = Moderately-thermophytes; 5-5.5 = Thermophytes; 0 = Eury thermophytes;
- the acidity scale (Sanda et al., 1983; 2003): 1 = High-acidophytes; 2 = Acidophytes; 3 = Acid-neutrophyltes; 4 = Lean acid-neutrophyltes; 5 = Neutro-alkalinophytes; 0 = Euryacidophytes;
- coenotic characteristic (Sanda et al., 2003; Ciocârlan, 2009);
- spread: each species is indicated locations literature (Lit.) accompanied by bibliographic informations or locations for the species identified in the field (Exs.) by the author of this paper.

RESULTS AND DISCUSSIONS

EQUISETACEAE

Equisetum arvense L., G, Cosm, U3T3R0, *Artemisietea*, *Chenopodietae*, *Filipendulo-Petasition*, *Secalietea*. Exs.: Chanel, village Catanele.

DENNSTAEDTIACEAE

Pteridium aquilinum (L.) Kuhn, (*Cincinalis aquiline* (L.) Gled.; *Pteridium tauricum* (C.Presl) V.I.Krecz.; *Pteris aquilina* (L.) Newm.), G, Cosm, U3T3R0, *Quercetea robori-petraeae*. Lit.: Căteasca (Alexiu, 2008).

ASPIDIDACEAE (DRYOPTERIDACEAE)

Dryopteris filix-mas (L.) Schott, (*Aspidium filix-mas* (L.) Sw.; *Nephrodium filix-mas*(L.) Strempe; *Polypodium filix-mas* L., *Nephrodium filix-mas* (L.) Rich.; *Lastrea filix-mas* (L.) C. Presl; *Polyistichum filix-mas* (L.) Roth), H, Cosm, U4R3T0, *Fagetalia sylvatica*, *Querco-Fagetea*. Exs.: Forest, Căteasca.

ARISTOLOCHIACEAE

Aristolochia clematitis L., G, Med, U2.5T3.5R5, *Arction lappae*, *Calystegion*, *Prunetalia*. Lit.: Alexiu, 2008.

Asarum europaeum L., H, Eua, U3.5T3R4, *Fagetalia sylvatica*. Lit.: Alexiu, 2008, Exs.: Forest, Căteasca.

RANUNCULACEAE

Adonis aestivalis L., Th, Eua-Med, U3T4R3, *Secalietea* Exs.: Wheat field, Căteasca.

Adonis vernalis L., H, Eua (Cont), U2T3.5R4, *Festucetalia valesiacae*. Exs.: Gruiu, Wheat field.

Anemone nemorosa L. subsp. *nemorosa*, G, Circ, U3.5T3R0, *Fagetalia sylvatica*, *Querco-Fagetea*. Exs.: Forest, Căteasca.

Anemone ranunculoides L., G, Eur, U3.5T3R4, *Fagetalia sylvatica*, *Querco-Fagetea*. Exs.: Forest, Căteasca.

Clematis vitalba L., nPh-L, Euc-Med, U3T3R3, *Prunetalia*, *Querco-Fagetea*. Exs.: Forest, Căteasca.

Consolida regalis S.F. Gray subsp. *regalis* (*Consolida regalis* Gray ssp. *arvensis* (Opiz) Soo; *Delphinium consolida* L. subsp. *consolida*; *Delphinium consolida* L.; *Delphinium consolida* L. subsp. *arvense* (Opiz) Graebn.), Th, Eur-Med, U2T4R4, *Caucalidion*, *Secalietea*. Exs.: Coșeri.

Nigella arvensis L., Th, Eur-Med, U2T4R4, *Caucalidion*, *Secalietea*. Exs.: Coșeri.

Ranunculus acris L. subsp. *acris*, (*Ranunculus stevenii* auct. Angl.; *Ranunculus stevenii* auct. Hung. et roman.; *Ranunculus stevenii* auct. Angl., hung. et roman., non Andrz. ex Besser), H, Eua, U3.5T0R0, *Molinio-Arrhenatheretea*. Exs.: Schoolyard Căteasca.

Ranunculus ficaria L., (*Ficaria degenii* Hervier; *Ficaria verna* Hudson; *Ficaria nudicaulis* A.Kern.; *Ficaria ranunculoides* Roth; *Ficaria vulgaris* A.St.-Hil.), H-G, Eua, U3.5T3R3, *Querco-Fagetea*. Exs.: village Catanele, Grassland, village Gruiu, forest.

Ranunculus repens L., (*Ranunculus oenanthifolius* Ten. et. Guss.; *Ranunculus pubescens* Lag.), H, Eua (Med), U4T0R0, *Agropyro-Rumicion*, *Alno-Padion*, *Bidentetalia tripartiti*, *Calystegion*, *Molinion-Arrhenatheretea*, *Phragmitetea*, *Plantaginetea majoris*, *Salicetea purpureae*. Exs.: Catanele, Grassland.

Ranunculus sardous Crantz (*Ranunculus pseudobulbosus* Schur; *Ranunculus sardous* Crantz subsp. *xatardii* (Lapeyr.) Rouy et Foucaud; *Ranunculus philonotis* Ehrh.), Th, Eur-Med, U3T3R4, *Agrophyro-Rumicion*, *Agrostion stoloniferae*, *Nanocyperion flavescentis*, *Secalietea*. Exs.: Catanele, Grassland, Căteasca.

PAPAVERACEAE

Chelidonium majus L., (*Chelidonium laciniatum* Mill.), H, Eua, U3R3R4, *Alliarion petiolatae*, *Arction lappae*, *Chenopodietea*, *Epilobietea angustifolii*. Exs.: Village Catanele.

Papaver rhoeas L., *Papaver strigosum* (Boenn.) Schur; *Papaver tenuissimum* Fedde; *Papaver tumidulum* Klokov; *Papaver intermedium* Beck; *Papaver roubiae* Vig.; *Papaver insignitum* Jord.; *Papaver trilobum* Wallr.; *Papaver commutatum* Fisch. et C.A.Mey.), Th, Eua-Med, U3T3.5R4, *Secalitea*. Exs.: wheat field Catanele-Oarja.

URTICACEAE

Urtica dioica L. subsp. *dioica*, H, Cosm, U3T3R4, *Alno-Padion*, *Artemisietea*, *Epilobietalia angustifolii*, *Fagetales*, *Salicion albae*. Exs.: Village Gruiu.

BETULACEAE

Alnus glutinosa (L.) Gaertner., MPh (mPh), Eua, U5T3R3, *Alnion glutinosae*, *Alno-Padion*. Exs.: Village Cireșu.

CORYLACEAE

Corylus avellana L., mPh, Balc, U3T3R3, *Querco-Fagetea*. Exs.: Catanele.

CARYOPHYLLACEAE

Gypsophila muralis L., Th, Eua, (Cont), U2T3R4, *Bidentetalia tripartiti*, *Nanocyperetalia*, *Puccinellio-Salicornietea*, *Secalietea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Lychnis flos-cuculi L., (*Lychnis cyrilli* K. Richt.; *Agrostema flos-cuculi* (L.) G. Don; *Coronaria flos-cuculi* (L.) A. Braun), H, Eua, U3.5T2.5R0,

Magnocaricion elatae, Molinieta, Molinio-Arhenatheretea. Lit.: Căteasca (Alexiu, 2006; 2008).

Lychnis viscaria L. subsp. ***viscaria***, (*Viscaria vulgaris* Bernh.; *Viscaria viscosa* Asch.) Ch (H), Eua U3T4R0, *Festucion rupicolae, Pino-Quercetalia, Sedo-Scleranthetea*. Lit.: Căteasca (Alexiu, 2008).

Saponaria officinalis L., (*Saponaria aenebia* Heldr.), H, Eua (Med), U3T3R0, *Calystegion, Chenopodietea, Senecion fluvialis*. Lit.: Căteasca (Alexiu, 2008).

***Silene alba* (Miller)** E.H.L. Kraus, (*Lychnis alba* Mill.; *Melandrium album* (Mill.) Garcke subsp. *album*; *Melandrium pretense* Rohl.), Th (TH), Eua, U3.5T2R3, *Chenopodio-Scleranthetea, Onopordion acanthi, Origanetalia*. Lit.: Căteasca (Alexiu, 2006; 2008).

Stellaria gramineae L., H, Eua, U2.5T3R3, *Arrhenatheretalia, Molinio-Arrhenateretea*. Lit.: Căteasca (Alexiu, 2006; 2008).

AMARANTHACEAE

Amaranthus albus L., Th, Adv, U3T3R3, *Chenopodietea*. Lit.: Căteasca (Alexiu, 2006; 2008).

***Amaranthus crispus* (Lesp. Et Thev.) N. Terracc.**, Th, Adv, U3T4R3, *Chenopodietea, Sisymbrium officinalis*. Lit.: Căteasca (Alexiu, 2006; 2008).

Amaranthus retroflexus L., (*Amaranthus bulgaricus* Kov.), Th, Adv, U3T3R0, *Chenopodietea, Panico-Setariion*. Exs.: Gruiu, wheat field.

POLYGONACEAE

Polygonum aviculare L., (*Polygonum heterophyllum* Lindm.; *Polygonum littorale* auct.; *Polygonum monspeliacum* Pers.), Th, Cosm, U2.5T0R3, *Polygonion avicularis*. Exs.: Căteasca, Schoolyard.

Polygonum convolvulus L., (*Fallopia convolvulus* (L.), A. Love), Th, Circ, U2.5T3R3, *Aperetalia, Chenopodio-Scleranthetea*. Lit.: Căteasca (Alexiu, 2008).

Polygonum hydropiper L., Th, Circ, U4.5T3R4, *Alnetea glutinosae, Bidention tripartite, Salcion albae*. Lit.: Căteasca (Alexiu, 2006; 2008).

Polygonum lapathifolium L., (*Polygonum paniculatum* Andr.; *Polygonum incanum* F.W.Schmidt; *Polygonum linicola* Sutulov; *Polygonum zaporoviense* Klokov; *Polygonum nodosum* Pers.; *Polygonum scarbum* Moench.; *Polygonum andrzeyowskianum* Klokov; *Polygonum hypanticum* Klokov), Th, Cosm, U4T0R3, *Bidention tripartite, Polygono-Chenopodion polyspermi, Sisymbrium officinalis*. Lit.: Căteasca (Alexiu, 2006; 2008).

Rumex acetosella L., subsp. ***acetosella***, H (G), Cosm, U2T3R2, *Aperetalia*. Exs.: River Neajlov.

ROSACEAE

Crataegus monogyna Jacq. subsp. ***monogyna***, mPh, Eua, U2.5T3R3, *Prunetalia, Querco-Fagetea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Fragaria vesca L., H, Eua, U3T2.5R0, *Cynosurion cristati*, *Epilobietalia angustifolii*, *Querco-Fagetea*. Exs.: „Coasta Dutina”.

Geum urbanum L., H, Med (Circ), U3T3R4, *Alno-Padion*, *Carpinion betuli*, *Prunetalia*, *Querco-Fagetea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Prunus avium L., (*Cerasus avium* (L.) Moench), mPh-MPh, Euc (Med), U3T3R3, *Carpinion betuli*, *Querco-Fagetea*. Exs.: Village Catanele.

Prunus spinosa L. subsp. ***spinosa***, mPh, Eua, (Med), U2T3R3, *Prunion spinosae*. Lit.: Căteasca (Alexiu, 2006; 2008).

Rosa canina L., (*Rosa canina* L. subsp.*dumalis* (Bechst.) Arcang. pro parte; *Rosa willibaldii* Chrshan.; *Rosa sarmentacea* J. Woods pro parte; *Rosa dumalis* Bechst.; *Rosa prutensis* Chrshan.; *Rosa canina* L. subsp. *vulgaris* (Mert. et W.D.J. Koch) Gams; *Rosa communis* Rouy subsp. *canina* (L.) Rouy), nPh, Eur, U2T3R3, *Festuco-Brometea*, *Prunion spinosae*, *Querco-Fagetea*. Exs.: Goleşti dam.

Rubus caesius L., H-nPh, Eur, U4T3R4, *Alno-Padion*, *Convolvuletalia*, *Fagetalia sylvaticae*, *Salicetea purpureae*, *Secalietea*. Lit.: Căteasca (Alexiu, 2006; 2008).

FABACEAE

Coronilla varia L., H, Eua, (Med), U2T3R4, *Festuco-Brometea*, *Quercetea robori-petraeae*. Lit.: Căteasca (Alexiu, 2006; 2008).

Larhyrus aphaca L., Th, Med, U3T3R3, *Caucalidion*, *Secalinetea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Lotus corniculatus L., (*Lotus ambiguous* Bassler ex Spreng.; *Lotus caucasicus* Kuprian.; *Lotus balticus* Miniaev; *Lotus olgae* Kolkov; *Lotus corniculatus* L. subsp. *corniculatus* proles *longipes* Samp. pro parte; *Lotus ruprechtii* Miniaev; *Lotus arvensis* Pers.; *Lotus tauricus* Juz.; *Lotus komarovii* Miniaev; *Lotus zhegulensis* Klokov; *Lotus ucrainicus* Klokov), H, Eua, U2.5T0R0, *Festucetalia valesiacae*, *Festucion vaginatae*, *Molinio-Arrhenatheretea*, *Plantaginetea majoris*, *Secalietea*. Exs.: Village Gruiu.

Medicago lupulina L., (*Medicago appenina* J. Woods), Th,-H, Eua, U2.5T3R4, *Alysso-Sedion*, *Chenopodieteа*, *Festuco-Brometea*, *Molinio-Arrhenatheretea*, *Plantaginetea majoris*, *Secalietea*. Exs.: Village Catanele.

Melilotus alba Medik., Th, (TH), Eua, U2.5T3R0, *Artemisietea*, *Chenopodieteа*. Lit.: Căteasca (Alexiu, 2006; 2008).

Melilotus officinalis (L.) Pall., (*Melilotus petitpierrean* Willd.; *Melilotus arvensis* Wallr.; *Melilotus melilotus-officinalis* Asch. Et Graebn.), Th, (TH), Eua, U2.5T3R0, *Artemisietea*, *Chenopodieteа*, *Secalietea*. Lit.: Căteasca (Alexiu, 2008).

Robinia pseudacacia L., MPh, Adv, U2.5T4R0, *Robinionpseudacacia*. Lit.: Căteasca (Alexiu, 2006; 2008). Exs.: Riverside coppice Catanele.

Trifolium arvense L., subsp. ***arvense***, (*Trifolium capitatum* Pau; *Trifolium agrestinum* Jord.ex Boreau), Th, Eua, U1.5T3R4, *Arrhenatheretalia*, *Corynephoretalia*, *Festuco-Brometea*, *Secalietea*, *Sedo-Scleranthetea*. Lit.: Căteasca (Alexiu, 2006; 2008). Exs.: Village Gruiu.

***Trifolium campestre* Schreb.**, (*Trifolium procumbens* L., nom. Ambig.), Th, (TH), Eur, U3T3R0, *Arrhenatheretalia*, *Festuco-Brometea*, *Plantaginetea majoris*, *Secalietea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Trifolium repens* L.**, subsp. ***repens, H, Eua, U3.5T0R0, *Cynosurion cristati*, *Molinio-Arrhenatheretea*, *Plantaginetea majoris*, *Secalietea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Vicia sativa* L. subsp. *sativa, (*Vicia sativa* L. subsp. *notata* Asch. et Graebn.), Th, Adv, U0T3R0, *Festuco-Brometea*, *Origanetalia*, *Secalietea*. Lit.: Căteasca (Alexiu, 2006; 2008). Exs.: Schoolyard Catane.

***Vicia tetrasperma* (L.) Schreber**, (*Vicia gemela* Crantz; *Ervum tetraspermum* L.), Th, Eua, U3.5T3R3, *Aperetalia*, *Secalietea*. Lit.: Căteasca (Alexiu, 2008).

LYTHRACEAE

***Lythrum salicaria* L.**, (*Lythrum intermedium* Ledeb. Ex Colla), H-Hh, Circ, U4T3R0, *Alnetea glutinosae*, *Filipendulo - Petasition*, *Molinietalia*, *Phragmitetea*, *Salicetea purpureae*. Exs.: River Neajlov.

ONAGRACEAE

***Oenothera biennis* L.**, Th, Adv, U2T4R0, *Chenopodietea*, *Onopordion achantii*, *Syimbrium officinalis*. Exs.: Village Catanele.

EUPHORBIACEAE

***Euphorbia amygdaloides* L.**, (*Euphorbia orjenii* Beck; *Tithymalus amygdalooides* (L.) Hill), Ch, Eur-Med, U3T3.5R4, *Querco-Fagetea*. Exs.; Căteasca, Schoolyard.

SIMAROUBACEAE

***Ailanthus altissima* (Miller) Swingle**, (*Ailanthus peregrine* F.A. Barkley; *Pongelion cacodendron* (Eherh.) Degen; *Ailanthus glandulosa* Desf.), MPh, Adv, U0T0R0, *Ailanthesum altissimae*. Lit.: Căteasca (Alexiu, 2006; 2008).

OXALIDACEAE

***Oxalis corniculata* L.**, Th, Med, U2.5T4R0, *Chenopodietea*, *Polygono-Chenopodion*. Lit.: Căteasca (Alexiu, 2006; 2008).

APIACEAE

***Bifora radians* M.B.**, Th, Med, U3T4R0, *Caucalidion*, *Consolido-Eragrostion*; Exs.: Căteasca, Schoolyard.

Daucus carota* L. subsp. *carota, (*Daucus carota* L. subsp. *maximus* auct. Luist. Non (Desf.) Ball; *Daucus communis* Rouy et E.G.Camus proles *communis*), TH-H, Eua (Med), U2.5T3R0, *Arrhenatherion elatioris*, *Molinio-Arrhenatheretea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Eryngium campestre L., (*Eryngium campestre* L. subsp. *contractum* (Micheletti) Degen; *Eryngium latifolium* Hoffmanns. et Link), H, Pont-Med, U1T4.5T4, *Festucetalia valesiacae*, *Festuco-Brometea*. Lit.: Căteasca (Alexiu, 2006; 2008). Exs.: Chanel, village Catanele.

Pimpinella saxifraga L., (*Pimpinella alpine* Host; *Pimpinella dissecta* Retz.; *Pimpinella nigra* Mill.; *Pimpinella alpestris* (Spreng.) Schult.; *Pimpinella laconica* Halacsy; *Pimpinella saxifrage* L. subsp. *alpestris* (Spreng.) W.D.J. Koch), H, Eua, (Med), U2.5T0R3, *Elyno-Seslerietea*, *Festuco-Brometea*. Exs.: Grassland, Gruiu.

HYPERICACEAE

Hypericum perforatum L., (*Hypericum veronense* Schrank; *Hypericum noeanum* Boiss.), H, Eua, U3T3R0, *Festuco-Brometea*, *Organetalia*, *Sedo-Scleranthetea*. Exs.: River Neajlov.

TILIACEAE

Tilia cordata Miller, (*Tilia officinarum* Crantz; *Tilia officinarum* Crantz subsp. *officinarum* pro parte; *Tilia ulmifolia* Scop.; *Tilia parvifolia* Ehrh. ex Hoffm.), MPh, Eur, U3T3R3, *Carpinion betuli*. Exs.: Village Catanele.

Tilia platyphyllos Scop. subsp. *platyphyllos*, (*Tilia officinarum* Crantz subsp. *platyphyllos* (Scop.) Hayek; *Tilia platyphyllos* Scop. subsp. *braunii* (Simonk) C.K.Schneid. pro parte), MPh, Euc, U2.5T3R4, *Acerion pseudoplatani*, *Fagetalia sylvaticae*, *Querco-Fagetea*. Exs.: Grassland, village Gruiu.

MALVACEAE

Malva pusilla Sm., (*Malva borealis* Wallr.; *Malva rotundifolia* L.), Th-TH, Eua-Med, U3.5T3R3, *Chenopodietea*, *Polygonion avicularis*. Lit.: Căteasca (Alexiu, 2006; 2008).

VIOLACEAE

Viola arvensis Murray, (*Viola banatica* Kit. Ex Roem. Et Schult.; *Viola nana* (DC.) Godr.; *Viola ruralis* Jord. Ex Boreau; *Viola segetalia* Jord.), Th, Cosm, U3T3R0, *Aperetalia*, *Festucetalia valesicae*, *Secalietea*. Exs.: Riverside coppice Catanele.

Viola odorata L., (*Viola stolonifera* Rodr.), H, Alt-Med, U2.5T3.5R4, *Alliarion petiolatae*, *Prunetalia*, *Querco-Fagetea*. Lit.: Căteasca (Alexiu, 2006; 2008).

TAMARICACEAE

Myricaria germanica (L.) Desv., nPh, Eua, U0T0R4, *Salicion elaeagni*, Exs. River Neajlov.

BRASSICACEAE

***Camelina microcarpa* Andrz. Ex DC.**, (*Camelina sativa* auct. ital.; *Camelina sylvestris* Wallr.; *Camelina sylvestris* Wallr. var. *sylvestris*), Th, Eua, U3T3R0, *Aperetalia, Chenopodietea*. Lit.: Căteasca (Alexiu, 2006; 2008).

***Capsela bursa-pastori* (L.) Medik.**, (*Bursa pastorii* Hill; *Thlaspi bursa-pastoris* L.), Th-TH, Cosm (Med), U3T0R0, *Chenopodietea, Chenopodi-Scleranthetea*. Exs.: Triptych, village Gruiu.

***Cardaria draba* (L.) Desv.**, (*Lepidium draba* L. subsp. *draba*; *Lepidium draba* L.), H, Eua, (Med), U2T4R4, *Sysimbrion officinalis*. Lit.: Căteasca (Alexiu, 2008).

Erophila verna* (L.) Chevall. subsp. *verna, (*Draba verna* L.; *Erophila stenocarpa* Jord.; *Draba verna* L. subsp. *verna*; *Erophila vulgaris* DC.), Th, Eur, U2.5T3,5R0, *Festuca-Brometea*. Exs.: Grassland, village Gruiu.

***Rorippa austriaca* (Crantz) Besser**, (*Nasturtium austriacum* Crantz), H (G), Pont, U4T3.5R4, *Agropyro-Rumicion, Bidentea tripartiti, Plantaginetea majoris, Senecio fluvialis*. Lit.: Căteasca (Alexiu, 2006; 2008).

***Sinapis arvensis* L.**, (*Sinapis schkuhriana*, Rchb.; *Brassica arvensis* (L.) Rabenh., non L.; *Sinapis orientalis* L.; *Brasica sinapistrum* Boiss.), Th, Eua, U3T3R2, *Secalietea*. Exs.: Grassland, village Coșeri.

***Thlaspi arvense* L.**, Th, Eua-Med, U2T3R4, *Polygono-Chenopodion polyspermi*. Lit.: Căteasca (Alexiu, 2006; 2008).

SALICACEAE

Salix alba* L. subsp. *alba, MPh-mPh, Eua, U5T3R4, *Alno-Podium, Salicion albae*. Exs.: Biserica Catanele.

***Salix fragilis* L.**, mPh-MPh, Eua, U4.5T3R4, *Alno-Podium, Salicion albae, Salicion triandrae*. Lit.: Căteasca (Alexiu, 2006; 2008).

PRIMULACEAE

***Anagallis arvensis* L.**, (*Anagallis arvensis* L. subsp. *parviflora* (Hoffmanns et Link) Arcang.; *Anagallis arvensis* L. subsp. *monelli* Arcang.; *Anagallis arvensis* L. subsp. *carnea* (Schrink) Gusul. et Morariu; *Anagallis latifolia* L.; *Anagallis caerulea* L.; *Anagallis arvensis* L. subsp. *latifolia* (L.) Braun-Blanq. et Maire; *Anagallis arvensis* L. subsp. *phoenicea* Vollm.; *Anagallis arvensis* L. subsp. *caerulea* auct. eur., non Hartm.; *Anagallis arvensis* L. subsp. *micrantha* (Gren. et Godr.) Rouy; *Anagallis phoenicea* Scop.), Th, Circ, U3T3R0, *Panico-Setarion, Polygono-Chenopodion polyspermi*. Lit.: Căteasca (Alexiu, 2006; 2008).

Primula veris* L. subsp. *veris, H, Eua, U3T2R5, *Arrhenatheretalia, Querco-Fagetea*. Lit.: Căteasca (Alexiu, 2006; 2008). Exs.: Wheat field Catanele.

GENTIANACEAE

***Centaurium erythraea* Rafin.** subsp. *erythraea*, (*Centaurium umbellatum* auct. subsp. *austriacum* Ronniger; *Centaurium umbellatum* auct. subsp. *umbellatum*; *Erythraea centaurium* auct., non (L.) Pers.; *Centaurium umbellatum*

auct. subsp. *transiens* (Wittr.) Ronniger; *Erythraea capitata* Willd.; *Centaurium umbellatum* auct.), Th, Euc, U3T3R2, *Molinio-Arrhenatheretea*. Lit: Căteasca (Alexiu, 2008).

SOLANACEAE

Solanum dulcamara L., (*Solanum depilatum* Kitag.; *Solanum littorale* Rabb), Ch-nPh, Eua, (Med), U4.5T3R4, *Alnetea glutinosae*, *Alno-Padion*, *Bidentea tripartiti*, *Calystegion*, *Epilobietalia angustifolii*, *Phragmition australis*. Exs.: Wheat field Catanele.

Solanum nigrum L., subsp. ***nigrum***, (*Solanum nigrum* L. subsp. *humile* (Bernh.) Marzell; *Solanum nigrum* L. subsp. *luteovirescens* (C.C.Gmel.) Kirsch.; *Solanum moschatum* C. Presl; *Solanum judaicum* Besser; *Solanum moschatum* C. Presl subsp. *moschatum*; *Solanum humile* Bernh. ex Willd., non Lam.; *Solanum suffruticosum* Schousb. ex Willd.; *Solanum nigrum* L. subsp. *chlorocarpum* (Spenn.) Arcang.; *Solanum morella* Desv. subsp. *nigrum* (L.) Rouy; *Solanum nigrum* L. subsp. *stenopetalum* (A. Braun) Arcang.; *Solanum dillenii* Schult.; *Solanum nigrum* L. subsp. *dillenii* (Schult.) Nyman), Th, Cosm, U3T4R0, *Chenopodietea*. Exs.: Village road Catanele-Goleşti.

CONVOLVULACEAE

Convolvulus arvensis L., G (H), Cosm, U0T0R0, *Arction lappae*, *Festuco-Brometea*, *Chenopodio-Scleranthetea*, *Sisymbrium officinalis*, *Caucalidion*. Exs.: Kindergarten, village Catanele.

BORAGINACEAE

Myosotis arvensis Hill subsp. ***arvensis*** (*Myosotis intermedia* Link), TH, Eua, U3T3R0, *Aperetalia*, *Arrhenatheretalia*, *Epilobietea angustifolii*. Exs.: Pond, village Gruiu.

Symphytum officinale L. subsp. ***officinale***, (*Symphytum officinale* L. subsp. *bohemicum* (F. W. Schmidt) Celak.; *Symphytum boemicum* F. W. Schmidt; *Symphytum molle* Janka), H, Eua, U4T3R0, *Molinietalia*, *Phragmitetea*. Exs.: Schoolyard Gruiu.

LAMIACEAE

Ajuga genevensis L., H, Eua, (Cont), U2,5T3R4, *Cynosurion cristati*, *Festuco-Brometea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Leonorus cardiaca L. (*Leonorus villosus* Desf. ex Spreng.; *Leonorus tataricus* L.; *Leonorus quinquelobatus* Usteri; *Leonorus glaucescens* Ledeb.), H, Eua, U3T4R4, *Arction lappae*, *Chenopodietea*. Exs.: Village Catanele – chanel.

Lycopus europaeus L., H, Eua, U5T3R0, *Bidentetea tripartiti*, *Salicetea purpureae*. Exs. Căteasca, Schoolyard.

Mentha aquatica L., (*Mentha litoralis* (Hartm.) Neuman; *Mentha hirsute* Huds.; *Mentha braunii* Oborny A.), H-Hh, Eur, U5T3R0, *Alnetea glutinosae*, *Molinietalia*, *Phragmitetea*, *Salicion albae*. Exs.: River Neajlov.

***Prunella vulgaris* L.**, H, Cosm, U3T3R0, *Alnetea glutinoase*, *Bidentea tripartite*, *Plantaginetea majoris*, *Querco-Fagetea*. Exs.: Village Cireşu.

PLANTAGINACEAE

***Plantago lanceolata* L.**, (*Plantago glabriflora* Sakalo; *Plantago lanuginosa* Bastard), H, Eua, U0T0R0, *Festuco-Brometea*, *Molinio-Arrhenatheretea*. Exs.: Village road Catanele - Oarja.

SCROPHULARIACEAE

***Kickxia spuria* (L.) Dumort.**, (*Elatinoides spuria* (L.) Wettst.; *Linaria spuria* (L.) Mill.; *Linaria spuria* (L.) Mill. subsp. *spuria*; *Linaria spuria* (L.) Mill. subsp. *spuria* var. *spuria*), Th, Euc-Med, U2.5T4R4, *Caucalidion*, *Nanocyperetalia*, *Secalietea*. Lit.: Căteasca (Alexiu, 2006; 2008).

***Linaria genistifolia* (L.) Mill.**, H, Eua-Cont, U1T3,5R5, *Festuco-Brometea*. Lit.: Căteasca (Alexiu, 2006; 2008).

***Veronica chamaedrys* L.** subsp. *chamaedrys*, H, (Ch), Eua, (Med), U2,5T3R4, *Arrhenatheretalia*. *Prunetalia*, *Rumicion alpine*, *Trifolion medii*. Exs.: Căteasca, Schoolyard.

***Veronica hederifolia* L.** subsp. *hederifolia*, Th, Eua, (Med), U2.5T3R4, *Aphanion*, *Polygono-Chenopodion polyspermi*, *Querco-Fagetea*, *Secalietea*. Lit.: Căteasca (Alexiu, 2006; 2008).

RUBIACEAE

***Cruciata laevipes* Opiz**, (*Cruciata chersonensis* auct.; *Galium cruciata* (L.) Scop.; *Cruciata ciliata* Opiz), H, Eua, U2.5T3R3, *Alno-Padion*, *Artemisietalia*, *Convoluteletalia*, *Salicion albae*. Lit.: Căteasca (Alexiu, 2006; 2008).

***Galium aparine* L.**, (*Galium spurium* L. subsp. *tenereum* (Schleich.) Nyman), Th, Circ, U3T3R3, *Convoluteletalia*. Exs.: Village Coşeri.

***Galium mollugo* L.**, (*Galium mollugo* L. subsp. *insubricum* (Gaudin) Arcang.; *Galium mollugo* L. subsp. *elatum* (Thuill.) Syme; *Galium insubricum* Gaudin; *Galium mollugo* L. subsp. *tyrolense* (Willd.) Haeyk; *Galium elatum* Thuill.; *Galium kernerianum* Klokov; *Galium tyrolense* Willd.), H, Eua, U3T0R3, *Arrhenatheretalia*, *Festuco-Brometea*, *Seslerio-Festucion pallentis*, *Teucrion montani*. Exs.: Triptych, village Gruiu.

***Galium schultesii* Vest.**, (*Galium aristatum* L. subsp. *schultesii* (Vest) Nyman; *Galium intermedium* auct., non Schult.; *Galium sylvaticum* L. subsp. *schultesii* (Vest) Stoj. et Stef.), G, Euc, U2.5T3R3, *Carpinion betuli*, *Querco-Fagetea*. Lit.: Căteasca (Alexiu, 2006; 2008).

CAPRIFOLIACEAE

***Sambucus ebulus* L.**, (*Sambucus deborensis* Kosanin), H, Eua, (Med), U3T3R4, *Arction lappae*, *Artemisietea*, *Epilobietea angustifolii*. Exs.: Forest Coşeri.

ASTERACEAE

Achillea millefolium L. subsp. *millefolium*, H, Eua, U3T0R0, *Agropyro-Rumicion*, *Artemisietea*, *Molinio-Arrhenathereta*, *Polygonion avicularis*. Exs.: Village Catanele.

Arctium lappa L., (*Arctium majus* Bernh.; *Arctium chaorum* Klokov; *Lappa glabra* Lam.; *Lappa major* Gaertn.; *Lappa officinalis* All.), TH, Eua, U3T3R4, *Arction lappae*. Exs.: Riverside coppice Catanele.

Bellis perennis L., H, Eur, (Med), U3T2.5R0, *Cynosurion cristati*, *Molinio-Arrhenatheretea*. Exs.: Căteasca, Schoolyard.

Bidens tripartite L., (*Bidens bullata* L.; *Bidens orientalis* Velen.), Th, Eua, U5T0R0, *Bidention tripartite*. Lit.: Căteasca (Alexiu, 2006; 2008).

Carduus crispus L. subsp. *crispus*, (*Carduus crispus* L. subsp. *agrestis* (A. Kern.) Vollm.; *Carduus incanus* Klokov), TH, Eur, U4T3R0, *Alno-Padion*, *Artemisietea*, *Salicion albae*. Lit.: Căteasca (Alexiu, 2006; 2008).

Carduus personata (L.) Jacq., H, Euc, U4.5T2.5R4, *Adenostylion alliariae*, *Alno-Padion*, *Filipendulo-Petasition*. Exs.: Chanel, Catanele.

Centaurea cyanus L., Th-TH, Cosm, U3T4R3, *Aperetalia*, *Secalietea*. Exs.: Wheat field, Căteasca.

Chamomilla recutita (L.) Rauschert, (*Matricaria recutita* L.; *Matricaria suaveolens* L.; *Matricaria chamomilla* L. pro parte), Th, Eua, U3T3.5R5, *Aperetalia*, *Chenopodio-Scleranthetea*, *Plantaginetea majoris*, *Puccinellio-Salicornietea*. Exs.: Căteasca, Schoolyard.

Chondrilla juncea L., (*Chondrilla latifolia* M.Bieb.; *Chondrilla graminea* M.Bieb.; *Chondrilla gummifera* Iljin; *Chondrilla brevirostris* Fisch. et C.A.Mey.; *Chondrilla canescens* Kar. et Kir.; *Chondrilla acantholepis* Boiss.), TH-H, Eua (Cont), U1.5T3.5R4, *Chenopodieta*, *Festucetalia valesicae*, *Festucion vaginatae*, *Festuco-Brometea*, *Secalietea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Cichorium intybus L. subsp. *intybus*, H, Eua, U2.5T3.5R4, *Agrostion stoloniferae*, *Arrhenatheretalia*, *Polygonion avicularis*, *Puccinellio-Salicornietea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Cirsium arvense (L.) Scop., (*Cirsium setosum* (Willd.) M.Bieb.; *Cirsium incanum* (S.G.Gmel.) Fisch.; *Cnicus arvensis* (L.) Roth; *Cirsium horridum* (Wimm. & Grab.) Stankov, non (M.Bieb.) Fisch.; *Cirsium argenteum* Peyer ex Vest), G, Eua, U0T0R0, *Artemisietea*, *Chenopodio-Scleranthetea*, *Epilobietea angustifolii*, *Onopordion acanthii*. Exs.: Maize cultures, village Coșeri.

Cirsium oleraceum (L.) Scop., (*Cirsium acaulon* (L.) Scop.; *Cnicus oleraceus* L.), H, Eua, U4T3R4, *Alno-Padion*, *Calthion palustris*, *Filipendulo-Petasition*, *Molinieta*. Lit.: Căteasca (Alexiu, 2006; 2008).

Conyza canadensis (L.) Cronq., (*Erigeron canadensis* L.; *Trimorphia canadensis* (L.) Lindm.), Th, Adv, U2.5T0R0, *Chenopodieta*, *Festucion vaginatae*, *Sisymbrium officinalis*. Lit.: Căteasca (Alexiu, 2006; 2008).

Eupatorium cannabinum L., H, Eua, U4T3R0, *Alnion glutinosae*, *Epilobietea angustifolii*, *Filipendulo-Petasition*, *Phragmitetea*, *Salicetea purpureae*. Exs.: Dutina.

***Galinsoga parviflora* Cav.**, (*Galinsoga quinquiradiata* Ruiz et Pav.), Th, Adv, U3.5T0R3, *Polygono-Chenopodietalia*. Lit.: Căteasca (Alexiu, 2006; 2008).

***Matricaria perforata* Merat**, (*Tripleurospermum maritimum* (L.) W.D.J.Koch subsp. *inodorum* (K.Kock) Hyl. Ex Vaar.; *Chamaemelum inodorum* Sch. Bip.), Th-TH, Eua, U0T3R3, *Onopordion acanthi*, *Sisymbrium officinalis*. Lit.: Căteasca (Alexiu, 2006; 2008).

***Senecio vulgaris* L.**, (*Senecio dunensis* Dumort.; *Senecio radiatus* W.D.J.Koch), Th, Eua, U3T0R0, *Chenopodietea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Sonchus arvensis* L.** subsp. ***arvensis, (*Sonchus vulgaris* Rouy subsp. *arvensis* (L.) Rouy; *Sonchus decorus* Castagne; *Sonchus humilis* N.I.Orlova), G, Eua, U3T3R4, *Polygono-Chenopodion polyspermi*. Lit.: Căteasca (Alexiu, 2006; 2008).

***Sonchus oleraceus* L.**, Th, Cosm, U3T0R0, *Stellarietea mediae*. Lit.: Căteasca (Alexiu, 2006; 2008).

Tanacetum corymbosum* (L.) Schultz Bip.** subsp. ***corymbosum, (*Pyrethrum subcorymbosum* (Sch.Bip.) Schur; *Pyrethrum corymbiferum* (L.) Schrank; *Chrysanthemum corymbosum* L.), Th, Eua, U2.5T3.5R3, *Festucetalia valesicae*, *Geranion sanguinei*, *Quercetalia pubescens*, *Querco-Fagetea*. Exs.: Village Catanele.

***Taraxacum officinale* Weber ex Wiggers**, H, Eua, U3T0R0, *Arrhenatheretalia*, *Artemisietea*, *Plantaginetea majoris*. Exs.: Village Catanele.

Xanthium strumarium* L.** subsp. ***strumarium, (*Xanthium sibiricum* Patrим ex Widder), Th, Cosm, U3.5T3.5R4, *Chenopodio-Scleranthesetalia*. Exs.: Riverside coppice, village Catanele.

HYACYNTHACEAE

Scilla bifolia* L.** subsp. ***bifolia, (*Scilla bifolli* L. subsp. *subtriphylla* (Schur) Domin), G, Eur, U3.5T3R4, *Alno-Padion*, *Carpinion betuli*, *Querco-Fagetea*. Exs.: Riverside coppice, village Catanele.

AMARYLLIDACEAE

***Galanthus nivalis* L.**, G, Eur, U3.5T3R4, *Fagetalia sylvaticae*, *Querco-Fagetea*. Exs.: Village Gruiu.

IRIDACEAE

***Iris pseudocorus* L.**, G-Hh, Eur, U5.5T0R0, *Phragmitetea*, *Alnetea*, *Phragmitetalia*. Exs. Catanele, swampy ditches.

JUNCACEAE

***Juncus bufonius* L.**, (*Juncus dregeanus* C.Presl; *Juncus divaricatus* Gilib.), Th, Cosm, U4.5T0R3, *Bidentetea tripartite*, *Nanocyperetalia*, *Plantaginetalia majoris*. Lit.: Căteasca (Alexiu, 2006; 2008).

POACEAE

Alopecurus pratensis L. subsp. *pratensis*, (*Alopecurus pratensis* L. subsp. *alpestris* (Wahlenb.) Selander), H, Eua, U4T3R0, *Agrostion stoloniferae*, *Calthion palustris*, *Filipendulo-Petasition*, *Molinio-Arrhenatheretea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Apera spica-venti (L.) Beauv. subsp. *spica-venti*, (*Apera longistea* Klokov), TH, Eua, U3.5T0R2, *Aperetalia*. Lit.: Căteasca (Alexiu, 2006; 2008).

Avena fatua L., Th, Eua-Med, U3T0R4, *Secalietea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Bromus sterilis L., (*Bromus grandiflorus* Weigel; *Anisantha sterilis* (L.) Nevski; *Bromus distichus* Moench; *Zerna sterilis* (L.) Panz.), Th, Eua, (Med), U2T4R4, *Arction lappae*, *Chenopodieta*, *Onopordion acanthi*, *Sisymbrium officinalis*. Lit.: Căteasca (Alexiu, 2006; 2008).

Cynodon dactylon (L.) Pers., (*Dactylon officinale* Vill.), G, Cosm, U2T3.5R0, *Festuco-Brometea*, *Polygonion avicularis*. Lit.: Căteasca (Alexiu, 2006; 2008).

Digitaria sanguinalis (L.) Scop., (*Digitaria pectiniformis* (Henrard) Tzvelev; *Digitaria aegyptiaca* (Retz.) Willd.; *Panicum sanguinale* L.; *Digitaria gracilis* Guss.; *Digitaria ciliaris* auct., non (Retz.) Koeler), Th, Cosm, U1.5T0R4, *Polygono-Chenopodieta*. Lit.: Căteasca (Alexiu, 2006; 2008).

Echinochloa crus-galli (L.) Beauv., (*Echinochloa erecta* (Pollacci) Pignatti; *Panicum crus-galli* L.), Th, Cosm, U4T0R3, *Bidention tripartite*, *Chenopodieta*. Lit.: Căteasca (Alexiu, 2006; 2008).

Elymus repens (L.) Gould, (*Agropyron repens* (L.) P. Beauv.; *Elytrigia repens* (L.) Nevski; *Agropiron repens* (L.) P. Beauv. subsp. *repens* var. *repens*; *Agropyron caesium* J. Presl proles *caesium*; *Triticum repens* L. var. *repens*; *Agropiron caldesii* Goiran; *Elytrigia repens* (L.) Nevski subsp. *repens* var. *repens*; *Agropyron caesium* J. Presl et C. Presl; *Triticum repens* L.), G, Circ, U0T0R0, *Artemisieta*, *Molinio-Arrhenatheretea*, *Agropyro-Rumicion*. Lit.: Căteasca (Alexiu, 2006; 2008); Exs. Village Catanele.

Festuca pratensis Hudson subsp. *pratensis*, H, Eua, U3.5T0R0, *Agrostion stoloniferae*, *Molinio-Arrhenatheretea*. Lit.: Căteasca (Alexiu, 2006; 2008).

Phragmites australis (Cav.) Trin ex Steudel subsp. *australis* (*Phragmites communis* Trin.; *Phragmites vulgaris* Samp.; *Phragmites pumila* Willk.; *Phragmites gigantea* J. Gay; *Arundo phragmites* L.; *Phragmites loscosii* Willk.), Hh, Cosm, U6T0R4, *Phragmition australis*. Lit.: Căteasca (Alexiu, 2006; 2008). Exs. Meadow Argeș, village Căteasca.

Poa pratensis L., (*Poa pratensis* L. subsp. *attica* (Boiss. et Heldr.) Rech. F.; *Poa pinegensis* Roshev.; *Poa turfosa* Litv.; *Poa attica* Boiss. et Heldr.), H, Cosm, U3T0R0, *Molinietalia*, *Molinion coeruleae*. Exs.: Village Gruiu.

Setaria pumila (Poiret) Schultes, (*Setaria lutescens* (Weigel) F.T. Hubb.; *Setariopsis glauca* auct., non (L.) Samp.; *Setaria glauca* auct., non (L.) P. Beauv.),

Th, Cosm, U2.5T4R0, *Eragrostetalia*, *Polygono-Chenopodietalia*. Lit.: Căteasca (Alexiu, 2006; 2008).

***Setaria viridis* (L.) Beauv.**, (*Setariopsis viridis* (L.) Samp.), Th, Cosm, U2T3.5R0, *Polygono-Chenopodietalia*. Exs.: Village Catanele.

***Sorghum halepense* (L.) Pers.**, (*Andropogon halepensis* (L.) Brot.), H, Med, U3T4R0, *Stellarietea mediae*. Lit.: Căteasca (Alexiu, 2006; 2008).

Taxonomic analysis of flora

As a consequence of consulting the literature and of the personal research in the field we can say that Căteasca common flora is represented by 204 species, distributed in 43 families. The families with the most species are: Asteraceae with 24 species (12%), Ranunculaceae with 20 species (10%), Poaceae with 18 species (9%), Fabaceae with 15 species (7%), Rosaceae with 10 species (5%), Brassicaceae and Lamiaceae with 8 species each (4%), Scrophulariaceae, Apiaceae and Caryophyllaceae with 6 species each (3%), Polygonaceae with 5 species (2%). These 11 families form the core floral background, representing 62% of the flora researched territory. 32 families have 1-4 species, making up 38% of the flora (Fig. 1).

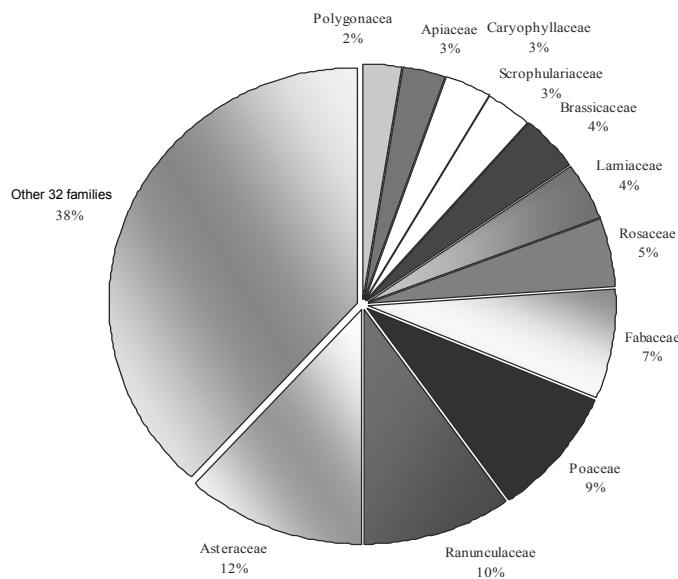


Figure 1 - Taxonomic analysis of flora.

Analysis of biological forms

Flora analysis by the percentage of different bioforms highlights predominance of hemicryptophytes (39%), indicating herbaceous layer mosaic of forests and coppices dominated by phanerophytes, and the presence of large areas of grassland mesophilic in the investigated region.

Follows in order terrophytes (33%), therefore the process of soil erosion (offering good conditions pioneer species) and anthropogenic influences. Chamaephytes and geophytes, fewer in number, are present in forests and grasslands. Hydrohelophytes, a limited number, meet the small areas occupied by ponds and rivers (Fig. 2).

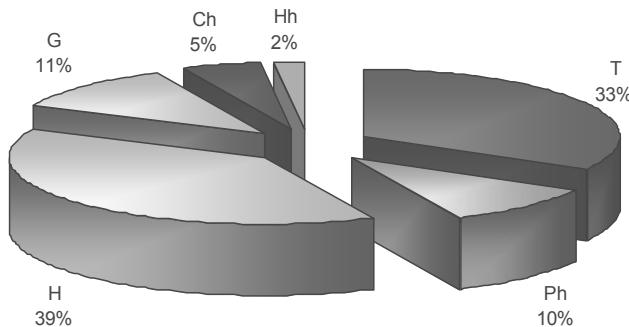


Figure 2 - Bioforms spectrum of flora.

Phytogeographical analysis

The phytogeographic spectrum shows the predominance of Eurasian elements (46%), followed by European (9.58) and cosmopolitan (8.21%). Floristic structure is colored by thermophilic elements of Mediterranean origin: Atl-Med, Med (5%), indicating the existence of warm microclimate stations. In term of floristic composition, thermophilic elements are very similar to those described in the southern parts of the country, indicating phyto-historical continuity of these lands (Fig. 3).

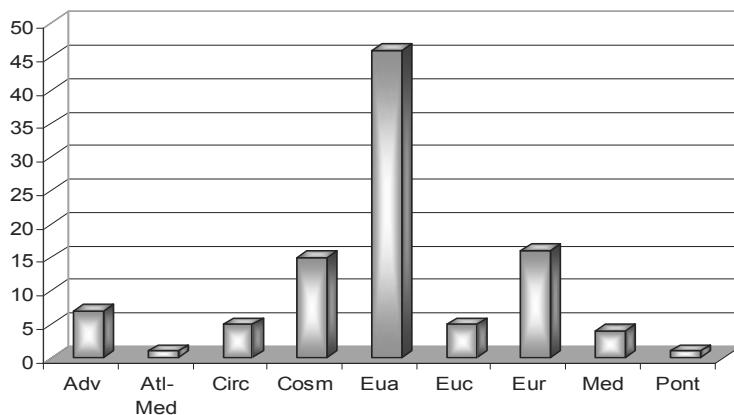


Figure 3 - Floristical elements of flora.

Cosmopolitan and adventitious elements are more common in ruderal and vegetal phytocoenosis and formations hydro- and hydrophilic, inhabiting swamps and rivers in the area. Eurasian element of remarkable proportions entering the plant associations, the signal: *Lychnis viscaria*, *Cirsium arvense*, *Sonchus arvensis*, *Achillea millefolium*, *Cichorium intybus*, *Eupatorium cannabinum*, *Taraxacum*

officinale, *Stellaria graminea* etc. European species are represented by: *Galanthus nivalis*, *Scilla bifolia*, *Anemone ranunculoides*, *Tilia cordata*, *Rosa canina*, *Sambucus nigra*, *Trifolium campestre*, *Nigella arvensis*, *Euphorbia amygdaloides*.

Central European species category mentioned: *Galium schultesii*, *Centaurium erythraea*, *Coronilla varia*. Significant presence Atlanto-Mediterranean species *Viola odorata*, as well as the Mediterranean: *Sorghum halepense*, *Bifora radians*, *Oxalis corniculata*, *Geum urbanum*, *Lathyrus aphaca*.

Spectrum of ecological indices

To characterize the flora in the perimeter of Căteasca in terms of ecological affinities were taken into account three major factors: humidity, temperature and soil reaction.

Analyzing the distribution of flora by species based on their requirement to humidity factor (U), it is noted that the species (45%) are mesophilic, as shown there favorable conditions of humidity all over the commune. Mesohygrophilic and hygrophilis species (21%) indicated the presence of excess moisture favors the development of mesohygrophilic and hygrophilic coenosis. Xero-mesophilic species (24%) indicated the presence of states with moisture regim that favors the development of xero-mesophilic grassland types. Compared to them, xerophilic species (2.1%) are much less represented, they appear only islander on sunny slopes inclined. Regarding the behavior of plants in relation to temperature, the temperate climat determines the predominance of micro-mesothermal elements (63%), followed by moderately thermophilic species (12%).

From the point of view of edaphic preferences, of the soil reaction, weakly acid-neutrophilic species have the highest proportion (33%), followed by acid-neutrophilic (24%). A large number are euryionic species (37%), (Fig. 4).

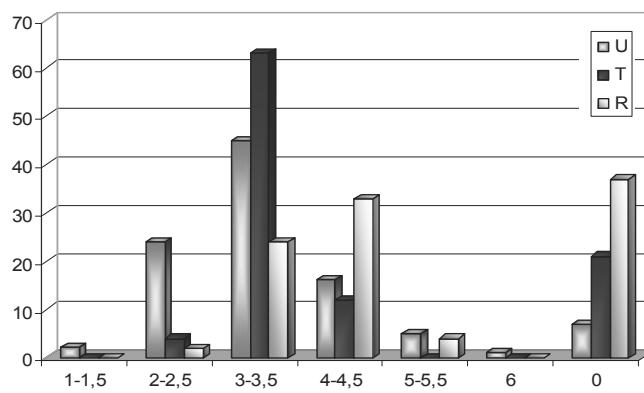


Figure 4 - Ecological indices of flora.

The economic importance of wild flora

- **Culinary herbs** used frech, canned or as preparations: *Bellis perennis*, *Crataegus monogyna*, *Corylus avellana*, *Fragaria vesca*, *Prunus avium*,

Ranunculus ficaria, Rosa canina, Rubus caesius, Rubus idaeus, Sinapis arvensis, Taraxacum officinale, Tilia sp., Urtica dioica.

- **Aromatic and spicy herbs:** *Melilotus officinalis.*
- **Oleaginous plants:** *Sinapis arvensis.*
- **Fodder plants:** *Achillea millefolium, Agrostis stolonifera, Alopecurus pratensis, Bellis perennis, Chenopodium album, Dactylis glomerata, Daucus carota ssp. carota, Festucapratensis, Fragaria vesca, Lathyrus pratensis, Lotus corniculatus, Lolium perenne, Malva sylvestris, Medicago lupulina, M. sativa, Plantago lanceolata, P. media, Poa nemoralis, P. pratensis, Polygonum aviculare, Salix alba, Symphytum officinale, Taraxacum officinale, Trifolium campestre, T. pratense, T. repens, Vicia cracca, Vicia sepium.*
- **Medicinal herbs:** *Achillea millefolium, Alnus glutinosa, Arctium lappa, Asarum europaeum, Betula pendula, Capsella bursa-pastoris, Centarium erythraea, Convolvulus arvensis, Corylus avellana, Crataegus monogyna, Dryopteris filix-mas, Echium vulgare, Equisetum arvense, Euphorbia cyparissias, Fragaria vesca, Galanthus nivalis, Geum urbanum, Hypericum perforatum, Lythrum salicaria, Malva sylvestris, Melilotus officinalis, Plantago lanceolata, P. media, Polygonum aviculare, Prunus avium, Primula veris, Ranunculus acris, Rosa canina, Rubus idaeus, Robinia pseudacacia, Rumex acetosella, Salix alba, Sambucus nigra, Taraxacum officinalis, Tilia cordata, Urtica dioica.*
- **Melliferous plants:** *Alnus glutinosa, Anemone nemorosa, A. ranunculoides, Bellis perennis, Betula pendula, Chelidonium majus, Clematis vitalba, Convolvulus arvensis, Corylus avellana, Crataegus monogyna, Daucus carota, Echium vulgare, Fragaria vesca, Galanthus nivalis, Lamium maculatum, Lotus corniculatus, Lycopus europaeus, Lythrum salicaria, Malva sylvestris, Medicago sativa, M. lupulina, Melilotus officinalis, Mentha aquatica, Polygonum aviculare, Primula veris, Prunus avium, Robinia pseudacacia, Rosa canina, Rubus caesius, R. idaeus, Salix alba, Sambucus nigra, Scabiosa ochroleuca, Scrophularia nodosa, Taraxacum officinalis, Tilia cordata, Tilia platyphyllos, Trifolium arvense, T. repens, T. pratense, Vicia cracca, V. sepium.*
- **Plant raw materials, wood working, pulp and paper:** *Alnus glutinosa, Betula pendula, Prunus avium, Salix sp. (4 species), Tilia cordata, T. platyphyllos.*
- **Plant raw materials for the chemical, dyes and leather production:** *Alnus glutinosa, Arctium lappa, Betula pendula, Echium vulgare, Genista tinctoria, Ligustrum vulgare, Lycopus europaeus, Malva sylvestris, Polygonum aviculare, Salix alba, Sambucus nigra, Taraxacum officinalis, Urtica dioica.*
- **Plant raw materials for the textile industry:** *Tilia cordata, Tilia platyphyllos, Urtica dioica.*
- **Plant materials handicrafts and domestic industry:** *Clematis vitalba, Corylus avellana, Ligustrum vulgare, Salix sp. (4 species), Sambucus nigra.*
- **Ornamental plants:** *Acer sp. (3 species), Bellis perennis, Betula pendula, Corylus avellana, Galanthus nivalis, Ligustrum vulgare, Tilia cordata, T. platyphyllos.*

CONCLUSIONS

1. Summarizing data in the literature with personal research results, the commune Căteasca flora was estimated at 204 species belonging to 43 families.
2. Analyzing the bioforms observed that the presence of a large percentage of hemicryptophytes signifies a rich herbaceous layer in forest groups, and the presence of mesophilic grasslands in the region studied.
3. Dominant share of phytogeographic elements hold Eurasian and European species, followed by the cosmopolitan. It is worth noting the presence of a small number of thermophilic elements of Mediterranean origin, which indicates the existence of warm microclimate stations.
4. Flora analysis of ecological bases reflects favorable conditions for temperature influences evident southern, moisture and soil trophic which favors the development of woody and herbaceous phytocoenoses, mesophilic and mesoxerophilic.
5. The possibilities for rational exploitation of the potential of regional plant are mentioned.

REFERENCES

- ALEXIU V., 2006 - *Completări la flora județului Argeș*. Argesis. Studii și Comunicări, Pitești. **XIV**: p. 53-66.
- ALEXIU V., 2008 - *Cormoflora județului Argeș*. Edit. Ceres, București. p. 323.
- CIOCÂRLAN V., 2009 - *Flora ilustrată a României, Pteridophyta et Spermatophyta*, Edit. Ceres, București. p. 1141.
- CRISTEA V., GAFTA D., PEDROTTI F., 2004 - *Fitosociologie*. Edit. "Presa Universitară Clujeană", Cluj-Napoca. p. 394.
- SANDA V., POPESCU A., DOLTU M. I., DONIȚĂ N., 1983 - *Caracterizarea ecologică și fitocenologică a speciilor spontane din România*. Studii și Com., Muz. Bruckenthal, Sibiu; **25**, supliment: p. 126.
- SANDA V., BIȚĂ-NICOLAE Claudia, BARABAȘ N., 2003 - *Flora cormofitelor spontane și cultivate din România*. Edit. "Ion Borcea", Bacău. p. 316.
- TUTIN T. G., HEYWOOD V. H., BURGES N. A., MOORE D. M., VALENTINE D. H., WALTERS S. M., WEBB D. A. (eds.), 1964-1980 - *Flora Europaea*, **1-5**, 1st Ed., Cambridge: Cambridge University Press. Available at: <http://rbg-web2.rbge.org.uk/FE/fe.html> (accesed: November 11, 2013).
- *** *Flora Republicii Populare Române (Flora Republicii Socialiste România)*, 1952-1976. Edit. Academiei, București. **I-XIII**.

EXTRACELLULAR PROTEOLYTIC ACTIVITY OF HALOPHILIC MICROORGANISMS ISOLATED FROM SALT ROCK

ROXANA COJOC

Institute of Biology Bucharest of the Romanian Academy, Spl. Independentei, no. 296, Sect. 6, P.O.
Box 56-53, 060031, Bucharest, Romania, e-mail: rocsana1582@yahoo.com

SIMONA NEAGU

Institute of Biology Bucharest of the Romanian Academy, Spl. Independentei, no. 296, Sect. 6, P.O.
Box 56-53, 060031, Bucharest, Romania, e-mail: simona_trifan@yahoo.com

MĂDĂLIN ENACHE

Institute of Biology Bucharest of the Romanian Academy, Spl. Independentei, no. 296, Sect. 6, P.O.
Box 56-53, 060031, Bucharest, Romania, e-mail: madalin_enache@yahoo.com

ABSTRACT. Extracellular degrading enzymes are important to both pathogenic and saprophytic microorganisms to overcome host resistance and to utilize organic and inorganic materials in the environment. The main components in organic materials can be represented by proteins and enzymes must also exist for their breakdown in extreme environments such as subterranean salt deposits. The industrial and economic significance of proteolytic enzymes is very high and they can be used for bioconversion of some agricultural waste to useful products. This work focuses on the extracellular proteolytic activities of some halophilic microorganisms (mainly moderately halophilic bacteria) isolated from subterranean salt deposit formed in Neogene period in Slănic (Prahova) area. The obtained results revealed the presence of proteolitic activity which are influenced by NaCl concentration and composition of substrates used in the study.

Key words: proteases, halophilic microorganisms, haloarchaea, salt, Slănic Prahova.

REZUMAT. Activitatea proteolitică extracelulară a unor microorganisme halofile izolate dintr-un zăcământ subteran de sare. Enzimele extracelulare sunt importante atât pentru microorganismele patogene cât și pentru cele saprofite întrucât conferă rezistență și permit utilizarea compușilor de natură organică și anorganică prezenti în mediul înconjurător. Materia organică este reprezentată în principal de proteine, iar enzimele necesare degradării lor trebuie să existe inclusiv în mediile extreme cum sunt zăcămintele subterane de sare. Importanța industrială și economică a enzimelor proteolitice este foarte ridicată, iar aceste enzime pot fi utilizate pentru bioconversia unor deșeuri agricole la produși utili. Lucrarea de față are ca obiect activitatea proteolitică extracelulară a unor microorganisme halofile (în principal bacterii moderat halofile) izolate din zăcământul de sare de la Slănic Prahova format în perioada Neogenă. Datele obținute dovedesc prezența activității proteolitice extracelulare precum și dependența acesteia de anumite concentrații de NaCl, dar și influența ei asupra naturii substratului utilizat.

Cuvinte cheie: proteaze, microorganisme halofile, haloarhee, sare, Slănic Prahova.

INTRODUCTION

Halophilic microorganisms which need the constant presence of high salt concentrations for structural stability and viability can colonize a variety of environments like salt lakes (for example, the Dead Sea, the Great Salt Lake), crystallizer ponds of solar salterns, and salt mines around the world. In his paper from 1934, Baas Becking stated that the salt microorganisms are thus „a beautiful illustration of the principle that everything is everywhere”, but with the amendment that „the environment selects” (Oren, 2011).

In Romania, the presence of halophilic microorganisms, both bacteria and archaea, was stated in a multitude of hypersaline environments (five salt lakes located in Prahova county and the Techirghiol Lake close to the Black Sea coast). For a few strains of halophilic archaea, preliminary taxonomic investigations have already been conducted (Enache et al., 2000; 2012), one strain being recently proposed as *Haloferax prahovense* (Enache et al., 2007). The almost 200 salt massifs located in the Romanian Carpathian area, by their favorable characteristics, such as surface proximity, superior purities of NaCl, or large reserves (for example, Cacica, Tg. Ocna and Ocnele Mari) constituted the subject of salt exploitation from antiquity until nowadays (Drăgănescu & Drăgănescu, 2001).

In the salt deposit from Slanic located in the outer Carpathian area, 45 km north of Ploiești, underground of Prahova city, the salt extraction began in 1685 (Broșteanu, 1901) by the utilization of the bell type exploitation technology (Sencu, 1968). This salt deposit dating from the Neogen period is 2.8 km long, 0.8 km breadth and 45.5 m to 499 m thick (Drăgănescu, 1990), consisting of a mixture of grey and swarthy colored crystals, with smaller sizes than the white ones that can be found in other Romanian salt mines. The overall aspect of this deposit is variegated (Fig. 1), as a consequence of turnovers that took place during precipitation process, due to the climatic and sedimentary variations (Har et al., 2006). The sedimentary basin includes early formed authigenic minerals, of which halite is the most abundant and the last to precipitate in the basin, and also some allochthonous minerals having the origin in the adjacent areas (Har et al., 2006). Extracellular degrading enzymes are important to both pathogenic and saprophytic microorganisms to overcome host resistance and to utilize organic and inorganic materials in the environment. Since the main component in organic materials can be represented by proteins, enzymes must exist for their breakdown also in extreme environments such subterranean salt deposits, previously thought to be inhospitable to life. Proteases play a key role in many biological processes and have numerous applications in biotechnology and industry.

Recent advances in the genetics, genomics and biochemistry of the halophilic microorganisms provide a tremendous opportunity for understanding proteases and their function in the context of a halophilic cell. Proteases participate in a number of biological processes such as the degradation of abnormal proteins, control of transcription factors, precursor processing, development and differentiation, regulation of the cell cycle and apoptosis (DeCastro et al., 2006).

The present paper focuses on the extracellular proteolytic activities of some halophilic microorganisms (mainly moderately halophilic bacteria) isolated from subterranean salt deposit formed in Neogene period in Slănic (Prahova) area. The researches of the area from microbiological point of view are highly supported by the economical interest based on the recreational and medical approaching of the salt lakes and salt mine in Slănic Prahova area. Consequently, the future investigations should be based also on the good co-operation with local factors directly involved in the economical exploitations of salt environments in order to manage a good plan for the future protection, conservation and sustainable development of the area.

MATERIALS AND METHODS

Sampling rock salt and isolation of halophilic bacteria.

The rock salt samples were taken from the wall of subterranean salt mine, Unirea, located in Slănic Prahova. The place from which the samples were taken is located at around 200 m below surface. The air temperature is 12 °C during the whole year, and the humidity is about 10% lower than at surface. Salt crystals were taken from the surface of the mine wall, around 2 m from the floor. One gram of salt crystal with no apparent contamination by clay or soil was immersed and shaken in sterile 10% NaCl solution for five minutes to wash the outside, and this process was repeated three times, and then dissolved in 50 ml of sterile 10% NaCl. One ml of this solution was mixed with 20 ml of autoclaved molten agar medium (around 55 °C) MH with the following composition (g/l): NaCl - 100, MgCl₂·6H₂O - 7, MgSO₄·7H₂O - 9.6, CaCl₂·2H₂O - 0.36, KCl - 2, NaHCO₃ - 0.06, NaBr - 0.026, glucose - 1, proteose peptone - 5, yeast extract - 10 (Ventosa et al., 1989). After solidification, the Petri dishes were incubated for several days at 28 °C and colony forming units (c.f.u.) number was counted.

Estimation of percentages of proteinase positive strains in rock salt.

In order to estimate the percentage of strains possessing proteolytic activities, the salt solution was diluted serially with sterile 10% NaCl and spread on agar plate's containing casein. The colonies surrounded by a halo were considered positive. Numbers of total colonies and protease positive colonies were counted.

RESULTS AND DISCUSSION

Isolation of halophilic bacteria.

The investigated area appears to be a variegated salt deposit due to geological sedimentation along the times. The data showed in Fig. 1 revealed the stratification of salt massif following geological period and this data could be also related to the abundance of halophilic microorganisms, both bacteria and archaea in salted environments developed on the salt massif from Slănic, Prahova. Thus, a relatively high number of halophilic microorganisms populated

salt lakes and deposit from Slănic and some are isolated from inside of salt crystal (Enache & Kamekura, 2013) revealing that they could play an important role in biogeochemistry of the area.

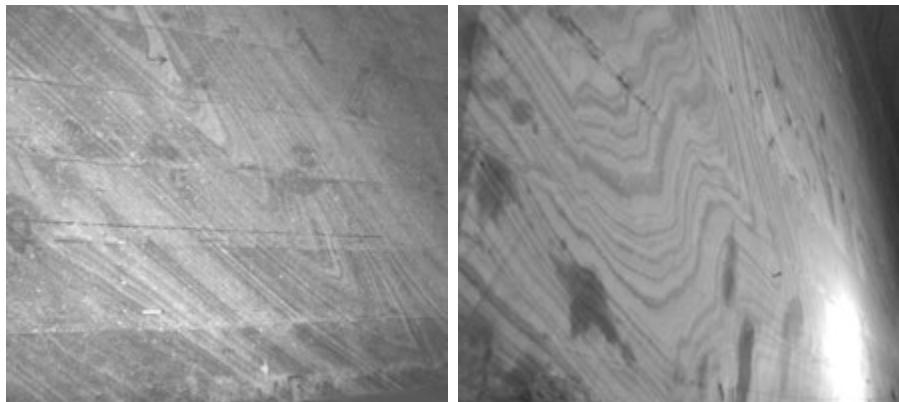


Figure 1 - Grey and swarthy interbedded strata in the salt deposit of the salt mine Unirea, Slănic Prahova.

The number of colonies obtained on the MH agar medium with 10% NaCl was calculated as around 3000 per gram of rock salt, as resulted from the data showed in the table 1. The number of colonies appears to be high if compared to previously reported data about total c.f.u. number from saline lakes in the area, but very close to the number of colonies recorded in Red Bath lake in Slănic area in the same year period and around three time lower than the number registered in same time period in Bride Cave salt lake, namely 750 c.f.u./ml (Enache et al., 2008a, b). The c.f.u. number in Red Bath was registered at around 2500 per mililiter (Enache et al., 2008a, b).

Estimation of percentages of proteinase positive strains in rock salt.

Following the purpose of the studies, the percentages of strains isolated from rock salt and having proteolytic activity were estimated. As resulted from the data showed in table 2 on agar plates with no NaCl added, around 13% of the colonies showed proteolytic activity.

On the other hand, at 1M NaCl, the number of positive proteolytic colonies remained relatively constant (Fig. 2; Tab. 2 and 3) in the diluted sample and decreased considerably in the native sample, respectively from 23 positive colonies recorded in the absence of NaCl to two colonies recorded in media with 1M NaCl, from 15% to 2% (Tab. 2) even if the total colony forming number appears to be similar (Tab. 2). The increasing of the salt content to 2M led to a high decreasing of total c.f.u numbers and to the absence of positive colonies for proteolytic activity (Tab. 2). These data argued that the proteolytic activity is affected by the increasing of the sodium chloride content, revealing its halotolerant behavior.

Table 1 - The number of c.f.u. estimated from rock salt dissolved in 10% sterile NaCl solution.

Sample	Absence of NaCl	1M NaCl	2M NaCl	
	48 h	48 h	48 h	72 h
Native sample	Over 800	700	0	Cannot read
Dilution 10^{-1}	50	43	2	5
Dilution 10^{-2}	6	11	0	0

Table 2 - Percentages of the proteolytic activity of samples from salt rock.

Sample	Absence of NaCl	1M NaCl	2M NaCl	
	48 h	48 h	48 h	72 h
Native sample	152 (23 positive) – 15%	133 (2 positive) – 2%	0	10
Dilution 10^{-1}	16 (2 positive) – 13%	31 (3 positive) – 10%	0	1
Dilution 10^{-2}	4	0	0	0

Taking into account the data presented in tables 2 and 3 resulted that after a period of incubation of four days the percent of colonies showing proteolytic activity remains relatively constant even if the total number of colony forming units increased considerably, namely from 133 to 520 in the native sample and from 31 to 44 in the diluted sample (Tab. 3).

On the other hand, it could be observed that at the content of 2M sodium chloride in the cultivation medium there was not recorded any positive colony for the proteolytic activity. Also the total colony forming unit number showed a high decrease, from 520 recorded at 1M NaCl to 68 at 2M in the native sample. In a similar way in the diluted sample the number decreased from 44 at 1M NaCl to 12 at 2M NaCl.

Considering the data recorded in figure 2, some colonies appeared to be surrounded by halo with a relatively high diameter. These data argued either for the abundance of protein with enzymatic activity extracellularly secreted by halophilic bacterial cells or for a good catalytic activity of the enzymes which converted the substrate (casein) present in the cultivation medium.

Table 3 - Percentages of the proteolytic activity of sample from salt rock (recorded after 4 days).

Sample	Absence of NaCl	1 M NaCl	2 M NaCl
Native sample	Cannot read c.f.u. but halo can be observed	520 c.f.u. (around 10 surrounded by halo) – (2%)	68 c.f.u. (no halo was observed)
Dilution 10^{-1}	Cannot read c.f.u. but halo can be observed	44 c.f.u. (around six surrounded by halo) – (14%)	12 c.f.u. (no halo was observed)
Dilution 10^{-2}	Cannot read c.f.u. but halo can be observed	4 c.f.u. (no halo was observed)	1 – 2 c.f.u. (no halo was observed)

On the other hand, it could be observed that the diameter of the halo surrounding the colony judged as positive for proteolytic activity decreased at 2M NaCl content in culture media if compared with the halo diameter observed on media with 1M NaCl (Fig. 2a, b). This result supported the previous remark related to the halotolerant behavior of the enzyme with proteolytic activity detected in the investigated sample of salt crystal.

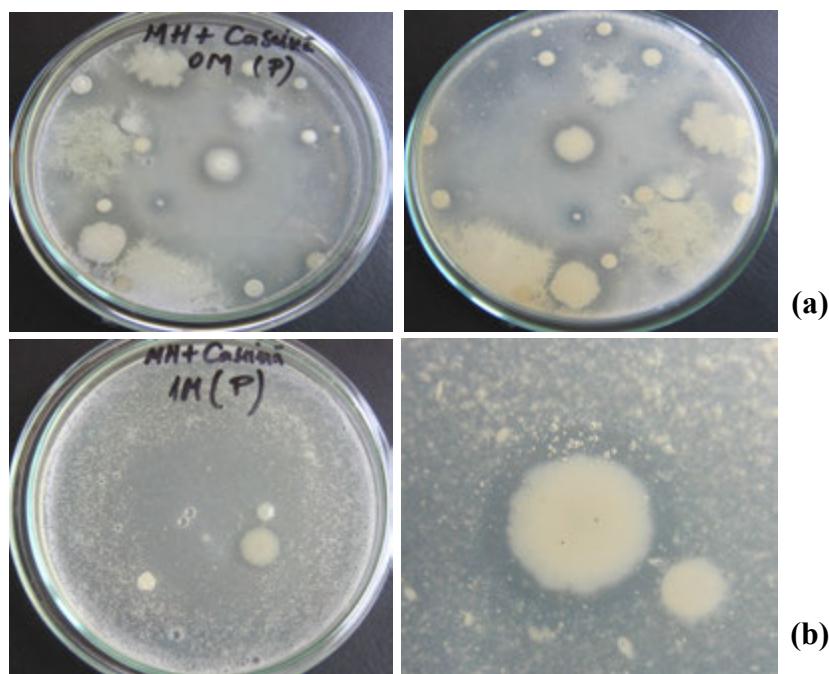


Figure 2 - Proteolytic activity of investigated halophilic bacteria on media without NaCl (a) or with 1M NaCl (b).

Since the area of microorganisms sampling is dedicated to a high touristic efflux, the registered data argued that the proteolytic activity of halophilic bacterial strains present in salt crystals is due to the abundance of proteinaceous substrates available following high human presence and impact. On the other hand, these preliminary investigations revealed the presence of proteolytic activity which is influenced by NaCl concentration and composition of substrates used in the study.

CONCLUSIONS

The study of proteases and their regulation in halophilic microorganisms continues to contribute to our overall understanding of the physiology of these unusual halophilic organisms that have adapted (evolved) their entire repertory of proteins to optimally grow in extreme environments. Future research in this field should be aimed at understanding how and when proteases function in the halophilic cell, revealing the mechanisms of targeting protein substrates for degradation by intracellular proteases, and identifying these protein targets (DeCastro et al., 2006).

REFERENCES

- BAAS BECKING L. G. M., 1934 - *Geobiologie of inleiding tot de milieukunde*. W. P. Van Stockum & Zoon, Diligentia Wetensch Series 18/19, Van Stockum's Gravenhage. p. 249-254.
- BROŞTEANU C., 1901 - *Salinele noastre. Studiu istoric, juridic, economic asupra exploatarii salinelor si monopolului sarii la romani si români*. Ed. G. A. Lăzăreanu, Bucureşti. p. 890.
- DECALSTRO R. E., MAUPIN-FURLOW J. A., GIMENEZ M. I., SEITZ M. K. H., SANCHEZ J. J., 2006 - *Haloarchaeal proteases and proteolytic systems*. FEMS Microbiol. Rev. **30**: p. 17-35.
- DRĂGĂNESCU L., 1990 - *Date din istoricul exploatarii sarii la Slanic-Prahova*. Rev. Muzeelor. **27**: p. 68-71.
- DRĂGĂNESCU L., DRĂGĂNESCU S., 2001 - *The history of the evolution of salt working methods in Romania from antiquity to the present*. 17th Intl. Mining Congress and Exhibition of Turkey – IMCET 2001. p. 627-633.
- ENACHE M., TEODOSIU G., FAGHI A. M., DUMITRÙ L., 2000 - *Identification of halophilic Archaeabacteria isolated from some Romanian salts lakes on the basis of lipids composition*. Rev. Roum. Biol. Ser. Biol. Veg. **45**: p. 93-99.
- ENACHE M., ITOH T., KAMEKURA M., TEODOSIU G., DUMITRU L., 2007 - *Haloferax prahovense sp. nov., an extremely halophilic archaeon isolated from a Romanian salt lake*. Intl. J. Syst. Evol. Microbiol. **57**: p. 393-397.
- ENACHE M., ITOH T., KAMEKURA M., POPESCU G., DUMITRU L., 2008a - *Halophilic archaea isolated from man-made young (200 years) salt lakes in Slanic, Prahova, Romania*. Cent. Eur. J. Biol. **3**: p. 388-395.
- ENACHE M., ITOH T., KAMEKURA M., POPESCU G., DUMITRU L., 2008b - *Halophilic archaea of Haloferax genus isolated from anthropocentric Telega (Palada) salt lake*. Proc. Rom. Acad., Series B. **10 (1-2)**: p. 11-16.

- ENACHE M., POPESCU G., ITOH T., KAMEKURA M., 2012 - *Halophilic microorganisms from man-made and natural hypersaline environments: physiology, ecology and biotechnological potential.* p. 173-197. In STAN-LOTTER H., FENDRIHAN S. (Eds.). Adaptation of Microbial Life to Environmental Extremes. Springer Wien New York.
- ENACHE M., KAMEKURA M., 2013 - *Halophilic archaea in the Neogene salt massif from Slănic Prahova, Romania.* Oltenia. Studii și comunicări. Științele Naturii. Craiova. **29:** p. 237-243.
- HAR N., BARBU O., CODREA V., PETRESCU I., 2006 - *New data on the mineralogy of the salt deposit from Slănic Prahova (Romania).* Studia UBB, Geologia. Cluj-Napoca. **51:** p. 29-33.
- OREN A., 2011 - *The Halophilic world of Lourens Baas Becking.* p. 407. In VENTOSA A., OREN A., MA Y. (Eds). Halophiles and Hypersaline Environments, Springer.
- SENCU V., 1968 - *Muntele de sare de la Slănic Prahova.* Ocrot. Nat. București. **12:** p. 167-179.
- VENTOSA A., GARCIA M.T., KAMEKURA M., ONISHI H., RUIZ-BERRAQUERO F., 1989 - *Bacillus halophilus sp. nov., a new moderately halophilic Bacillus species.* Syst. Appl. Microbiol. **12:** p. 162-166.

THE IMPORTANCE OF CONSERVATION OF BILBOR SWAMPS

ANDREEA NATALIA MATEI

University of Pitesti, Târgul din Vale Street, no.1, 110040, Pitești, Argeș, Romania,
e-mail: mateiandreeanatalia@gmail.com

ABSTRACT. This paper is the result of the study of the conserving importance of Bilbor swamps, due to the existence in the territory of many high value glacial relicts. Glacial relicts, from eutrophic with oligotrophic intrusions swamps were taken into study as: *Ligularia sibirica* (L.) Cass., *Pedicularis sceptrum-carolinum* L., *Swertia perennis* L., *Carex diandra* Schrank, *Carex appropinquata* Schumach. and more. Vegetal species which build or are included in three associations that belong to the same class *Scheuchzerio-Caricetea nigrae* (Nordh. 1937) Tx. 1937 are: *Caricetum diandrae* Jon. 1932 em. Oberd. 1957 (Syn.: *Carici-Meyanthetum caricetosum diandrae* Ratiu 1972), *Carici flavae-Eriophoretum latifolii* Soó 1944 and *Carici flavae-Blysmetum compressi* Coldea 1997. By Habitats Directive these associations are classified into different types of priority habitats with high conservation value: Alkaline fens and Transition mires and quaking bogs.

Key words: Bilbor, eutrophic swamps, glacial relicts, habitat.

REZUMAT. Importanța conservării mlaștinilor Bilborului. Prezenta lucrare constituie rezultatul studiului privind importanța protejării Mlaștinilor Bilborului, datorită existenței în teritoriu a relietelor glaciare de o mare valoare. Au fost luate ca studiu relictele glaciare din mlaștinile eutrofe, precum: *Ligularia sibirica* (L.) Cass., *Pedicularis sceptrum-carolinum* L., *Swertia perennis* L., *Carex diandra* Schrank, *Carex appropinquata* Schumach. etc., specii vegetale ce edifică sau sunt incluse în trei asociații ce aparțin clasei *Scheuchzerio-Caricetea nigrae* (Nordh. 1937) Tx.1937: *Caricetum diandrae* Jon. 1932 em. Oberd. 1957 (Syn.: *Carici-Meyanthetum caricetosum diandrae* Ratiu 1972), *Carici flavae-Eriophoretum latifolii* Soó 1944 și asociația *Carici flavae-Blysmetum compressi* Coldea 1997. Prin Directiva Habitate, aceste asociații sunt încadrate în două tipuri de habitate prioritare cu o valoare conservativă mare, respectiv foarte mare: Mlaștinile turboase de tranziție și turbării mișcătoare și Mlaștini alcaline.

Cuvinte cheie: Bilbor, mlaștini eutrofe, relicte glaciare, habitate.

INTRODUCTION

Mountain valleys in Romania are great subject of study both past and present for biologists, geologists, economists and ethnographers. **Inter-Carpathian swamps, especially eutrophic ones are the richest conservative of glacial relicts** (Pop, 1858), as in this situation Bilbor swamps, requiring constant observation and conservation. Bilbor valley, located in Harghita County is part of

the Central Group of Eastern Carpathian mountains, situated in the region of meeting of crystalline-Mesozoic area of Bistricioara Mountains with Neocene eruptive of Calimani Mountains, representing one of the highest valleys of the Romanian Carpathians, 880-900 m. Bilbor belongs to the type of tectonic and volcanic valleys or volcanic dam, being drained by tributaries of the upper basin of Bistricioara river.

Bilbor swamps are part of the trigeminal eutrophic swamps Drăgoiasa-Bilbor-Borsec, have approximately 100 km² area, covered randomly by 8 main individualized swamps, which three are directly influenced by mineral springs.

MATERIALS AND METHODS

To achieve the objective was necessary to describe researched area from **Ocrotirea Naturii** (Pop, 1958) and PhD thesis **Componenta nordică a ulucului depresionar (Drăgoiasa-Glodu-Bilbor-Borsec-Corbu-Tulgheş)** (Tofan, 2012). The identification of relict species was made from: **Ocrotirea Naturii** (Pop, 1958), **Vegetația României** (Doniță et al., 1992), **Carici remotae-Calthetum laethae Coldea (1972) 1978 ligularietosum sibiricae nova subass. in the Brusturet Gorges (Piatra Craiului)** (Alexiu & Stancu, 2003), **Flora și vegetația Văii Gurghiului** (Sămărghițan, 2001). Coenotic integration was made using **Les associations végétales de Roumanie** (Coldea et al., 1997). For the study of the habitats and special areas for protection was used: **Arii speciale pentru protejarea și conservarea plantelor în România** (Sârbu, 2007), **Habitate și situri de interes comunitar** (Drăgulescu & Schneider, 2005), **Habitatele din România** (Doniță et al., 2005), **Manual de interpretare a habitatelor Natura 2000 din România** (Gafta & Mountford, 2008) and **Catalogul habitatelor, speciilor și siturilor Natura 2000 în România** (Bădărău et al., 2013).

RESULTS AND DISCUSSIONS

Bilbor swamps are eutrophic with small oligotrophic areas, divided in two categories: the meadows swamps, uninfluenced or influenced by mineral waters (Pârâul Rușilor swamp, Lunca Bistricioarei, Tiffreni and Bilborăș swamp) and swamps with mineral water (Sub Sasca, Pârâul Bilborului Mare and Pârâul Dobreanului). One particular thing that makes Bilbor swamps special is the presence of mineral springs that burst on many fracture lines, loaded with calcium carbonate which dissolves in contact with dolomitic layers, producing slag or massive slabs of travertine. Mineral waters soaked partially swamps territory, even if they were formed in conjunction with most common infiltration water.

Other factors such as climate, soils, also contributed to the preservation of glacial relicts up today. The cold climate of Bilbor valley is part of temperate-continental transition climate specific to intermountain areas; which is another cause of retrieval in this field of many vegetal glacial relicts. The temperature is constant in those springs without ponds, is between 9.5 to 9.75 °C and in those

springs which collects water in basins the temperature is between 11-15 °C. The springs which contain CO₂ are acidic with a pH value between 5.9 and 6.3 or slightly alkaline pH value ranging between 7.9 and 8.5, due to calcium carbonate is resulting formation of travertine deposits, depending of their distance to the springs, peat has variable pH value. Average annual rainfall is between 700 to 800 mm. The types of soil found in the eutrophic wetlands are hydrate-soils, litomorph, proti-soils and histic-soils, the rest of the Bilbor area is covered by district cambisole.

In Bilbor valley respectively Bilbor swamps there is a huge complex variety of plant species, glacial relicts are combined with today's climate appropriate plant species, grouped in several associations like *Scirpo-Phragmitetum*, *Caricetum (fuscae) nigrae*, *Carici-Menyanthetum* and *Deschampsietum caespitosae*, *Caricetum diandrae*, *Carici flavae-Eriophoretum* and association *Carici flavae-Blysmetum compressi*. It have been taken to study the last three associations that are part of *Scheuchzerio-Caricetea nigrae* (Nordh. 1937) Tx. 1937 class, these tree associations contain relict species with a significant conservation value: *Ligularia sibirica* (L.) Cass., *Pedicularis sceptrum-carolinum* L., *Swertia perennis* L., *Carex appropinquata* Schumach. etc.

Association *Caricetum diandrae* Jon. 1932 em. Oberd. 1957 (Syn.: *Carici-Menyanthetum caricetosum diandrae* Rațiu 1972) belongs to the order *Scheuchzerietalia palustris* Nordh. 1936 and to the *Caricion lasiocarpae* Vanden Bergh ap. Lebrun et al. 1949 alliance. This association is characteristic of a mesotrophic habitat with moderate content of organic substances and a fairly big presence of calcium ions, the peat layer reaction at surface is alkaline. *Carex diandra* Schrank is the characteristic specie of the association along with other important species: *Carex nigra* (L.) Reichard, *Menyanthes trifoliata* L., *Eriophorum angustifolium* Honck., *Ligularia sibirica* (L.) Cass., *Pedicularis palustris* L., *Carex rostrata* Stokes, *Dactylorhiza incarnata* (L.) Soó, *Eriophorum latifolium* L., *Bryum pseudotriquetrum* (Hedw.) Gaertn., Mey. & Scherb., *Drepanocladus vernicosus* (Mitt.) Warnst., *Saxifraga hirculus* L., *Comarum palustre* L., *Sphagnum angustifolium* (C. Jens. ex Russ.) C. Jens., *Galium palustre* L., *Equisetum fluviatile* L., *Valeriana simplicifolia* Kab.

The association *Carici flavae-Eriophoretum latifolii* Soó 1944 belongs to the order *Tofieldietalia* Prsg. ap. Oberd. 1949 and to *Caricion davallianae* Klika 1934 alliance. The present association is also located in habitats of southeastern Carpathian eutrophic swamps, on soils rich in organic substances and calcium carbonate, with a less acidic or with a neutral reaction (pH 5.8-6.8). Floristic composition of the association contains two edifying species: *Carex flava* L. and *Eriophorum latifolium* Hoppe, with the characteristic species: *Eriophorum latifolium* Hoppe, *Schoenus nigricans* L., *Carex davalliana* Sm., *Blysmus compressus* (L.) Panz., associated with other important species: *Carex nigra* (L.) Reichard ssp. *nigra*, *Molinia caerulea* (L.) Moench, *Salix rosmarinifolia* L., *Carex gracilis* Curtis, *Carex appropinquata* Schumach., *Juncus compressus* Jacq., *Juncus inflexus* L., *Valeriana simplicifolia* Kab., *Carex panacea* L., *Pinguicula vulgaris*

L., *Parnassia palustris* L., *Epipactis palustris* (L.) Crantz, *Carex lepidocarpa* Tausch., *Swertia perennis* L., *Carex distans* L., *Dactylorhiza maculata* (L.) Soó, *Tofieldia calyculata* (L.) Wahlenb., *Dactylorhiza incarnata* (L.) Soó.

Carici flavae-Blysmetum compressi Coldea 1997 association belongs to the order *Tofieldietalia* Prsg. ap. Oberd. 1949 and to the *Caricion davallianae* Klika 1934 alliance. Is found on the surface of southeast Carpathians eutrophic swamps with an alkaline reaction pH value is 7.5. Floristic composition of this peat habitat edified by *Blysmus compressus* (L.) Panz. and *Carex flava* L., complemented by species: *Juncus compressus* Jacq., *Carex nigra* (L.) Reichard ssp. *nigra*, *Gymnadenia conopsea* (L.) R. Br., *Juncus effusus* L., *Juncus inflexus* L., *Valeriana simplicifolia* Kab., *Carex panacea* L., *Epipactis palustris* (L.) Crantz, *Swertia perennis* L., *Carex distans* L., *Dactylorhiza maculata* (L.) Soó, *Pinguicula vulgaris* L., *Eriophorum angustifolium* Honck., *Juncus articulatus* L., *Triglochin palustre* L., *Carex echinata* Murray, *Pedicularis sceptrum-carolinum* L., *Pedicularis palustris* L., *Ligularia sibirica* (L.) Cass., *Carex diandra* Schrank.

The importance of Bilbor swamps is the presence on the territory of many glacial relicts, those that survived glaciation, which sometimes are growing in huge densities on the eutrophic swamps: *Carex appropinquata* Schumach. - widespread in central and northern Europe, forming associations in the Bilbor swamps region, isolated descending to the Balkans and Caucasus; *Carex diandra* Schrank - can be seen in Pârâul Dobreanului and Sasca, being a boreal species that descend more and more to the south of the country; *Swertia perennis* L. - a glacial relict spread in Eurasian boreal zone, rarely in our country, reaching the southern limit on the Carpathians longitude; *Ligularia sibirica* (L.) Cass. - glacial relict, representing an subarctic Siberian element with the southern European limit at Brusturet Gorges in Piatra Craiului National Park; *Pedicularis sceptrum-carolinum* L. - an impressive glacial relict, with acanthine rosette of large leaves and his scepter shaped stern flourished, is one of the most attractive of the Bilbor swamps, is a north European-Siberian element that has its southern limit of its world area at Harman swamp.

The main activities in this region leading to the destruction of vegetation are overgrazing, drainage works and uncontrolled deforestation. To prevent the biodiversity damage through the anthropogenic activity and also climate changes, the Natura 2000 network through Habitats Directive requires specific standards of conservation for each type of habitat. According to the first Annex of the Habitats Directive, alpine bioregion from the studied area, have the next types of bogs and wetlands habitats: active raised bogs, alkaline fens and transition mires and quaking bogs. All three types of habitats have a high conservation value as priority habitats.

Transition mires and quaking bogs, is a habitat of high conservation that covers the flat lands in boreal floor, mainly covered with vegetation that is not set to the substrate. In Romania there are several types: middle European yellow sedge fens, alpine pioneer formations of *Caricion bicoloris-atrofuscae*, *Carex chordorrhiza* Ehrh. ex L. F., swards, *Carex lasiocarpa* Ehrh., swards, mud sedge (*Carex limosa* L.) swards and *Carex diandra* Schrank, quaking mires. A special

attention should be paid to the relict species on the surface of these habitats: *Drosera rotundifolia* L., *Betula nana* L., *Liparis* sp. and more. One characteristic associations of transition mires and quaking bogs in Bilbor valley is *Caricetum diandrae* Jon. 1932 em. Oberd. 1957 (Syn.: *Carici-Menyanthetum caricetosum diandrae* Rațiu 1972).

Alkaline fens have a high conservation value, because of *Ligularia sibirica* (L.) Cass. species. This habitat has low altitude peat lands, with neutral-slightly alkaline water. These preserved over time pollen and plant debris. Sedge short and brown moss communities almost covers totally the habitat area, with favorable ecological conditions and permanent saturated soils with water rich in limestone base, with ground water near or slightly above the ground. Those species that lives in this type of habitat have a restricted distribution, characteristic for alkaline fens, endangered in almost all regions when is formed the infra-aquatic peat. In Bilbor swamps, some of the association that corresponding to this type of habitat are *Carici flavae-Eriophoretum latifolii* Soó 1944 and association *Carici flavae-Blysmetum compressi* Coldea 1997.

CONCLUSIONS

Bilbor swamps are part of the trigeminal swamps Drăgoiasa-Bilbor-Borsec. Those from Bilbor are different from other swamps from Romania by their reduced extend but with a long length, the rich vegetation developed in the presence of mineral waters, in an environment almost entirely eutrophic, with few oligotrophic intrusions.

Peat dates back to the finiglacial and preboreal period, preserving in time with mineral water, a huge number of glacial relicts (*Ligularia sibirica* (L.) Cass., *Swertia perennis* L., *Pedicularis sceptrum-carolinum* L. and more).

These habitat types require increased protection, therefore any human activity such as cutting bushes, overgrazing, draining land for exploitation, forest cutting are destroying the original vegetation of the area.

Of all the eight swamps from the Bilbor valley, just Pârâul Dobreanului swamp was declared in 1980 nature reserve of botanical interest.

REFERENCES

- ALEXIU V., STANCU Daniela, 2003 - *Carici remotae-Calthetum laethae* Coldea (1972) 1978 *ligularietosum sibiricae nova subass. in the Brusturet Gorges (Piatra Craiului)*; p. 94-97. In: POP. O., VERGHELET M. (eds.) - Piatra Craiului National Park Administration. Research in Piatra Craiului National Park. Edit. Phoenix, Brașov.
- BĂDĂRĂU S., MURARIU D., STAICU C., PATRICHE N., CIUBUC C., HULEA D., 2013 - *Catalogul habitatelor, speciilor și siturilor natură 2000 în România*. Edit. Fundația Centrul Național pentru Dezvoltare Durabilă – București. p. 7-15; 18; 47-48; 49-50; 143.

- COLDEA Gh., SANDA V., POPESCU A., ȘTEFAN N., 1997 - *Les associations végétales de Roumanie*. Edit. Presses Universitaires de Cluj. p. 109 ; 114 ; 134.
- DONIȚĂ N., IVAN D., COLDEA Gh., SANDA V., POPESCU A., CHIFU Th., PAUCĂ-COMĂNESCU M., MITITELU D., BOȘCAIU N., 1992 - *Vegetația României*. Editura Tehnică Agricolă, București. p. 27-30; 45; 47-54.
- DONIȚĂ N., POPESCU A., PAUCĂ-COMĂNESCU M., MIHĂILESCU S., BIRIȘ I., 2005 - *Habitatele din România*. Editura Tehnică Științifică, București. p. 298-230; 305.
- DRĂGULESCU C., SCHNEIDER E., 2005 - *Habitate și situri de interes comunitar*. Editura Universității „Lucian Blaga”, Sibiu. p. 7; 17; 19; 39; 45; 64.
- GAFTA D., MOUNTFORD O. (editors), 2008 - *Manual de interpretare a habitatelor Natura 2000 din Romania*. Editura Risoprint, Cluj-Napoca. p. 54-58.
- POP E., 1958 - *Regiunea de mlaștini eutrofe Drăgoiasa-Bilbor-Borsec și importanța ei fitogeografică*. In: *Buletinul Comisiei pentru Ocrotirea Monumentelor Naturii, Ocrotirea Naturii*. Editura Academiei Republicii Populare Române. p. 11-43.
- SĂMĂRGHITAN M., 2001 - *Flora și vegetația Văii Gurghiului*. Editura Facultății de Medicină și Farmacie, Târgu-Mureș. p. 189.
- ÎĂRBU A., 2007 - *Arii speciale pentru protejarea și conservarea plantelor în România*. Editura Victor B Victor, București. p. 17; 175.
- TOFAN G., 2012 - *Componența nordică a ulucului depresionar (Drăgoiasa-Glodu-Bilbor-Borsec-Corbu-Tulgheș)*. Teză de doctorat. Rezumat - Universitatea „Babeș-Bolyai”, Cluj-Napoca, Facultatea de Geografie. p. 6-11.

FORESTS HABITATS IN RÂIOSU AND BUDA MOUNTAINS, FĂGĂRAŞ MASSIF

DANIELA ILEANA STANCU

Argeș County Museum, Armand Călinescu Street, no. 44, 110047, Pitești, Argeș, Romania,
e-mail: stancuileana@yahoo.com

ABSTRACT. As a member of the European Union, Romania is obliged to implement NATURA 2000, which is a pan-European network for the conservation of nature, whose goal is to protect the natural habitats, as well as the wild flora and fauna, conformable to the stipulations of the Birds Directive (2009/147/EC) and Habitats Directive (92/43/EEC). Some of these classifications systems are more detailed; for example CORINE (1991), Devillers & Devillers (1996, 1999) and EUNIS (1997-2005), while others are brief, including only those types of habitat whose preservation needs the endorsement of some specific measures, for example EMERALD (2000), Habitats Directive (1992, amended in 1992 and 2002). The paper presents a list of the main forests habitats identified in Râiosu and Buda Mountains, Făgăraş Massif.

Keywords: forests habitats, NATURA 2000, Râiosu and Buda Mountains.

REZUMAT. Habitatele forestiere din Munții Râiosu și Buda, Masivul Făgăraș. România, în calitate de stat membru al Uniunii Europene, are obligația de a implementa rețeaua NATURA 2000, o rețea pan-europeană pentru conservarea naturii, în scopul protejării habitatelor naturale, a florei și faunei sălbatică, conform prevederilor Directivei Păsări (2009/147/EC) și Directivei Habitate (92/43/EEC). Lucrarea prezintă o listă cu principalele habitate prioritare alpine și subalpine din Munții Râiosu și Buda, Masivul Făgăraș. Unele dintre aceste sisteme de clasificare sunt mai detaliate, de exemplu CORINE (1991), Devillers & Devillers (1996, 1999) și EUNIS (1997-2005), iar altele mai sumare, incluzând numai acele tipuri de habitate a căror conservare necesită adoptarea unor măsuri specifice, de exemplu EMERALD (2000), Directiva Habitate (1992, amendată în 1992 și 2002).

Cuvinte cheie: habitate forestiere, NATURA 2000, Munții Râiosu și Buda.

INTRODUCTION

The mountain level is quite well represented in Râiosu and Buda Mountains. Includes closed forests situated above the hilly floor. The lowest limit is the level at which *Quercus* species disappear and the upper limit is considered the altitude where spruce fir forests rarely begin.

The two mountains whose vegetation was researched are divided into three vegetation sublevels: the sublevel of the lower mountain, middle mountain sublevel and the sublevel of the upper mountain (Stancu, 2005).

The sublevel of the lower mountain (800 (600)-1200 m) is characterized by forest vegetation composed of pure stands of beech or mixed with other deciduous trees (occur sporadically) and conifers. The area occupied by this sublevel is small compared to the other two less grown; it is present below the altitude of 1000 m. All other areas at the foot of two studied mountains are found straight into the middle mountain sublevel.

The middle mountain sublevel (1200-1400 m) is characterized by mixed beech forests with spruce or fir. Common associations found here are: *Sympyto cordati-Fagetum sylvatice*, *Pulmonario rubrae-Fagetum* and on hillsides *Scorzonero roseae-Festucetum nigricantis* (Coldea, 1991).

The sublevel of the upper mountain (1300-1700 m) is made of pure spruce stands grouped in *Hieracio transsilvanici-Piceetum* association. However, spruce fir forest are commonly found up to an altitude of 1700 m on the southern slope of Buda Mountain, while the steep western slope of the Raisu mountain spruce fir suppression occurs either because the orographic nature or due to anthropozoogenic action.

MATERIAL AND METHODS

During the last two decades, various systems of classification of the habitats have been completed in Europe. The purpose of this action was to highlight the diversity of the ecosystems that represent the spontaneous living coverage, part of it natural, which is still present on the continent.

Some of these classifications are more detailed; for example CORINE (1991) (Devillers & Devillers, 1996; 1999) and EUNIS (1997-2005), while others are brief, including only those types of habitat whose preservation needs the endorsement of some specific measures, for example EMERALD (2000), Habitats Directive (1992, amended in 1992 and 2002).

In Romania, the issue of establishing the habitats has dated since 1991, when over 240 types were identified. During the years, the number of the identified habitats has increased. Thus, in 1995, there were recorded 986 entrances, belonging to 7 hierachic levels of classification. In 2005, it was performed the first attempt of a unitary description of the main types of habitats from Romania, most of them being included in the systems of classification CORINE (1991) and PALEARCTIC HABITATS (1996, 1999).

As a member of the European Union, Romania is obliged to implement NATURA 2000, which is a pan-European network for the conservation of nature, whose goal is to protect the natural habitats, as well as the wild flora and fauna, conformable to the stipulations of the Birds Directive (2009/147/EC) and Habitats Directive (92/43/EEC).

RESULTS AND DISCUSSIONS

The following habitat types were identified:

1. Temperate deciduous hardwoods

➤ Habitats of Romania R4104

The Southeastern Carpathian forest of beech (*Fagus sylvatica*) and fir (*Abies alba*) with *Pulmonaria rubra*.

Correspondences:

NATURA 2000: 91V0 Dacian beech forest (*Symphyto – Fagion*).

EMERALD: 41.1 Beech forests.

CORINE: -

PAL.HAB: 41.1D212 Dacian *Pulmonaria rubra* fir – beech forest.

EUNIS: G3.1123 Dacian neutrophile mountaine fir forest

Vegetal associations: *Pulmonario rubrae – Fagetum* (Soó 1964) Täuber 1987.

The association includes mixed beech stands (*Fagus sylvatica* ssp. *sylvatica* L.) with spruce (*Picea abies* (L.) H. Karst.) and fir (*Abies alba* (Mill.)) found between 700-1200 m altitude, usually above the pure beech forests (*Symphyto-Fagetum*).

Few specimens of sycamore (*Acer pseudoplatanus* L.), elm mountain (*Ulmus glabra* Huds.), less ash (*Fraxinus excelsior* L.), hornbeam (*Carpinus betulus* L.) are met here.

Shrub layer is represented by a small number of *Corylus avellana* L., *Lonicera nigra* L., *Daphne mezereum* L., *Spiraea chamaedryfolia* L.

Grass and under grown layer are developed unevenly depending on light exposure and is composed of species of Mull flora (*Dentaria glandulosa* Waldst. et Kit., *Galium odoratum* (L.) Scop., *Asarum europaeum* L., *Stellaria holostea* L., *Rubus hirtus* Waldst. et Kit.). Discontinuous and poorly developed moss layer is composed of *Hylocomium splendens* (Hedw.), *Dicranum scoparium* Hedw. etc.

Conservative value: moderate.

➤ Habitats of Romania R4109

Southeast Carpathian forests of beech (*Fagus sylvatica*) with *Symphytum cordatum*.

Correspondences:

NATURA 2000: 91V0 Dacian beech forest (*Symphyto – Fagion*).

EMERALD: 41.1 Beech forests.

CORINE: -

PAL.HAB: 41.1D211 Dacian *Dentaria glandulosa* beech forest.

EUNIS: G1.6D21 Dacian *Symphytum* beech forest.

Vegetal associations: *Symphyto cordati – Fagetum* Vida 1959.

The association is well defined and unitary throughout the Romanian Carpathians. It is developed on brown soils, deep, often skeletal, more or less moist

with a rich mull type and trophic medium to high. Among the monodominante clusters enlightened only by beech (*Fagus sylvatica* ssp. *sylvatica*) there are clumps of fir disseminantion (*Abies alba*) and spruce (*Picea abies*). Rare specimens of sycamore (*Acer pseudoplatanus*) or elm mountain (*Ulmus glabra*) could also be found here.

The shrub layer is missing or poorly developed because of the shadow. There are rare specimens of *Corylus avellana*, *Crataegus monogyna* Jacq., *Sambucus racemosa* L., *Lonicera xylosteum* L., *Daphne mezereum* L., *Spiraea chamaedryfolia* L.

In the herbaceous layer, *Symphytum cordatum* has a high consistency. Besides this endemic species, there are other Dacian or Daco-Balkans species like: *Hepatica transsilvanica* Mill., *Dentaria glandulosa*, *Pulmonaria rubra* Schott. In all studied groves, regeneration is active, the fact that the beech forests provides an optimum climate in the current period.

The tree layer is well finished, clot canopy is 90%.

Conservative value: high.

2. Temperate coniferous forests

➤ **Habitats of Romania R4206**
The Southeast Carpathian forests of spruce (*Picea abies*) and fir (*Abies alba*) with *Hieracium rotundatum* Kit. ex Schult.

Correspondences:

NATURA 2000: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio – Piceetea*).

EMERALD: -

CORINE: -

PAL.HAB: 42.21623 Carpathian high montane *Hieracium* spruce forests.

EUNIS: G3.1B1 Bilberry spruce forest.

Vegetal associations: *Hieracio rotundati – Piceetum* Pawl. et Br.-Bl. 1939

Spruce stands on the north-eastern side of the Râiosu mountain and the south-eastern slope of Buda mountain, had the dominant species (*Picea abies*) that inhabit humus rich soils moder type, moderately acid reaction. Tree layer is composed exclusively of (*Picea abies*) or, at lower altitudes mixed fir (*Abies alba*), mountain ash (*Sorbus aucuparia* L.) etc.

The shrub layer is absent or poorly developed. There are rare specimens of *Sambucus racemosa*, *Lonicera nigra*, *Spiraea chamaedryfolia* etc.

In the herbaceous layer, besides the characteristic species *Hieracium transsylvanicum* (syn. *Hieracium rotundatum*), there are a lot of specific forests of spruce's acidophilous species such as: *Luzula sylvatica* (Huds.) Gaudin, *Calamagrostis villosa* Chaix ex Vill., *Vaccinium myrtillus* L., *Homogyne alpina* (L.) Cass., *Luzula luzuloides* (Lam.) Dandy & Wilmott and transgressive species of beech forests.

The moss layer is composed of species as: *Hylocomium splendens*, *Sphagnum* sp., *Dicranum scoparium*.

FORESTS HABITATS IN RÂIOSU AND BUDA MOUNTAINS, FĂGĂRAŞ MASSIF 45

Conservative value: moderate.

➤ **Habitats of Romania R4209**

The Southeastern Carpathian forests of spruce (*Picea abies*) with *Leucanthemum waldsteinii*.

Correspondences:

NATURA 2000: - 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio – Piceetea*).

EMERALD: -

CORINE: -

PAL.HAB: 42.21625 Carpathian *Leucanthemum* high mountaine spruce forest.

EUNIS: -

Vegetal associations: *Leucanthemo waldsteinii-Piceetum* Krajna 1933.

In contradistinction to *Hieracio rotundati-Piceetum* which is climatically conditioned, this association has an edaphogenous character, because its development is ensured by an abundance of edaphic and atmospheric humidity. Spruce phytocoenosis of this association are scattered throughout the Buda Valley, Buda River bank. They are growing on brown, acid, moist soil, rich in moder humus type. The characteristic species of the association, *Leucanthemum waldsteinii* (Sch. Bip.) Pouzar has a hygrofile character.

These spruce stands have united canopy, in contrast, the shrub layer is less developed, while the herbaceous layer is characterized by a rather small number of species. The direct contact of these spruce stands with the phytocoenosis of *Leucanthemo waldsteinii-Fagetum* association makes possible the transition of many forest species characteristic to the Fagetalia order.

Conservative value: high.

➤ **Habitats of Romania R4401**

The Southeastern Carpathian forests of white alder (*Alnus incana* (L.) Moench) with *Telekia speciosa* (Schreb.) Baumg.

Correspondences:

NATURA 2000: 91E0 Alluvial forest with *Alnus glutinosa* L. and *Fraxinus excelsior* (*Alno – Padion, Alnion incanae, Salicion albae*).

EMERALD: -

CORINE: -

PAL.HAB: 44.214 Eastern Carpathian grey alder galleries.

EUNIS: G1.1214 Eastern Carpathian grey alder galleries.

Vegetal associations: *Telekio speciosae – Alnetum incanae* Coldea (1986) 1990.

Groves with white alder (*Alnus incana*) is an endemic forest association for the Romanian Carpathians, with a unitary floristry composition in all massifs of this orogenetic system. Along the Buda Valley groves with white alder (*Alnus incana*) which are growing on alluvial soils and even on gravel with neutral or slightly acid reaction are met. Besides the high groundwater level caused by the

constant moisture, these groves are exposed regularly to floods. Tree layer is composed exclusively of white alder (*Alnus glutinosa*) with a little mixture of spruce (*Picea abies*), fir (*Abies alba*), beech (*Fagus sylvatica* ssp. *sylvatica*), and at lower altitudes, black alder (*Alnus glutinosa*).

The shrub layer is absent or poorly developed, compound of *Salix triandra* L., *Lonicera xylosteum* L., *Corylus avellana* L., *Prunus padus* L. Grass and undergrowth layer is strongly developed, dominated by *Petasites albus* (L.) Gaertn. and *Telekia speciosa* (Schreber) Baumg., *Ranunculus repens* L., *Festuca gigantea* (L.) Vill., *Cirsium oleraceum* (L.) Scop. etc.

Conservative value: high.

CONCLUSIONS

In the paper 5 forests habitats are described. These habitats, which include protected species, relict species, and endemic species, are threatened by numerous negative anthropogenic impacts.

Knowing the different habitat types, their distribution and extent is very important to develop a management plan for the two studied mountains. This plan is necessary in order to improve the conservation status of habitats and species through a series of strategic actions following the increasing ecological database and to educate the population.

REFERENCES

- COLDEA Gh., 1991 - *Prodromes des associations végétales des Carpates du Sud-Est (Carpates Roumaines)*. Camerino. Universita degli Studi. p. 539.
- DONIȚĂ N., POPESCU N., PAUCĂ-COMĂNESCU Mihaela, MIHĂILESCU Simona, BIRIŞ IOVU A., 2005 - *Habitatele din România*. Edit. Tehnică Silvică. București. p. 496.
- DEVILLERS P., DEVILLERS-TERSCHUREN J., VANDER Ch., 1996 - *Palearctic Habitats*. PHYSIS Data Base. Royal Belgium Institute of Natural Sciences. Last update 1999.
- STANCU Daniela Ileana, 2005 - *Flora și vegetația munților Râiosu și Buda, masivul Făgăraș*. Edit. Universității din Pitești. p. 226.
- ***1991. CORINE Biotopes Manual - Habitats of the European Community. EUR 12587/3, Office for Official Publications of the European Communities.
- ***Birds Directive 2009/147/EC - Council Directive 2009/147/EC on the conservation of the wild birds.
- ***EUNIS - EUROPEAN NATURE INFORMATION SYSTEM. <http://eunis.eea.eu.int> (accessed March 10, 2013).
- ***Habitats Directive 92/43/EEC - Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.7.92).
- *** NATURA 2000. O.U.G. 57/20.06.2007 privind regimul ariilor naturale protejate.

BRIEF HISTORICAL REVIEW OF ORNITHOLOGICAL RESEARCH ON THE MIDDLE BASIN OF THE ARGEȘ RIVER

DENISA CONETE

University of Pitești, Târgu din Vale Street, no. 1, 110040, Pitești, Argeș, Romania,
e-mail: denisa_conete@yahoo.com

ABSTRACT. The history of Romanian ornithology began with Carol Wallstein de Wella, who, in 1853 published his book entitled **Elemente de ornitologie** (Elements of Ornithology). The wintering of birds in our country was initially studied by Pașcovschi (1968). As regards the creation of numerous reservoirs, Munteanu (1963; 1968; 1969), Mătieș and Kohl (1965) signalled that many species had settled in these regions as winter guests. The beginnings of the research on the aquatic avifauna of the reservoirs created in the upstream or midstream regions are due to Dan Munteanu (1961-1966), who continued his work together with Mătieș (1973-1982). In their study – **Modificări induse de lacurile de acumulare în structura și dinamica avifaunei** (Changes Induced by Basins in the Structure and Dynamics of the Avifauna - Munteanu and Mătieș (1983) presented a synthesis of the changes that had taken place in the structure and dynamics of the avifauna due to the modifications in the Arges River basin. After 1999, many of our articles (Radu Gava, Adrian Mestecăneanu, Denisa Conete) added new data to the previous research studies.

Key words: ornithological research, brief historical review, Argeș River, reservoirs, protection.

REZUMAT. Scurt istoric al cercetărilor ornitologice din bazinul mijlociu al râului Argeș. Istoria ornitologiei românești își are începuturile în cartea lui Carol Wallstein de Wella, care în 1853 a publicat lucrarea intitulată **Elemente de ornitologie**. Iernatul păsărilor, în țara noastră, a fost studiat inițial de Pașcovschi (1968), iar în ceea ce privește apariția lacurilor artificiale de acumulare a fost semnalată instalarea a numeroase specii oaspeți de iarnă: Munteanu (1963; 1968; 1969), Mătieș și Kohl (1965). Cercetarea avifaunei acvatice de pe lacurile de acumulare, create pe cursul superior și mijlociu al Argeșului, a fost începută de Dan Munteanu (1961-1966) și continuată împreună cu Matieș (1973-1982). În **Modificări induse de lacurile de acumulare în structura și dinamica avifaunei**, Munteanu și Matieș (1983) au făcut o sinteză a modificărilor apărute în structura și dinamica avifaunei datorate transformărilor apărute în bazinul Argeșului. După anul 1999 numeroase articole (Radu Gava, Adrian Mestecăneanu, Denisa Conete) au completat vechile cercetări.

Cuvinte cheie: cercetări ornitologice, scurt istoric, râul Argeș, lacuri de acumulare, protecție.

From the oldest times, birds have called our attention, both by their appearance and behaviour. We are fascinated especially because we associate them with the idea of freedom. The first rustic drawings that depict birds date back to the

Stone Age, for example the birds sketched on the walls of the Tajo Segura Cave, in Spain or those found in the Gaura Chindiei Cave, in Romania. In the old Egyptian ceramics we have the first painted image of a bird - the Flamingo. The first representations of birds in our country were discovered in the Precucuteni Culture (4.500-4.000 B. C.). The Mallard is also present here, as a result of domestication. The Romanian archaeologist Dan Monah acknowledges that the first domesticated birds were mallards, due to the fact that most of the times our ancestors settled near water sources (Rang, 2002). The study of their behaviour, in close correlation with ecology, has occupied a central role within ornithological research.

Until around 1925, the avifauna of our country was occasionally studied by different travellers and hunters, and more substantially by zoologists and ornithologists, most of them foreigners, not Romanian scientists. Thus, the first reference goes back to 1622, when the traveller Samuel Twardowski mentioned the existence of big flocks of cranes and swans among the numerous birds he saw in the Danube Holms, at Giurgiu. But ornithological research in Romania was not conducted separately from the global and especially from the European context (Rang, 2002).

The Romanian ornithological history certainly has its origins in Carol Wallstein de Wella's book, published in 1853 and entitled **Elemente de ornitologie** (Elements of Ornithology), in which he referred for the first time in the Romanian scientific literature to the habit of the Shelduck (*Tadorna tadorna*) (Linnaeus, 1758) of nesting in fox dens, observations he made in the Oltenia region (Băcescu & Tăzlăoanu, 1953; Wallstein, 1853). Yet, the fundamental Romanian work on ornithology remains **Ornis Romaniae** by Robert Ritter von Dombrowski, published in German in 1912 and then translated, reorganized, and completed by Dionisie Linția. It was edited in three volumes as **Păsările României** (Birds of Romania) (1946-1955). The most complete works on the avifauna of Romania are those written by Dombrowski and Linția (Dombrowski, 1912; 1946; Linția, 1954; 1955), which comprise not only identification keys, but also valuable observations on the biology of each species (Rang, 2002). Dionisie Linția, a complete ornithologist and a renowned scientist, dedicated over 50 years of his life to the study of birds. He is the first modern Romanian ornithologist, the founder of the biggest and broadest collection of native birds.

The wintering of birds was studied by Pașcovschi, Papadopol and Tălpeanu (Pașcovschi, 1968; Papadopol, 1957; 1960; Tălpeanu, 1969; 1970). As regards the creation of numerous reservoirs, besides the partial modifications of some routes of passage, it was signalled that many species settled in these regions as winter guests, both on the surfaces of the lakes and in the neighbouring areas (Munteanu, 1963; 1968; 1969; Mătieș & Kohl, 1965; Radu, 1964; Rang, 1967; Tălpeanu, 1970).

The number of the Romanian works on ecology is growing as the study of the biology of bird populations is given more and more importance, mainly in those regions where the reservoirs and the other major interventions by human activity

have caused extensive and profound changes in the environment, followed by changes in bird communities.

The observations made on birds have been most often linked, consciously or involuntarily, to the situation of the environment.

The Argeş River drains most of the southern slope of the Făgăraş Mountains, the corresponding Subcarpathian region, the eastern part of the Getic Piedmont and a vast area of the Romanian Plain (Barco & Nedelcu, 1974). The Argeş Valley is one of the most important bird migration routes in our country. Thus, after 1960, a series of reservoirs was created. These have been used to produce electrical power. The creation of this chain of reservoirs has led to a strong anthropization of the natural landscape and produced important changes in the qualitative and quantitative structure of the ornithofauna (Gava, 1997; Munteanu & Mătieş, 1983).

Mihai C. Băcescu, in his work **Păsările în nomenclatura și viața poporului român** (Birds in Romanian Nomenclature and Everyday Life of the Romanian People) mentioned some localities in the Argeş county and the neighbouring areas, from which he collected regional names, sayings or information that offered indications regarding the distribution of many birds species in the past (Băcescu, 1961).

Aurel Papadopol (Papadopol, 1965), in his work entitled **Contributions à la connaissance de la systématique, répartition et biologie d' *Alcedo atthis* (L.) en Roumanie** (Contributions to the Knowledge of the Systematics, Distribution and Biology of *Alcedo atthis* (L.) in Romania), based on a material which resulted from different regions of our country, showed the distribution of the subspecies of Kingfisher (*Alcedo atthis*) (Linnaeus, 1758) found in our country. The author concluded that all the southern part of our country, except for the high mountain peaks, was populated by *Alcedo atthis atthis* (Linnaeus, 1758).

In his work, **Cercetări biometrice, morfologice și sistematice cu privire la populația de *Lanius excubitor* L. din Republica Socialistă România** (Biometric, Morphologic and Systematic Research on the Population of *Lanius excubitor* L. in the Socialist Republic of Romania), Mircea Mătieş performed a biologic and morphologic analysis of the Great Grey Shrike population of our country. The author observed that *L. e. excubitor* Linnaeus, 1758 nested in the provinces of Crișana, Transylvania and north-western Moldavia, while the species *L. e. homeyeri* Cabanis, 1873 probably nested in the plains from the south-western part of the country (Mătieş, 1968).

In volume II (1969) of Studies and Communications, the journal of the Museum of Piteşti, Mircea Mătieş published the article **Cercetări avifenologice de-a lungul bazinului mijlociu și superior al Argeșului** (Research on Bird Phenology along the Middle and Upper Basins of the Argeş River). The author conducted a series of analyses in the regions of the Argeş basin which allowed him to make some specifications concerning the migration of birds. In the case of *Anas querquedula* Linnaeus, 1758, he indicated the small-scale night migration to the east. For *Anthus spinolella* (Linnaeus, 1758), *Buteo buteo* (Linnaeus, 1758),

Carduelis spinus (Linnaeus, 1758), *Miliaria calandra* (Linnaeus, 1758), *Lanius collurio* Linnaeus, 1758, the author indicated the fact that they migrate to the north through the Argeș basin. It was determined that for the species *Motacilla alba* Linnaeus, 1758, *Sturnus vulgaris* Linnaeus, 1758, *Merops apiaster* Linnaeus, 1758, *Vanellus vanellus* (Linnaeus, 1758), migration took place along the Argeș River (to NNW), probably to the Olt Defile. It was also established that for many species of birds that migrated through the territory of our country, the Argeș River basin was one of the main migration routes, even if at the north there was a barrier represented by the Făgăraș-Iezer Mountains and many authors considered that the passage was strongly influenced by this chain of mountains. In his opinion, the mountain barrier led to the appearance of two main migration directions, both crossing the Argeș Basin: one towards the Olt Defile and the other to the Bran Pass, with some species flying over the peak of the Făgăraș Mountains. Over 250,000 individuals from 53 species were determined in the field and recorded; some specimens were collected and preserved and documentary photos were taken (Mătieș, 1969).

Working in collaboration with R. Stancu and L. Stănculescu, Mătieș published the book **Izvoarele Colcot de lângă Topoloveni (jud. Argeș) - loc de iernare pentru păsări** (Colcot Springs near Topoloveni (Argeș County) - a Wintering Site for Birds) (Mătieș et al., 1969). Mircea Mătieș and Radu Gava (Mătieș & Gava, 1971) also presented in their article **Alte exemplare document în colecția ornitologică a Muzeului din Pitești** (Other Typical Specimens in the Ornithological Collection of the Museum of Pitești), novel scientific data regarding four bird species from the upper and middle basins of the Argeș River.

In his work **Contribuții la cunoașterea migrației carpaticice a păsărilor** (Contributions to the Knowledge of Bird Migration through the Carpathian Passage), Mircea Mătieș presented information about the passage of birds through the Făgăraș Mountain area and the southern region of it: the author made reference to collecting a specimen of Red-throated Loon (*Gavia stellata*) (Pontoppidan, 1763) on November 8, 1969 on the Argeș River, at Pitești, as well as to the delayed migration of the White Stork (*Ciconia ciconia* Linnaeus, 1758) in the spring of 1969, which was characterized by a much colder weather than usual (Mătieș, 1971).

In the work **Contribuții privind cunoașterea situației actuale a păsărilor răpitoare de zi, Ordinul Falconiformes, din județul Argeș (perioada 1967 - 1973)** (Contributions to the Knowledge of the Current Situation of Diurnal Birds of Prey, Order Falconiformes, in the Argeș County (period 1967 - 1973)), Mircea Mătieș offered a panoramic view of the situation of falconiform species in the Argeș County. Ten species were recorded in the middle basin area of the Argeș River: *Milvus migrans* (Boddaert, 1783), *Accipiter gentilis* (Linnaeus, 1758), *Accipiter brevipes* (Severtzov, 1850), *Accipiter nisus* (Linnaeus, 1758), *Buteo lagopus* (Pontoppidan, 1763), *Buteo buteo*, *Circus cyaneus* (Linnaeus, 1766), *Falco subbuteo* Linnaeus, 1758, *Falco vespertinus* Linnaeus, 1766 and *Falco tinnunculus* Linnaeus, 1758. The conclusion was that

the more pronounced anthropic density in the plain and hill areas, compared with that of the mountain regions, had caused a retreat of the brooding falconiform species toward upstream areas (Mătieş, 1974).

Mătieş and Munteanu approached the topic of the migration of the Woodcock in **Sitarul - migrație, vînătoare, ocrotire** (The Woodcock - Migration, Hunting and Conservation Measures) in 1976 and resumed it later with new data in Travaux. Thus, it was pointed out that the spring passage for this species started in the south in the first half-decade of March and in the hill regions between March 5 and March 10 with a 9 to 12 days difference between the southern and western plains, on the one hand and the northern regions of the country on the other (Mătieş & Munteanu, 1976).

An interesting article was written by the ornithologist Aurel Papadopol and published in the journal Travaux (Papadopol, 1979), **Contribution à la connaissance de l'avifaune des départements d'Argeş et de Dâmboviţa (Roumanie)** (Contributions to the Knowledge of the Avifauna of the Argeş and Dâmboviţa Counties (Romania)).

Dimitrie Radu identified the Cirl Bunting (*Emberiza cirlus*) Linnaeus, 1766 brooding in the Argeş River Valley, in the upstream region of the Vidraru Reservoir, on July 2, 1972 (Radu, 1972).

Mircea Mătieş and Dan Munteanu published in Travaux the article **La dynamique saisonnière de la bécasse des bois (*Scolopax rusticola*) en Roumanie** (The Seasonal Dynamics of the Eurasian Woodcock (*Scolopax rusticola*) in Romania). The result of a very thorough documentation, this article discuss again the topic of annual and multiannual seasonal dynamics of the Woodcock (*Scolopax rusticola*) Linnaeus, 1758 in Romania, based on an article published by the authors in 1976 (Mătieş & Munteanu, 1979).

Mircea Mătieş in collaboration with Victor Ciocchia (Mătieş & Ciocchia, 1980), in the article **Primele date asupra cuibăritului sfrânciocului mare (*Lanius excubitor* L.) în Oltenia și Muntenia** (The First Data on the Brooding of the Great Grey Shrike (*Lanius excubitor* L.) in Oltenia and Muntenia), presented the results of their research on the distribution of the Great Grey Shrike south of the Middle Carpathians. We can also find a few references to localities from the Argeş River Basin: Merişani (Brăteasca village), Merişani (Vâlcele village), Băiculeşti and Curtea de Argeş. It is considered that they referred to *L. e. excubitor*.

In 1983, in **Modificări induse de lacurile de acumulare în structura și dinamica avifaunei** (Changes Induced by Reservoirs in the Structure and Dynamics of the Avifauna), Munteanu and Mătieş synthesised the changes found in the structure and dynamics of the avifauna due to the transformations in the Argeş Basin. When considering the avifauna of the reservoirs from the upper and middle basin of the Argeş River (Vidraru, Oeşti, Cerbureni, Curtea de Argeş, Zigoneni, Vâlcele, Budeasa, Bascov, Piteşti and Goleşti), the authors determined 84 aquatic species, some of them with a low occurrence in the mountain and hill regions of our country – *Gavia stellata*, *Phalacrocorax pygmeus* (Pallas, 1773),

Platalea leucorodia Linnaeus, 1758, *Plegadis falcinellus* Linnaeus, 1766, *Tadorna ferruginea* (Pallas, 1764), *Netta rufina* (Pallas, 1773), *Haematopus ostralegus* Linnaeus, 1758, *Pluvialis squatarola* (Linnaeus, 1758) etc. It was mentioned that the eutrophication of the new dam lakes on the Olt River had attracted a part of the aquatic avifauna, and subsequently, the number of birds living on the lakes in the Argeș County had declined (Munteanu & Mătieș, 1983).

Les routes de migration des oiseaux en Roumanie (The Migration Routes of Birds in Romania) by Mircea Mătieș appeared in 1986 (Mătieș, 1986). In this work, the author specified the routes of migration through our country for 37 bird species. Among these, there were some that passed through the area of the Argeș River Basin. It was noted that *Larus ridibundus* Linnaeus, 1766, *Egretta garzetta* (Linnaeus, 1766) and *Egretta alba* (Linnaeus, 1758) flew over the Carpathians, following the reservoirs and *Ciconia nigra* (Linnaeus, 1758) followed the same routes as *Ciconia ciconia*, but preferred the company of some raptor species such as *Milvus migrans* and *Buteo buteo*.

Victor Ciocchia presented in his work **Păsările cloacitoare din România** (Brooding Birds of Romania) a series of maps in UTM grid, marking the bird brooding areas in Romania (Cichia, 1992).

Mitică Georgescu and George Cistian Georgescu, in **Enciclopedie zoocinegetică** (Zoo-cynegetic Encyclopedia), offered a series of regional bird names: „cioară pucioasă” for the Roller (*Coracias garrulus*) Linnaeus, 1758, „papagal tigănesc” for the Jackdaw (*Corvus monedula*) Linnaeus, 1758 or „pescar” for the Heron (*Ardea cinerea*) Linnaeus, 1758, all of them common in the Argeș region (Georgescu & Georgescu, 1996).

Atlasul păsărilor cloacitoare din România (The Atlas of the Brooding Birds of Romania) appeared in 2002, coordinated by Dan Munteanu, Aurel Papadopol and Peter Weber was his collaborators. It is a comprehensive work of synthesis which comprises the brooding areas of the bird species of our country and implicitly of the Argeș River Basin. These are represented using the 50x50 km UTM grid (Munteanu et al., 2002).

In **Cartea Roșie a Vertebratelor din România** (The Red Book of the Vertebrates of Romania) (Munteanu, 2005), 30 endangered species living in the vicinity of the middle basin of the Argeș River were mentioned.

After 1999, many of our articles (Radu Gava, Adrian Mestecăneanu, Denisa Conete) completed the previous research studies concerning the ornithofauna of the reservoirs created on the Argeș River.

Since 2002 we have conducted detailed research on the ornithofauna of the middle basin of the Argeș River (on the Vâlcele, Budeasa, Bascov, Pitești and Golești lakes). The synthesis of the research we performed until 2011 was the theme of my doctoral thesis. A representative part of these results has been made public in a large number of articles (analytic ornithologic studies) that have been published since 2003.

Taking into account the fact that the reservoirs created on the Argeș River are, first of all, important wintering sites for the aquatic birds in the area, being

included in the site „ROSPA0062 Reservoirs on the Argeş River” - as an Avifaunistic Special Protection Area (SPA) and considered an integral part of the European ecological network Nature 2000 in Romania, it is absolutely necessary to ensure the optimum protection of the biodiversity of the area and the conservation of the endangered, vulnerable or rare bird species through continuous monitoring of the pressure factors and, implicitly, through adopting some efficient and concrete measures for the preservation of birds and of their habitats. The lack of a continuous monitoring program of the avifauna in the area makes the quantification of the changes impossible.

REFERENCES

- BARCO Aurelia, NEDELCU E., 1974 - *Judeţul Argeş*. Editura Academiei, Bucureşti. p. 166.
- BĂCESCU M., 1961 - *Păsările în nomenclatura și viața poporului român*. Editura Academiei Republicii Populare Române, Bucureşti. p. 442.
- BĂCESCU M., TĂZLĂOANU I., 1953 – *Centenarul primei lucrări originale de ornitologie românească: Carol Walstein: „Elemente de ornitologie”*, Ocrotirea Naturii. **1**: p. 127-131.
- CIOCHIA V., 1992 - *Păsările clocitoare din România*. Editura Științifică, Bucureşti. p. 386.
- DOMBROWSKI R., 1912 - *Ornis Romaniae*. Bukarest. p. 872.
- DOMBROWSKI R., 1946 - *Păsările României. Ornis Romaniae*. Fundația Regală pentru Literatură și Artă. Bucureşti. p. 436.
- GAVA R., 1997 - *Acumulările hidroenergetice de pe râul Argeş, posibile ARII de Importanță Avifaunistică*. Lucrările simpozionului ARII de Importanță Avifaunistică din România, publicațiile S.O.R., Cluj-Napoca. **3**: p. 39-42.
- GEORGESCU M., GEORGESCU G. C., 1996 - *Enciclopedie zoocinegetică*. Editura Albatros. Bucureşti. p. 450.
- LINTIA D., 1954 - *Păsările din R. P. R.* Editura Academiei Republicii Populare Române. Bucureşti. **II**: p. 304.
- LINTIA D., 1955 - *Păsările din R. P. R.* Editura Academiei Republicii Populare Române. Bucureşti. **III**: p. 492.
- MĂTIEŞ M., 1968 - *Cercetări biometrice, morfologice și sistematice cu privire la populația de Lanius excubitor L. din Republica Socialistă România*. Muzeul Județean Argeş. Studii și Comunicări. p. 213-226.
- MĂTIEŞ M., 1969 - *Cercetări avifenologice de-a lungul bazinului mijlociu și superior al Argeșului între 1 ianuarie-31 mai 1968*. Muzeul Județean Argeş. Studii și Comunicări. Piteşti. p. 73-90.
- MĂTIEŞ M., 1971 - *Contribuții la cunoașterea migrației carpaticice a păsărilor*. Revista muzeelor. **3**: p. 251-254.
- MĂTIEŞ M., 1974 - *Contribuții privind cunoașterea situației actuale a păsărilor răpitoare de zi, ord. Falconiformes, din județul Argeş (perioada 1967 - 1973)*. Nymphaea, **II**: p. 129-136.
- MĂTIEŞ M., 1977 - *Migrația păsărilor prin defileul Olt*. Vânătorul și Pescarul Sportiv, **XXIX (4)**: p. 5.

- MĂTIEŞ M., 1986 - *Les routes de migration des oiseaux en Roumanie*. Travaux du Museum d'Histoire Naturelle „Grigore Antipa”, Bucureşti. **XXVIII**: p. 247-264.
- MĂTIEŞ M., CIOCHIA V., 1980 - *Primele date asupra cuibăritului sfrâncioculuui mare (Lanius excubitor L.) în Oltenia și Muntenia*. Muzeul Județean Argeș. Studii și Comunicări. V: p. 191-196.
- MĂTIEŞ M., GAVA R., 1971 - *Alte exemplare document în colecția ornitologică a Muzeului din Pitești*. Muzeul Județean Argeș. Studii și Comunicări. p. 99-105.
- MĂTIEŞ M., MUNTEANU D., 1976 - *Sitarul - migrație, vînătoare, ocrotire*. Vânătorul și Pescarul Sportiv. **XXVIII (4)**: p. 11-12.
- MĂTIEŞ M., MUNTEANU D., 1979 - *La dynamique saisonnière de la bécasse des bois (Scolopax rusticola) en Roumanie*. Travaux du Museum d'Histoire Naturelle „Grigore Antipa”. Bucureşti. **XX**: p. 455-478.
- MĂTIEŞ M., MUNTEANU D., 1980 - *Pasajele timpurii și târzii la sitar*. Vânătorul și Pescarul Sportiv. **XXXII (3)**: p. 2-3.
- MĂTIEŞ M., STANCU R., STÂNCULESCU L., 1969 - *Izvoarele „Colcot” de lângă Topoloveni (jud. Argeș) - loc de iernare pentru păsări*. Muzeul Județean Argeș. Studii și Comunicări. **II**: p. 61-71.
- MUNTEANU D., 1968 - *Observații ornitologice pe lacul de acumulare Bicaz (III)*. Lucrările Stațiunii de Cercetări Biologice, Geologice și Geografice „Stejarul”. Ministerul Învățământului, Universitatea „Al. I. Cuza” – Iași. Pângărați. **1**: p. 345-349.
- MUNTEANU D., 1978 - *Avifauna ecosistemelor antropogene și influența presiunii antropicice asupra populațiilor de păsări*. Cluj-Napoca. **1**.
- MUNTEANU D., 1992 - *Dicționar poliglot al speciilor de păsări din România*. Publicațiile Societății Ornitologice Române. Cluj-Napoca. **1**: p. 78.
- MUNTEANU D., 2005 - *Aves (Păsări)*. p. 85-173. In: BOTNARIUC N., TATOLE Victoria (eds) - Cartea Roșie a Vertebratelor din România. Muzeul Național de Istorie Naturală „Grigore Antipa”, Bucureşti.
- MUNTEANU D., MĂTIEŞ M., 1983 - *Modificări induse de lacurile de acumulare în structura și dinamica avifaunei*. Analele Banatului. Științele Naturii. Muzeul Banatului. Timișoara. **1**: p. 217- 225.
- MUNTEANU D., PAPADOPOL A., WEBER P., 2002 - *Atlasul păsărilor clocitoare din România*. Ediția a II-a. Cluj-Napoca. p. 152.
- PAPADOPOL A., 1965 - *Contributions à la connaissance de la systématique, répartition et biologie d' Alcedo atthis (L.) en Roumanie*. Travaux du Museum d'Histoire Naturelle „Grigore Antipa”. Bucureşti. **V**: p. 335-346.
- PAPADOPOL A., 1979 - *Contribution à la connaissance de l'avifaune des départements d'Argeș et de Dâmbovița (Roumanie)*. Travaux du Museum d'Histoire Naturelle „Grigore Antipa”. Bucureşti. **XX**: p. 401-422.
- RADU D., 1972 - *Presura bărboasă și codobatura galbenă cu cap negru își extind arealul în România*. Vânătorul și Pescarul Sportiv. **XXIV (12)**: p. 26.
- RANG C. P., 2002 - *Studiul dinamicii unor comunități de păsări din bazinul mijlociu al râului Siret inclusiv zonele lacurilor de acumulare*. Publicațiile SOR. Cluj-Napoca. **13**: p. 249.
- TĂLPEANU M., 1969 - *Rața arămie (Oxyura leucocephala) pasare rară în România*. Rev. Muzeelor. **3**: p. 256-257.

TĂLPEANU M., 1970 - *Les anseriformes de Roumanie (Nidification, Hivernage)*. Trav.
Mus. Hist. Nat. „Gr. Antipa”. **10**: p. 295-305.

WALSTEIN C., 1853 - Elemente de ornitologie dupe proprii observații locale chiar în Țara
Românească. Tipografia Sf. Mitropolii. București. p. 414.

THE GREAT BUSTARD (*OTIS TARDÀ LINNAEUS, 1758*) SIGNALLED IN BRĂILA COUNTY AFTER 1950

SORIN GEACU

Institute of Geography of the Romanian Academy, Dimitrie Racoviță Street, no. 12, 023993,
Bucharest, Romania, e-mail: geacuserin@yahoo.com

ABSTRACT. The Great Bustard was permanently seen in the North Bărăgan Plain until the 1960s, afterwards being found occasionally only in a few places. The harsh winter of 1953-1954 and the intensification of agriculture led to the decline and the extinction of the species.

Key words: Great Bustard, Brăila County, Romania.

REZUMAT. Semnalări ale dropiei (*Otis tarda* Linnaeus, 1758) în județul Brăila după 1950. Prezența dropiei în fauna Câmpiei Bărăganului Nordic a fost continuă până în anii '60 ai secolului trecut, după care s-a observat ocazional, în câteva locuri. Iarna grea din 1953-1954 și intensificarea agriculturii au determinat declinul și extincția populatiei speciei.

Cuvinte cheie: dropie, județul Brăila, Romania.

INTRODUCTION

The Great Bustard (*Otis tarda* Linnaeus, 1758) is the most robust bird in Romania's fauna. Until mid-20th century, it used to live in certain Romanian Plain areas, one of them being Brăila County. In the 1950-1960s strong human pressure made it disappear from the study-area. However, a few specimens, migrating from other regions, could still be seen in some places of this County.

MATERIAL AND METHOD

The data have been collected in a survey among hunters and locals, as well as from the archives of some forestry and cynegetic institutions.

PRESENCE OF THE SPECIES

Brăila County ($4,766 \text{ km}^2$) is situated in the south-east of Romania; its territory encompasses sub-units of the Romanian Plain (60%) and floodplains (40%).

The Bărăgan Plain has two units: Brăila Bărăgan in the north and Ialomița Bărăgan in the south, the two being separated by the Călmățui Valley. In the past, its fauna also includes the Great Bustard, called also „the Bărăgan Metropolite”.

In 1951, flock of ten birds each could be seen near the northern boundary of the County, in the fields of three villages: Romanu, Găvani and Scorțaru Nou.

As far as 1952, flocks of 10-15 birds were observed in the fields around Spiru Haret-Polizești-Bertești-Mihai Bravu settlements, that is, on the south-east edge of the County.

After the severe winter of 1953-1954 the population of this typically steppe bird fell drastically.

In 1955, Great Bustard effectives in Brăila County (at the time part of Galați Region) numbered some 60 specimens (Barbu, 1976), but only 35 remained in the spring of 1958 (Popescu & Scărlătescu, 1961).

A few individuals had been poached on glazed frost (January, 1962) close to the Însurăței Village. In 1965, five birds were still observed on the territory of Scorțaru Nou Village (about 20 km west of Brăila Town).

It should be mentioned that from 1956 to 1970 the Great Bustard disappeared from most of the area south of the Călmățui Valley, and from the fields extending north of the Ianca Lake; in other parts of the County they had already disappeared before 1956 (Iana, 1974) through poaching (especially on frosty days) and intense mechanisation and chimification of agriculture.

In 1964-1965 a few specimens still existed in the fields between Șușești and Râmnicești villages (in the west of Brăila County). Worth recalling are some stuffed birds seen at Camnița Forest challet in the Buzău Floodplain, a former property of Prince Șușu, hunted near-by in the inter-war period.

In 1970, some individuals were noticed in the communes of Ulmu and Ciocile, as well as in the north of the Insula Mare a Brăilei (isle), south-east of Brăila Town.

A flock of 12 Great Bustard birds were observed in the summer of 1972 (after wheat had been threshed) near the Călmățui Floodplain, on the righthandside of the road connecting Viziru and Însurăței communes; the following year three more birds were detected close to Cireșu Village; four specimens were seen south of Ulmu Commune in 1995.

Finally, we mention a staffed specimen acquired by the Brăila Museum Natural Sciences Section, on December 24, 1983: it had been hunted in the inter-war period on the Însurăței Commune territory. Biometric measurements show this individual to be 93 cm long in all, with a 5 cm long beak, 60 cm long wing and 21 cm long tail.

REFERENCES

- BARBU Profira, 1976 - *Dropia*. Vâنătorul și Pescarul Sportiv. București. **5**: p. 8-9.
- IANA Sofia, 1974 - *Influența omului asupra vegetației forestiere și a faunei de interes vânătoresc din Bărăgan*. Revista Pădurilor, București. **2**.
- POPESCU C. C., SCÄRLÄTESCU G., 1961 - *Criterii provizorii pentru determinarea bonității fondurilor de vânătoare din R. P. R.* Studii și Cercetări. Edit. Agrosilvică. București. **XXII**: p. 9-24.

DATA ON DIURNAL LEPIDOPTERAN FAUNA OF NATURE RESERVE SPRING FROM CORBII CIUNGI (DÂMBOVIȚA)

NICOLAE LOTREAN

Argeș County Museum, Armand Călinescu Street, no. 44, 110047, Pitești, Argeș, Romania,
e-mail: lotrean_n@yahoo.com

ABSTRACT. The article presents the results of the research carried out on the diurnal lepidopteran fauna of the Nature Reserve Spring from Corbii Ciungi, Dâmbovița County, during May-September 2012. There were identified 33 species of diurnal lepidopteran of which only one species *Lycaena dispar* (Haworth, 1803) is included in the list of protected species at European level. There are presented data on grouping of the diurnal lepidopteran species according to ecological and biogeographical characteristics.

Key words: fauna, diurnal lepidopteran, reserve, Corbii Ciungi.

REZUMAT. Date asupra faunei de lepidoptere diurne din Rezervația Naturală Izvorul de la Corbii Ciungi (Dâmbovița). Articolul prezintă rezultatele cercetărilor efectuate asupra faunei de lepidoptere diurne din Rezervația Naturală Izvorul de la Corbii Ciungi, județul Dâmbovița, în perioada mai-septembrie 2012. Au fost identificate 33 de specii de lepidoptere diurne, dintre care o singură specie, *Lycaena dispar* (Haworth, 1803) este inclusă în lista speciilor protejate la nivel european. Sunt prezentate date cu privire la gruparea speciilor de lepidoptere diurne în funcție de caracteristicile ecologice și biogeografice.

Cuvinte cheie: faună, lepidoptere diurne, rezervație, Corbii Ciungi.

INTRODUCTION

The first data on the fauna of the area Nature Reserve Spring from Corbii Ciungi was published by L. Botoșaneanu and Șt. Negrea, in the year 1961 (Botoșaneanu & Negrea, 1961). They are the result of a larger study on the fauna of the springs and groundwater from Romanian Plain, started in year 1959. After the discovery of the complex of springs from Corbii Ciungi, L. Botoșaneanu and Șt. Negrea started a systematic faunal and ecological study, before this complex springs to be changed by man (Negrea & Negrea, 1999). Rich biological material collected for two years (14 May 1959 - 5 April 1961) was the basis of publication of the first faunal lists, which highlighted the extraordinary diversity of the springs complex and relict character of many species identified here

(Botoșăneanu & Negrea, 1961; 1962). The faunal results, complete by the floristic data, have led authorities to declare the springs complex from Corbii Ciungi reserve, on June 24, 1966, under the name: *Nature Reserve Spring from Corbii Ciungi*. The studies mentioned above have been focused on aquatic fauna inventorying of the springs, being mentioned 73 supraspecific taxons, most hydrobionts (aquatic macroinvertebrates).

Over the period 2005-2007, C. Ciubuc (Ciubuc, 2007) conducting a study on the **Maintaining and improving the favorable conservation status of habitats and species and stopping the decay of biodiversity in Nature Reserve Corbii Ciungi, Dâmbovița County**. On this occasion were partially inventoried and terrestrial invertebrates from riparian areas adjacent to the springs and creeks that are part of the reserve, including the butterflies, which are mentioned as order, without being given a list of species.

In the year 2012 the latest study on habitats and species of the aquatic and terrestrial vertebrates and invertebrates was conducted at Nature Reserve Spring from Corbii Ciungi for inventorying species and habitats of Community interest. On this occasion it was written and a list with the diurnal lepidopteran species identified, which partially covers the lack of information on the lepidopteran fauna of the reserve perimeter.

The springs complex is located on the left bank of the Neajlov Valley, at approximately 800 m from the Neajlov River, at approx. 2 km after exiting the commune Corbii Mari, toward commune Izvoru (former village Corbii Ciungi), on the right side of DN61 (at approx. 200 m from road), at a medium altitude of 110 m (Negrea & Negrea, 1999). The frontal springs are arranged in the form of an arc of circle, with a length of about 600 m. They are grouped into two complexes, appointed by the locals' fountains, to the west, fountain his Lisandru Vlăduț and to the east the Cacaleților fountain. The two fountains are separated by a swampy area which representing the watershed. The water of each springs complex is drained by one the collector creek, which flows into the Neajlov River. The two creeks (the creek his Lisandru Vlăduț and the Cacaleților creek), delimiting between them an area of about 9 ha (Fig. 1).

Riparian areas, from the immediate vicinity of the watercourse, are covered by herbaceous vegetation and shrubs. In the marshy areas we meet typical paludous vegetation consisting of species belonging to the genera: *Phragmites*, *Typha*, *Carex* and *Juncus*, which form thickets of rush and reed on relatively small surfaces. Shrub layer is composed of young specimens: *Alnus glutinosa* (L.), *Salix fragilis* L., *Salix cinerea* L., *Evonymus europaeus* (L.), *Cornus sanguinea* (L.), *Viburnum opulus* L., *Rosa canina* (L.), *Crataegus monogyna* (Jacq.), *Rhamnus frangula* (L.) etc., disposed singly or in compact groups, around the springs and along the two creeks. In some places, width the zone with spontaneous vegetation, one side and other of the watercourse, is less than 10 m. The entire reserve is surrounded by crops, including the area bounded by the two creeks is cultivated.



Figure 1 - Locating the wetland complex Spring from Corbii Ciungi (<http://maps.google.ro>).

MATERIALS AND METHODS

For identification/collection in the terrain of the species were chosen the areas with herbaceous vegetation and/or shrubs, from vicinity of the water. Thirty meters long transects parallels with the watercourse were made. At browse the transects we walk slowly and steadily to identify and to count/collect individuals; identifying/the collection the specimens was done in an imaginary cube with sides of 5 m; 2.5 m to the left and right of the observer and 5 m in front and above. For common species identifying was made „at sight”, directly or with binoculars; for the most part of species the identification was performed by the capture method, the identification and the release; the species that could not be identified in the field were collected in entomological envelopes and determined in laboratory. We used an entomological net with the opening of 30 cm.

The collecting was made monthly, from May to September 2012, between hours 9:00 and 16:00.

Researches have focused on faunal aspects; therefore the work can be classified in the category called „checklist”. We followed compiling the list of species and identify species of conservation interest. Were investigated only diurnal lepidopteran. The faunal data are accompanied by a brief characterization of the ecological and zoogeographical structure of the diurnal lepidopteran fauna

from Nature Reserve Spring from Corbii Ciungi. The quantitative data that complement the faunistic information are indicative, working methodology was not designed to investigate the quantitative aspects.

RESULTS AND DISCUSSIONS

207 exemplary of diurnal lepidopteran from 33 species, grouped into 5 families (Tab. 1) were identified.

Table 1 - The list of the diurnal lepidopteran species collected in the Nature Reserve Spring from Corbii Ciungi (Dâmbovița), including data about: the number of collected exemplars from each species, the ecological character and the geographical spreading.

No.	Taxon	15.05.2012	07.06.2012	10.07.2012	03.08.2012	01.09.2012	28.09.2012	Sum	Ecological character	Zoogeographical elements
	Phylum Arthropoda									
	Class Insecta									
	Order Lepidoptera									
	FAM. HESPERIIDAE									
1	<i>Erynnis tages</i> (Linnaeus, 1758)				1			1	Mxt	EuA
2	<i>Ochlodes sylvanus</i> (Esper, 1777)				1			1	Mh	EuA
3	<i>Pyrgus malve</i> (Linnaeus, 1758)					1		1	Eu	EuA
	FAM. PAPILIONIDAE									
4	<i>Iphiclus podalirius</i> (Linnaeus, 1758)	2	1	2	1			6	Mxt	PM
5	<i>Papilio machaon</i> (Linnaeus, 1758)		1	1		1		3	M	Hol
	FAM. PIERIDAE									
6	<i>Leptidea sinapis</i> (Linnaeus, 1758)	2	4	3	1	3		13	M	EuA
7	<i>Anthocaris cardamines</i> (Linnaeus, 1758)		3	1				4	M	EuA
8	<i>Aporia crataegi</i> (Linnaeus, 1758)		2	2				4	M	EuA

Continues.

Table 1 - Continuation.

No.	Taxon	15.05.2012	07.06.2012	10.07.2012	03.08.2012	01.09.2012	28.09.2012	Sum	Ecological character	Zoogeographical elements
9	<i>Pieris brassicae</i> (Linnaeus, 1758)		2	1	4	2		9	M, Mg	EuA
10	<i>Pieris napi</i> (Linnaeus, 1758)			5	2			7	Eu, Mg	PM
11	<i>Pieris rapae</i> (Linnaeus, 1758)	4	5	3	3	4	1	20	Eu, Mg	Hol
12	<i>Pontia edusa</i> (Fabricius, 1777)	2	2	3		1		8	Mx	PM
13	<i>Colias croceus</i> (Fourcroy, 1785)		1	2	4			7	Mxt, Mg	EuA
14	<i>Colias hyale</i> (Linnaeus, 1758)		2	2	6	1		11	M, Mg	EuA
15	<i>Gonepteryx rhamni</i> (Linnaeus, 1758)	1			3	1		5	M, Mg	EuA
	FAM. LYCAENIDAE									
16	<i>Aricia agestis</i> (Denis & Schiffermüller, 1775)			2	3			5	Mxt	EuA
17	<i>Celastrina argiolus</i> (Linnaeus, 1758)					2		2	M	Hol
18	<i>Lycaena phlaeas</i> (Linnaeus, 1761)	1	3	3	2			9	Mxt, Mg	Hol
19	<i>Lycaena dispar</i> (Haworth, 1803)			1		1		2	Hg	PM
20	<i>Plebeius argus</i> (Linnaeus, 1758)	2	5	1	2			10	Mh	EuA
21	<i>Polyommatus icarus</i> (Rottemburg, 1775)			7	2	3		12	M	EuA
	FAM. NYMPHALIDAE									
22	<i>Aglais urticae</i> (Linnaeus, 1758)			3	1	2	1	7	Eu, Mg	EuA
23	<i>Argynnis paphia</i> (Linnaeus, 1758)			1	3	1		5	Mh	EuA
24	<i>Boloria selene</i> (Denis & Schiffermüller, 1775)				1			1	Mh	Hol
25	<i>Inachis io</i> (Linnaeus, 1758)				2			2	M	EuA

Continues.

Table 1 - Continuation.

No.	Taxon	15.05.2012	07.06.2012	10.07.2012	03.08.2012	01.09.2012	28.09.2012	Sum	Ecological character	Zoogeographical elements
26	<i>Issoria lathonia</i> (Linnaeus, 1758)		2					2	Mxt, Mg	EuA
27	<i>Polygonia c-album</i> (Linnaeus, 1758)						4	4	Eu	EuA
28	<i>Vanessa atalanta</i> (Linnaeus, 1758)			2				2	Eu, Mg	EuA
29	<i>Vanessa cardui</i> (Linnaeus, 1758)			1	1			2	Eu, Mg	Cos
30	<i>Coenonympha pamphilus</i> (Linnaeus, 1767)			6	5	2	3	16	M	EuA
31	<i>Lasiommata maera</i> (Linnaeus, 1767)			2	2	3	1	8	M	EuA
32	<i>Maniola jurtina</i> (Linnaeus, 1767)			5	1	7	3	16	M	EuA
33	<i>Melanargia galathea</i> Fruhstorfer, 1917			2				2	M	PM
	Total species	7	13	23	24	15	6			
	Total individuals	14	32	60	54	34	13	207		

Legend: Eu – Eurybiont; Hg – Hygrophilous; Mh – Mesohygrophilous; M – Mesophilous; Mg – migratory; Mx – Mesoxerophilous; Mxt – Mesoxerothermophilous; Cos – Cosmopolitan; EuA – European-Asian; Hol – Holarctic; PM – Ponto-Mediterranean.

The small number of species and individuals of diurnal lepidopteran identified was determined by the small size of the site, approximately 9 ha (Ciubuc, 2007) and of the sampling method.

The most of the identified species belong to the family Nymphalidae (Fig. 2), their weighting was 36.36%. It was followed by the families: Pieridae (30.30%) and Lycaenidae (18.18%). The other two families, Hesperiidae and Papilionidae, had smaller weightings by 10% (9.09% and 6.07%).

As number of identified specimens, raised weighting had families: Pieride (42.51%) and Nymphalidae (32.37%), followed at a big distance by: Lycaenidae (19.32%), Papilionidae (4.35%) and Hesperiidae (1.45%), (Fig. 2).

Out of the 33 species identified, most specimens belonged to species: *Pieris rapae* (9.66%), *Coenonympha pamphilus* (7.73%), *Maniola jurtina* (7.73%) and *Leptidea sinapis* (6.28%), followed by: *Polyommatus icarus* (5.80%) and

Colias hyale (5.31%). The other species were recorded percentages less than by 5%. It is noted that no species no exceeded the threshold of 10%.

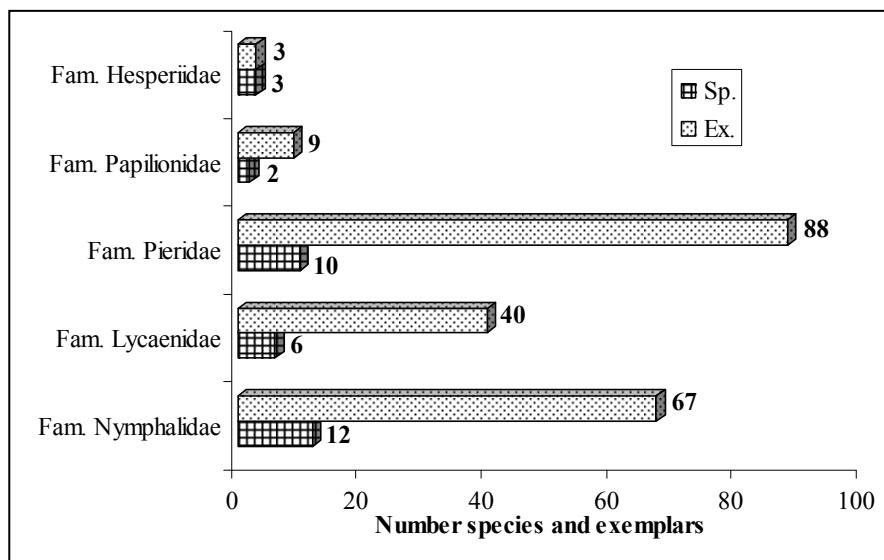


Figure 2 - The number of exemplars and species identified in each family of diurnal lepidopteran.

In accordance with their ecological preferences, the 33 species of diurnal lepidopteran identified in the Nature Reserve Spring from Corbii Ciungi were grouped into 6 ecological categories (Rákosi, 1997; Székely, 2008). The most of the species have entered in the category of mesophilous species, their weighting was of 42.42%. These together with the eurybiонт species (21.21%) totaled 63.64% of total the species identified, being followed by the mesoxerothermophilous species (18.18%) and by ones mesohygrophilous (12.12%). Were identified only one hygrophilous species (3.03%) and one mesoxerophilous (3.03%), (Fig. 3).

If we exclude from the analysis the mesophilous and eurybiонт species, which do not have the discriminant character in relation, regards characterization of the environmental conditions, we observe a slight dominance of the mesoxerothermophilous species on the mesohygrophilous species. This can be the result the aridization tendency of the area, due to restricting the original riparian habitats, wet, phenomenon accompanied by the expansion of xerophylous habitats, due to anthropic pressure at which is subjected to the area. This tendency, observed at level to other groups of invertebrates, is confirmed and by the presence of a single hygrophilous species, *Lycaena dispar* (Haworth, 1803).

Zoogeographical analysis of diurnal lepidopteran fauna of the reserve perimeter Spring from Corbii Ciungi show net dominance of the species European-Asian (66.67%) followed by Holarctic and Ponto-Mediterranean species (15.15% each), (Fig. 4).

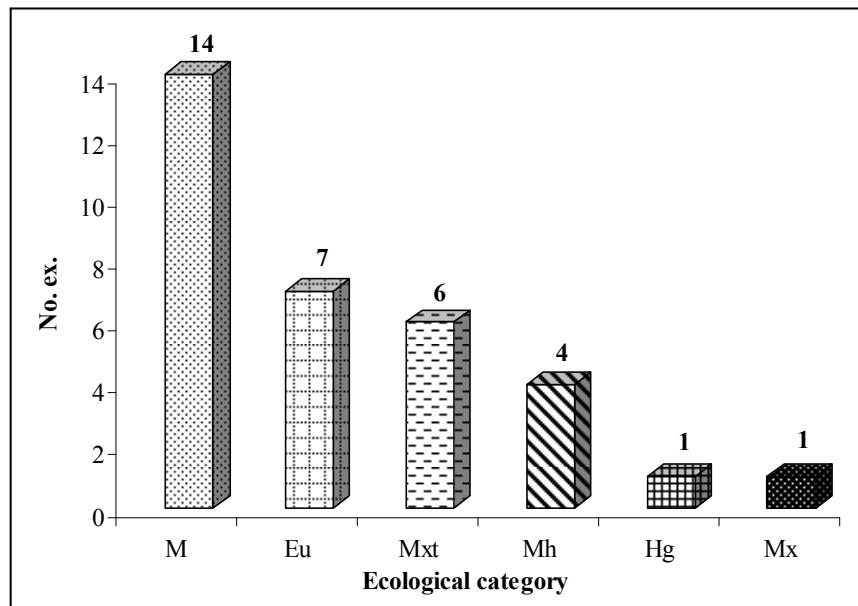


Figure 3 - The number of diurnal lepidopteran species that enter in each ecological category (Eu – Eurybiont; Hg – Hygrophilous; M – Mesophilous; Mh – Mesohygrophilous; Mx – Mesoxerophilous; Mxt – Mesoxerothermophilous).

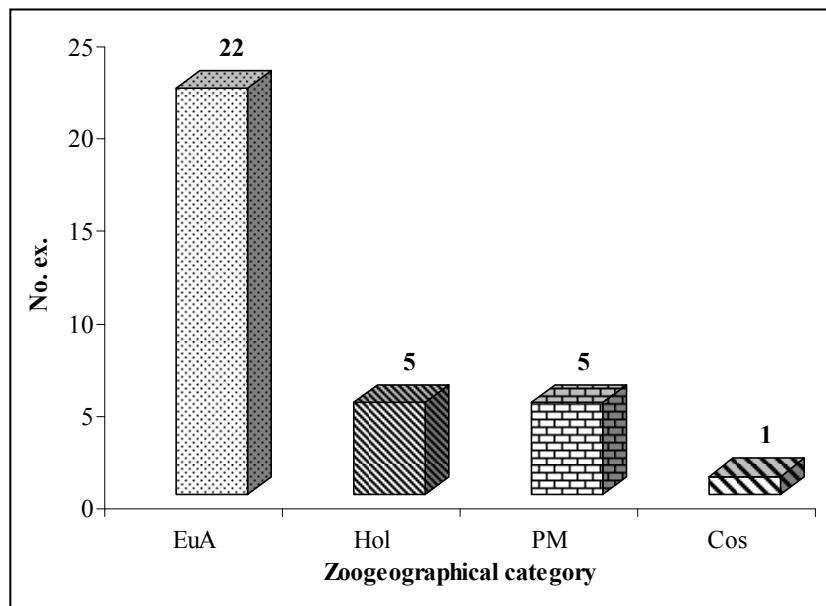


Figure 4 - Zoogeographical structure of diurnal lepidopteran fauna from Nature Reserve Spring from Corbii Ciungi (Cos – Cosmopolitan, EuA – European-Asian, Hol – Holarctic, PM – Ponto-Mediterranean).

Previously submitted data shows that, from the zoogeographical point of view, the diurnal lepidopteran fauna from Nature Reserve Spring from Corbii Ciungi is dominated by widely spread species. Weighting the Holarctic and European-Asian species (spread throughout Europe, except the extreme north and in the temperate zone of Asia) is 81.82%. This finding indicates existence in the perimeter of the reserve of a large number by species with average and big ecological valence. This characterizes the fauna with relatively low specificity for particular environment conditions.

The large share of European-Asian elements show that diurnal lepidopteran fauna from Nature Reserve Spring from Corbii Ciungi is resembling, from zoogeographic point of view, with fauna of some regions in Romania localized at latitudes and altitudes greater (Brașov, Cluj, Timișoara), characterized by a weighting of European-Asian elements greater than 60% (Székely, 2006).

From conservative point of view, was put into evidence the presence of a species protected at European level *Lycaena dispar* (Haworth, 1803), mentioned in: Habitats Directive 92/43/EEC (the Annex II); O. U. G 57/20.06.2007, Annex 3 (plant and animal species whose conservation requires the designation of Special Areas of Conservation and a Avifaunistic Special Protection Areas) and Annex 4A (species of Community interest; animal and plant species requiring strict protection). Due to protection measures taken at European level, IUCN changed its status from Vulnerable species (VU) to the Near Threatened species (NT).

CONCLUSIONS

In the period of the achievement the study (May-September 2012), were identified, in the Nature Reserve Spring from Corbii Ciungi, 33 species of diurnal lepidopteran, grouped into 5 families.

Of the 33 species identified, a single species, *Lycaena dispar* (Haworth, 1803), the order Lepidoptera, family Lycaenidae, is included in the list of species of Community interest, being protected at European level.

Specific composition of diurnal lepidopteran fauna is not characteristic for wet riparian areas. Most of the identified species are common species, widespread, which have penetrated in riparian habitats due to their degradation under the influence of anthropic activities, represented by grubbing of coppices and expanding crops.

REFERENCES

- BOTOȘĂNEANU L., NEGREA Șt., 1961 - *Une oasis aquatique à faune relicte dans la Plaine du Danube*. Hydrobiologia. București. **18 (3)**: p. 199 – 218.
BOTOȘĂNEANU L., NEGREA Șt., 1962 - *Complexul de izvoare de la Corbii Ciungi - oază acvatică relictă în Câmpia Română*. Ocrotirea Naturii. București. **6**: p. 93 - 110.

- CIUBUC C., 2007 - Studiu științific - contractul „Menținerea și îmbunătățirea stării de conservare favorabilă a habitatelor și speciilor, stoparea degradării biodiversității în Rezervația Naturală Corbi Ciungi, județul Dâmbovița”.
- NEGREA Șt., NEGREA Alexandrina, 1998-1999 - Problema conservării Rezervației Naturale - Complexul de Izvoare de la Corbi Ciungi - oază acvatică de faună relictă în Câmpia Română. Ocrot. Nat. Med. Înconj. București. **42-43:** p. 33-45.
- RÁKOSY L., 1997 - Macrolepidopterele din Parcul Național Retezat; p. 87-122. In: RÁKOSY L., (ed). Entomofauna Parcurilor Naționale Retezat și Valea Cernei. Cluj-Napoca.
- SZÉKELY L., 2006 - Lepidopterele din Delta Dunării. Edit. Disz-Tipó. Săcele, Brașov; p. 150.
- SZÉKELY L., 2008 - Fluturii de zi din România. Brastar Print. Brașov; p. 304.

THE AVIFAUNA FROM VÂLCELE, BUDEASA, BASCOV, PITEȘTI AND GOLEȘTI BASINS OBSERVED IN THE PREVERNAL SEASON IN 2013

ADRIAN MESTECĂNEANU

Argeș County Museum, Armand Călinescu Street, no. 44, 110047, Pitești, Argeș, Romania,
e-mail: mestecaneanua@yahoo.com

RADU GAVA

University of Pitești, Târgu din Vale Street, no. 1, 110040, Pitești, Argeș, Romania,
e-mail: gavaradu@yahoo.com

ABSTRACT. The avifauna of the Vâlcele, Budeasa, Bascov, Pitești, and Golești basins from the protected area ROSPA0062 - Lacurile de acumulare de pe Argeș observed during the prevernal season in 2013 was composed by 71 species that belong to 13 orders. Concerning the species, the best represented was Passeriformes (34 species) and concerning the individuals, the best represented was Anseriformes (2929 individuals). *Aythya fuligula* (Linnaeus, 1758), *Aythya ferina* (Linnaeus, 1758), and *Fulica atra* Linnaeus, 1758 were eudominant, they summing together over half of the total number of observed individuals (58.79%). Anseriformes was overdominant, Gruiformes and Passeriformes were dominant and the other orders were complementary. In the annex I of Birds Directive are included 9 species – *Phalacrocorax pygmeus* (Pallas, 1773), *Egretta garzetta* (Linnaeus, 1766), *Egretta alba* (Linnaeus, 1758), *Ardea purpurea* Linnaeus, 1766, *Circus aeruginosus* (Linnaeus, 1758), *Recurvirostra avosetta* Linnaeus, 1758, *Chlidonias hybridus* (Pallas, 1811), *Sterna hirundo* Linnaeus, 1758, and *Ficedula albicollis* (Temmink, 1815). In the paper there are also made some other considerations on the birds' ecology (monthly dynamics, constancy, dominancy, Dzuba index of ecological signification, etc.).

Key words: avifauna, Lacurile de acumulare de pe Argeș, Special Protected Area, Nature 2000 network.

REZUMAT. Avifauna lacurilor de acumulare Vâlcele, Budeasa, Bascov, Pitești și Golești observată în sezonul prevernal al anului 2013. Avifauna celor cinci lacuri de acumulare (Vâlcele, Budeasa, Bascov, Pitești și Golești) din aria protejată ROSPA0062 - Lacurile de acumulare de pe Argeș, observată în sezonul prevernal al anului 2013, a cuprins 71 de specii care aparțin la 13 ordine, cel mai bogat în specii fiind Passeriformes (cu 34 de specii) iar cel mai bogat în exemplare, Anseriformes (cu 2929 exemplare). Speciile *Aythya fuligula* (Linnaeus, 1758), *Aythya ferina* (Linnaeus, 1758) și *Fulica atra* Linnaeus, 1758 au fost eudominante, totalizând împreună peste jumătate din numărul total de exemplare observate (58,79%). Ordinul Anseriformes a fost supradominant, ordinele Gruiformes și Passeriformes au fost dominante iar celealte ordine au fost complementare. În Anexa I a Directivei Păsări, sunt incluse 9 specii – *Phalacrocorax pygmeus* (Pallas, 1773), *Egretta garzetta* (Linnaeus, 1766), *Egretta alba* (Linnaeus, 1758), *Ardea purpurea* Linnaeus, 1766, *Circus aeruginosus* (Linnaeus, 1758), *Recurvirostra avosetta* Linnaeus, 1758, *Chlidonias hybridus* (Pallas, 1811), *Sterna hirundo* Linnaeus, 1758, și *Ficedula albicollis* (Temmink, 1815).

Chlidonias hybridus (Pallas, 1811), *Sterna hirundo* Linnaeus, 1758 și *Ficedula albicollis* (Temmink, 1815). În lucrare se fac și alte considerații privitoare la ecologia speciilor de păsări (dinamică lunată, constanță, dominanță, indice de semnificație ecologică Dzuba etc.).

Cuvinte cheie: avifaună, Lacurile de acumulare de pe Argeș, Arie de Protecție Specială, rețeaua Natura 2000.

INTRODUCTION

The avifauna of the basins from the Argeș River, included in the protected area ROSPA0062 - Lacurile de acumulare de pe Argeș, is the object of researches since the '60s, when they were built (Mătieș, 1969; Munteanu & Mătieș, 1983). After 1995, it was more intensely studied: in the beginning, the Midwinter Census, co-ordinated, initially at the national level by the Romanian Ornithological Society and lately by the Romanian Ornithological Society and the Association for Birds and Nature Protection "Milvus Group", was performed every year (Gava, 1997; Gava et al., 2004a; Mestecăneanu et al., 2010 etc.); by 2001, the avifauna of the whole year had systematically been studied, the results of the researches being published in a series of articles (Gava et al., 2004b; Mestecăneanu et al., 2003; 2004; Conete et al., 2006; 2010; 2012 etc.) and in a PhD thesis (Conete, 2011), too.

This paper shows a part of the results of the research-studies performed in the area in 2013. They are a continuation of the works carried out here until now.

MATERIAL AND METHOD

From upstream to downstream the basins where the research-studies on the birds were performed were: Vâlcele (408 ha), Budeasa (412 ha), Bascov (162 ha), Pitești (122 ha), and Golești (649 ha). They appertain to the upper and middle course of the Argeș River (Fig. 1) and are situated between the Cotmeana Platform, in the West, the Argeș Platform, in the North, the Cândești Platform, in the East, and the Pitești High Plain (part of the Romanian Plain), in the South. Together with the Zigoneni basin, these dam lakes form the ROSPA0062 - Lacurile de acumulare de pe Argeș, Special Protected Area and part of the Natura 2000 network.

The vegetation of the basins is influenced by the process of silting. It is disposed on variable surfaces depending on the basin and is typical of wetland areas, primarily with reed bed, bulrush, alder, and willow. The vegetation from adjacent hilly areas includes broad leaf forests (beech, hornbeam, diverse species of oak, etc.) and, rarely, artificial coniferous forests. There are orchards, too. The meadows are covered with crops (cereals, fodder, green goods, etc.). In the vicinity of each basin there are various roads which connect the settlements.

The fauna is characteristic for Muntenia.

The climate is temperate with hilly influence. The annual average air temperature is about 9 °C, while the annual average water temperature of the Argeș River is 1-2 °C lower (Barco & Nedelcu, 1974).

Regarding the methods of field work, the itinerary method was used in combination to one of the fixed point of observations. Between 10 and 20 of every month, one day field trip was affected on all basins. The same track on one bank of the basins was used every time, as it was the most favourable for the observation of water birds. Visual and auditory observations were used for identification of the birds from the basins and from the nearby areas. Binoculars (10x50), a spotting scope (14-45x50) and a photo device (42x optical zoom) were used.

The scientific nomenclature and classification of the birds are compatible with the Hamlin Guide (Bruun et al., 1999).



Figure 1 - The partial map of Argeş River.

RESULTS AND DISCUSSIONS

In the prevernal season (March, April) 2013, 71 species of birds (18.58% of all species identified in Romania) and 4713 individuals were observed on the basins Vâlcele, Budeasa, Bascov, Piteşti, and Goleşti (Tab. 1). They belong to 13 orders. Concerning the species, the best represented was Passeriformes (34 species) and concerning the individuals, the best represented was Anseriformes (2929 individuals).

The Goleşti Basin had the biggest number of species (44) and individuals (2923). The smallest number of species (14) registered the avifauna of Bascov Basin and the smallest number of individuals (285) registered the avifauna of Budeasa Basin (Tab. 1). As noted on other occasions, too (Mestecăneanu et al., 2010; Conete et al., 2012, etc.), this situation depends on more factors: the surface and the depth of each basin, the position on the course of the river, the vegetation and the anthropogenetic pressure. The Goleşti Basin has the biggest surface of

them. This surface, that generates a relative assurance, permits to more species having more individuals to stay here, despite poaching. Its downstream position on the Argeș River (on the route of the Rucăr-Bran corridor of migration) also facilitates the translation of the birds between the great courses of water from proximity (Olt, Danube, Ialomița). Although Pitești has the smallest surface of them, it has the most favourable rapport between the surface and number of species/individuals. An explanation for this can be the fact that the habitat is varied, caused by its higher process of silting. Also, the close vicinity with Pitești city, which at a first glance can be considered negative, can protect the birds, because the shooting is impossible here. On the Bascov Basin found in the vicinity, a similar situation could have been fund, but the kayakers' training here constitutes an intense derange for the birds. Budeasa and Vâlcele basins are visited by hunters, too. Their typical vegetation of water is poor and it is present upstream. Not much can be said about the depth of the water as a proper study does not exist but it is obvious that a basin with water of variable depth is more attractive for the species than one with a constant depth.

Table 1 - The distribution of the species depending on basin and month and their general number.

No.	Species	Vâlcele Basin	Budeasa Basin	Bascov Basin	Pitești Basin	Golești Basin	March	April	Period
1.	<i>Podiceps cristatus</i> (Linnaeus, 1758)	*	*			*	*	*	109
2.	<i>Podiceps nigricollis</i> Brehm C.L., 1831	*				*		*	10
3.	<i>Tachybaptus ruficollis</i> (Pallas, 1764)	*		*			*		6
4.	<i>Phalacrocorax carbo</i> (Linnaeus, 1758)	*	*		*	*	*	*	64
5.	<i>Phalacrocorax pygmeus</i> (Pallas, 1773)					*	*		35
6.	<i>Egretta garzetta</i> (Linnaeus, 1766)					*		*	11
7.	<i>Egretta alba</i> (Linnaeus, 1758)	*	*			*	*	*	22
8.	<i>Ardea cinerea</i> Linnaeus, 1758	*	*			*	*	*	18
9.	<i>Ardea purpurea</i> Linnaeus, 1766				*		*		1
10.	<i>Cygnus olor</i> (Gmelin, 1789)		*		*	*	*	*	59

Continues.

Table 1 - Continuation.

No.	Species	Valcelele Basin	Budeasa Basin	Bascov Basin	Piteşti Basin	Goleşti Basin	March	April	Period
11.	<i>Anas platyrhynchos</i> Linnaeus, 1758	*	*	*	*	*	*	*	381
12.	<i>Anas penelope</i> Linnaeus, 1758		*	*		*	*	*	44
13.	<i>Anas querquedula</i> Linnaeus, 1758				*	*	*	*	41
14.	<i>Anas crecca</i> Linnaeus, 1758	*			*	*	*	*	207
15.	<i>Anas clypeata</i> Linnaeus, 1758	*			*			*	13
16.	<i>Aythya fuligula</i> (Linnaeus, 1758)	*	*		*	*	*	*	1420
17.	<i>Aythya ferina</i> (Linnaeus, 1758)		*	*	*	*	*	*	743
18.	<i>Bucephala clangula</i> (Linnaeus, 1758)	*				*	*		21
19.	<i>Buteo buteo</i> (Linnaeus, 1758)	*				*	*	*	2
20.	<i>Circus aeruginosus</i> (Linnaeus, 1758)		*			*		*	2
21.	<i>Falco tinnunculus</i> Linnaeus, 1758					*	*	*	3
22.	<i>Phasianus colchicus</i> Linnaeus, 1758	*			*		*	*	2
23.	<i>Gallinula chloropus</i> (Linnaeus, 1758)				*			*	1
24.	<i>Fulica atra</i> Linnaeus, 1758	*	*	*	*	*	*	*	608
25.	<i>Vanellus vanellus</i> Linnaeus, 1758					*	*		1
26.	<i>Charadrius dubius</i> Scopoli, 1786	*				*	*	*	5
27.	<i>Actitis hypoleucos</i> Linnaeus, 1758	*	*		*			*	3
28.	<i>Tringa ochropus</i> Linnaeus, 1758					*		*	2
29.	<i>Recurvirostra avosetta</i> Linnaeus, 1758					*		*	7

Continues.

Table 1 - Continuation.

No.	Species	Valcele Basin	Budeasa Basin	Bascov Basin	Pitești Basin	Golești Basin	March	April	Period
30.	<i>Larus argentatus</i> <i>cachinnans/michahellis</i> Pontoppidan, 1763	*	*	*	*	*	*	*	203
31.	<i>Larus ridibundus</i> Linnaeus, 1766	*	*	*	*	*	*	*	130
32.	<i>Chlidonias hybridus</i> (Pallas, 1811)	*						*	4
33.	<i>Sterna hirundo</i> Linnaeus, 1758					*		*	2
34.	<i>Streptopelia decaocto</i> (Frivaldszky, 1838)				*		*	*	5
35.	<i>Apus apus</i> (Linnaeus, 1758)				*			*	5
36.	<i>Upupa epops</i> Linnaeus, 1758	*				*	*	*	4
37.	<i>Jynx torquilla</i> Linnaeus, 1758				*			*	1
38.	<i>Alauda arvensis</i> Linnaeus, 1758					*	*	*	5
39.	<i>Hirundo rustica</i> Linnaeus, 1758	*	*	*		*		*	12
40.	<i>Anthus trivialis</i> (Linnaeus, 1758)					*		*	8
41.	<i>Anthus spinoletta</i> (Linnaeus, 1758)	*	*		*		*		3
42.	<i>Motacilla flava</i> Linnaeus, 1758	*			*	*		*	17
43.	<i>Motacilla alba</i> Linnaeus, 1758	*	*	*	*	*	*	*	75
44.	<i>Lanius excubitor</i> Linnaeus, 1758	*						*	2
45.	<i>Sturnus vulgaris</i> Linnaeus, 1758	*			*	*	*	*	86
46.	<i>Pica pica</i> (Linnaeus, 1758)	*	*	*	*	*	*	*	84
47.	<i>Corvus monedula</i> Linnaeus, 1758				*	*	*	*	41
48.	<i>Corvus frugilegus</i> Linnaeus, 1758					*	*	*	69

Continues.

Table 1 - Continuation.

No.	Species	Valcelele Basin	Budeasa Basin	Bascov Basin	Piteşti Basin	Goleşti Basin	March	April	Period
49.	<i>Corvus corone cornix</i> Linnaeus, 1758			*	*	*	*	*	3
50.	<i>Corvus corax</i> Linnaeus, 1758		*		*	*	*	*	3
51.	<i>Locustella lusciniooides</i> (Savi, 1824)			*				*	2
52.	<i>Acrocephalus palustris</i> (Bechstein, 1798)			*				*	1
53.	<i>Acrocephalus scirpaceus</i> (Hermann, 1804)			*				*	1
54.	<i>Sylvia atricapilla</i> (Linnaeus, 1758)			*				*	2
55.	<i>Sylvia curruca</i> (Linnaeus, 1758)	*	*	*				*	17
56.	<i>Ficedula albicollis</i> (Temminck, 1815)			*				*	1
57.	<i>Oenanthe oenanthe</i> (Linnaeus, 1758)				*			*	1
58.	<i>Saxicola torquata</i> (Linnaeus), 1766	*						*	1
59.	<i>Erithacus rubecula</i> (Linnaeus, 1758)			*		*			1
60.	<i>Luscinia megarhynchos</i> (Brehm, C.L., 1831)			*	*			*	4
61.	<i>Turdus merula</i> Linnaeus, 1758			*			*		1
62.	<i>Turdus philomelos</i> Brehm, C.L., 1831			*			*		2
63.	<i>Parus major</i> Linnaeus, 1758			*			*		2
64.	<i>Passer domesticus</i> (Linnaeus, 1758)	*	*	*	*	*	*	*	42
65.	<i>Passer montanus</i> (Linnaeus, 1758)	*						*	3
66.	<i>Carduelis chloris</i> (Linnaeus, 1758)	*		*	*			*	6
67.	<i>Carduelis carduelis</i> (Linnaeus, 1758)	*			*	*		*	9
68.	<i>Carduelis cannabina</i> (Linnaeus, 1758)				*			*	2

Continues.

Table 1 - Continuation.

No.	Species	Vâlcele Basin	Budeasa Basin	Bascov Basin	Pitești Basin	Golești Basin	March	April	Period
69.	<i>Emberiza schoeniclus</i> Linnaeus, 1758				*			*	3
70.	<i>Miliaria calandra</i> (Linnaeus, 1758)					*	*	*	5
71.	<i>Emberiza citrinella</i> Linnaeus, 1758	*				*			4
Number of species		31	21	14	39	44	42	60	71
Number of individuals		628	285	317	560	2923	3494	1219	4713

Legend: * - the occurrence.

The species with the most important numbers were *Aythya fuligula*, *Aythya ferina*, and *Fulica atra* (Tab. 2). They sum together 58.79% of all observed individuals. It is obvious that in the prevernal season the Golești Basin was the most favorable for all these species and mainly for *Aythya fuligula* (1259 individuals), which instead had 0 individuals on Bascov Basin. The numbers of *Aythya ferina* increased from upstream (0 individuals on Vâlcele Basin) to downstream (460 individuals on Golești Basin). *Fulica atra* varied between 12 individuals (on Budeasa Basin) and 208 individuals (on Golești Basin) and, considering the number from the Bascov Basin, it seems to be least sensible to the water sport impact.

Regarding the monthly variation of all species and individuals we observe that they are in inverse correlation: the increase of the number of species from the period of migration for many birds is accompanied by the decrease of the number of individuals (Tab. 3). The monthly distribution of numbers for *Aythya fuligula*, *Aythya ferina*, and *Fulica atra* varied similarly. It shows how the majority of their individuals (that wintered or passed here) moved to places of breeding from North.

Table 2 - The distribution on basins for *Aythya fuligula*, *Aythya ferina*, and *Fulica atra*.

Species	Vâlcele Basin	Budeasa Basin	Bascov Basin	Pitești Basin	Golești Basin
<i>Aythya fuligula</i>	83	54	0	24	1259
<i>Aythya ferina</i>	0	13	80	190	460
<i>Fulica atra</i>	134	12	173	81	208

Table 3 - The monthly distribution of numbers for *Aythya fuligula*, *Aythya ferina*, and *Fulica atra*.

Species	March	April	Prevernal
<i>Aythya fuligula</i>	1122	298	1420
<i>Aythya ferina</i>	674	69	743
<i>Fulica atra</i>	519	89	608

There is not much to say about the constancy and Dzuba index of ecological significance (because only two sample were drawn), but regarding the dominancy it is noticeable that 3 species (4.23%, *Aythya fuligula*, *Aythya ferina*, and *Fulica atra*) were eudominant, 1 species (1.41%, *Anas platyrhynchos*) was dominant, 4 species (5.63%, *Podiceps cristatus*, *Anas crecca*, *Larus argentatus* *cachinnans/michahellis*, and *Larus ridibundus*) were subdominant, 6 species (8.45%, *Phalacrocorax carbo*, *Cygnus olor*, *Motacilla alba*, *Sturnus vulgaris*, *Pica pica*, and *Corvus frugilegus*) were recedent and 57 species (80.28%, *Podiceps nigricollis*, *Phalacrocorax pygmeus*, *Egretta garzetta*, *Egretta alba*, *Ardea purpurea*, *Circus aeruginosus*, *Recurvirostra avosetta*, *Chlidonias hybridus*, *Sterna hirundo*, etc.) were subrecedent (Tab. 4, Fig. 2).

Table 4 – The categories of constancy, dominancy, and Dzuba index for the observed birds.

No.	Species	Category of constancy	Category of dominancy	Category of Dzuba index
1.	<i>Podiceps cristatus</i>	C4	D3	W3
2.	<i>Podiceps nigricollis</i>	C2	D1	W2
3.	<i>Tachybaptus ruficollis</i>	C2	D1	W1
4.	<i>Phalacrocorax carbo</i>	C4	D2	W3
5.	<i>Phalacrocorax pygmeus</i>	C2	D1	W2
6.	<i>Egretta garzetta</i>	C2	D1	W2
7.	<i>Egretta alba</i>	C4	D1	W2
8.	<i>Ardea cinerea</i>	C4	D1	W2
9.	<i>Ardea purpurea</i>	C2	D1	W1
10.	<i>Cygnus olor</i>	C4	D2	W3
11.	<i>Anas platyrhynchos</i>	C4	D4	W4
12.	<i>Anas penelope</i>	C4	D1	W2
13.	<i>Anas querquedula</i>	C4	D1	W2
14.	<i>Anas crecca</i>	C4	D3	W3
15.	<i>Anas clypeata</i>	C2	D1	W2
16.	<i>Aythya fuligula</i>	C4	D5	W5
17.	<i>Aythya ferina</i>	C4	D5	W5
18.	<i>Bucephala clangula</i>	C2	D1	W2
19.	<i>Buteo buteo</i>	C4	D1	W1
20.	<i>Circus aeruginosus</i>	C2	D1	W1
21.	<i>Falco tinnunculus</i>	C4	D1	W1
22.	<i>Phasianus colchicus</i>	C4	D1	W1
23.	<i>Gallinula chloropus</i>	C2	D1	W1
24.	<i>Fulica atra</i>	C4	D5	W5
25.	<i>Vanellus vanellus</i>	C2	D1	W1

Continues.

Table 4 - Continuation.

No.	Species	Category of constancy	Category of dominancy	Category of Dzuba index
26.	<i>Charadrius dubius</i>	C4	D1	W2
27.	<i>Actitis hypoleucus</i>	C2	D1	W1
28.	<i>Tringa ochropus</i>	C2	D1	W1
29.	<i>Recurvirostra avosetta</i>	C2	D1	W1
30.	<i>Larus argentatus</i> <i>cachinnans/michahellis</i>	C4	D3	W3
31.	<i>Larus ridibundus</i>	C4	D3	W3
32.	<i>Chlidonias hybridus</i>	C2	D1	W1
33.	<i>Sterna hirundo</i>	C2	D1	W1
34.	<i>Streptopelia decaocto</i>	C4	D1	W2
35.	<i>Apus apus</i>	C2	D1	W1
36.	<i>Upupa epops</i>	C4	D1	W1
37.	<i>Jynx torquilla</i>	C2	D1	W1
38.	<i>Alauda arvensis</i>	C4	D1	W2
39.	<i>Hirundo rustica</i>	C2	D1	W2
40.	<i>Anthus trivialis</i>	C2	D1	W1
41.	<i>Anthus spinoletta</i>	C2	D1	W1
42.	<i>Motacilla flava</i>	C2	D1	W2
43.	<i>Motacilla alba</i>	C4	D2	W3
44.	<i>Lanius excubitor</i>	C2	D1	W1
45.	<i>Sturnus vulgaris</i>	C4	D2	W3
46.	<i>Pica pica</i>	C4	D2	W3
47.	<i>Corvus monedula</i>	C4	D1	W2
48.	<i>Corvus frugilegus</i>	C4	D2	W3
49.	<i>Corvus corone cornix</i>	C4	D1	W1
50.	<i>Corvus corax</i>	C4	D1	W1
51.	<i>Locustella lusciniooides</i>	C2	D1	W1
52.	<i>Acrocephalus palustris</i>	C2	D1	W1
53.	<i>Acrocephalus scirpaceus</i>	C2	D1	W1
54.	<i>Sylvia atricapilla</i>	C2	D1	W1
55.	<i>Sylvia curruca</i>	C2	D1	W2
56.	<i>Ficedula albicollis</i>	C2	D1	W1
57.	<i>Oenanthe oenanthe</i>	C2	D1	W1
58.	<i>Saxicola torquata</i>	C2	D1	W1
59.	<i>Erythacus rubecula</i>	C2	D1	W1
60.	<i>Luscinia megarhynchos</i>	C2	D1	W1

Continues.

Table 4 - Continuation.

No.	Species	Category of constancy	Category of dominancy	Category of Dzuba index
61.	<i>Turdus merula</i>	C2	D1	W1
62.	<i>Turdus philomelos</i>	C2	D1	W1
63.	<i>Parus major</i>	C2	D1	W1
64.	<i>Passer domesticus</i>	C4	D1	W2
65.	<i>Passer montanus</i>	C2	D1	W1
66.	<i>Carduelis chloris</i>	C2	D1	W1
67.	<i>Carduelis carduelis</i>	C4	D1	W2
68.	<i>Carduelis cannabina</i>	C2	D1	W1
69.	<i>Emberiza schoeniclus</i>	C2	D1	W1
70.	<i>Miliaria calandra</i>	C4	D1	W2
71.	<i>Emberiza citrinella</i>	C2	D1	W1

Legend: C1 – accidental species, C2 – accessory species, C3 – constant species, C4 – euconstant species, D1, W1 – subrecedent species, D2, W2 – recedent species, D3, W3 – subdominant species, D4, W4 – dominant species, D5, W5 – eudominant species.

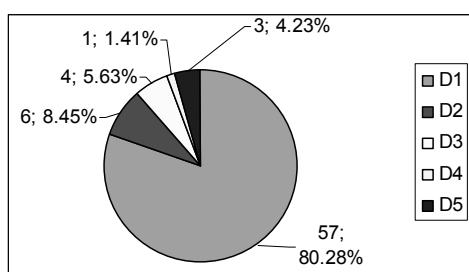


Figure 2 - The birds' distribution by the categories of dominance.

According to the index of relation, the dynamics of the orders show that the Anseriformes was permanently overdominant. Passeriformes was overdominant order, too (only in April), in March being dominant. Dominant were: in April - Podicipediformes, in March and April - Gruiformes, in April - Charadriiformes, and in March - Passeriformes. Otherwise, the orders were complementary (Tab. 5, Fig. 3).

Table 5 - The value of the index of relation for the orders of birds identified in the area.

Order	March	April	Prevernal
Podicipediformes	0.85	7.79	2.65
Pelecaniformes	1.43	4.01	2.10
Ciconiiformes	0.25	3.52	1.10
Anseriformes	66.42	49.87	62.14
Gruiformes	14.85	7.38	12.92
Charadriiformes	7.46	7.87	7.57
Passeriformes	8.47	18.21	10.99
Other orders	0.22	1.31	0.50

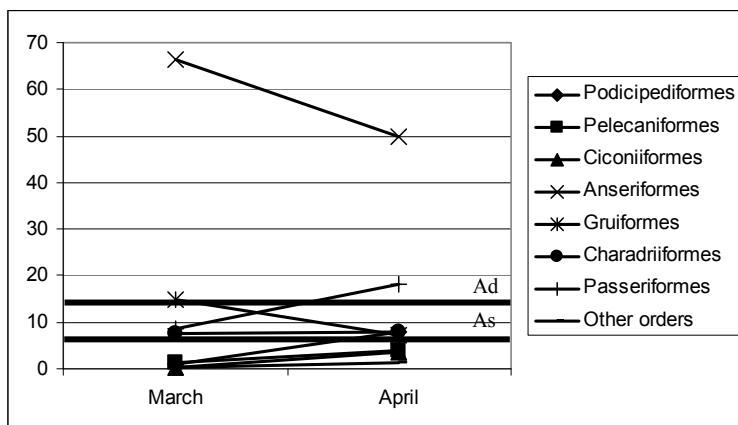


Figure 3 - The monthly dynamics of the orders according to the index of relation.

For the whole area, Anseriformes was the only overdominant order. Gruiformes, Charadriiformes, and Passeriformes were in the group of dominant order and the other orders (Falconiformes, Galliformes, Columbiformes, Apodiformes, Coraciiformes, and Piciformes) were complementary (Tab. 5, Fig. 4).

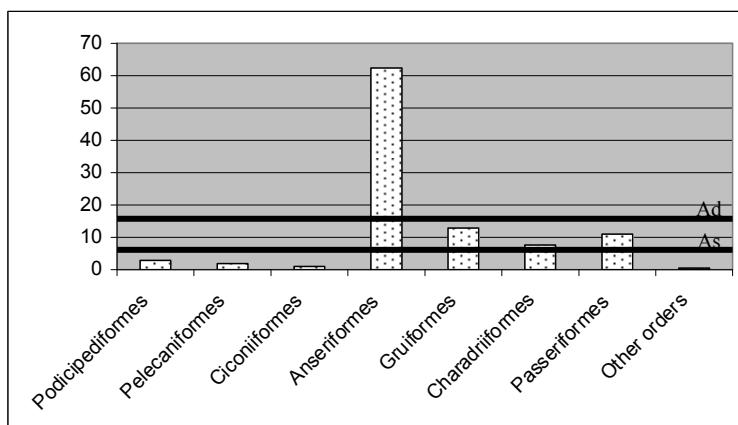


Figure 4 - The participation of the orders to the avicoenosis of the prevernal season.

According to the Bray-Curtis index, the biggest similarity was established between Pitești and Bascov avicoenosis; a good similarity was established between Budeasa and Vâlcele avicoenosis, too (Tab. 6, Fig. 5).

According to the Jaccard index, the biggest similarity was established between Bascov and Budeasa avicoenosis; a smaller similarity was established between Golești and Vâlcele avicoenosis, too (Tab. 7, Fig. 6).

The surface and the depth of every basin, the position on the course of the river, the vegetation and the anthropogenetic pressure explain the similarity between the avicoenosis of the basins.

Table 6 - The similarity matrix (by Bray-Curtis) between the avicoenosis of the basins.

Similarity matrix	Vâlcele Basin	Budeasa Basin	Bascov Basin	Piteşti Basin	Goleşti Basin
Vâlcele Basin	*	44.46	36.40	30.80	23.20
Budeasa Basin	*	*	23.58	26.03	14.83
Bascov Basin	*	*	*	46.97	19.19
Piteşti Basin	*	*	*	*	26.35
Goleşti Basin	*	*	*	*	*

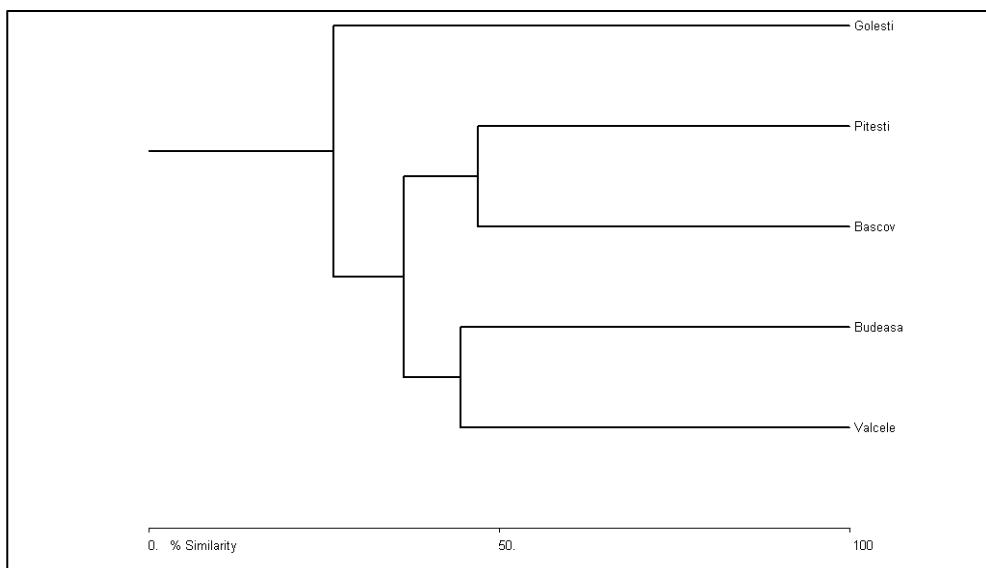


Figure 5 - The Bray-Curtis Cluster Analysis (Single Link).

Table 7 - The similarity matrix (by Jaccard) between the avicoenosis of the basins.

Similarity matrix	Vâlcele Basin	Budeasa Basin	Bascov Basin	Piteşti Basin	Goleşti Basin
Vâlcele Basin	*	36.84	21.62	29.62	38.88
Budeasa Basin	*	*	45.83	30.43	38.29
Bascov Basin	*	*	*	23.25	23.40
Piteşti Basin	*	*	*	*	27.69
Goleşti Basin	*	*	*	*	*

It is noticeable that Bray-Curtis index is based on the presence/absence of the species in the samples and on their number of individuals and Jaccard index is based only on the presence/absence of the respective species in the samples.

9 species of birds (12.67% of all: *Phalacrocorax pygmeus*, *Egretta garzetta*, *Egretta alba*, *Ardea purpurea*, *Circus aeruginosus*, *Recurvirostra avosetta*, *Chlidonias hybridus*, *Sterna hirundo*, and *Ficedula albicollis*) are included in the annex I of the Birds Directive. These species shall be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution (<http://eur-lex.europa.eu/>).

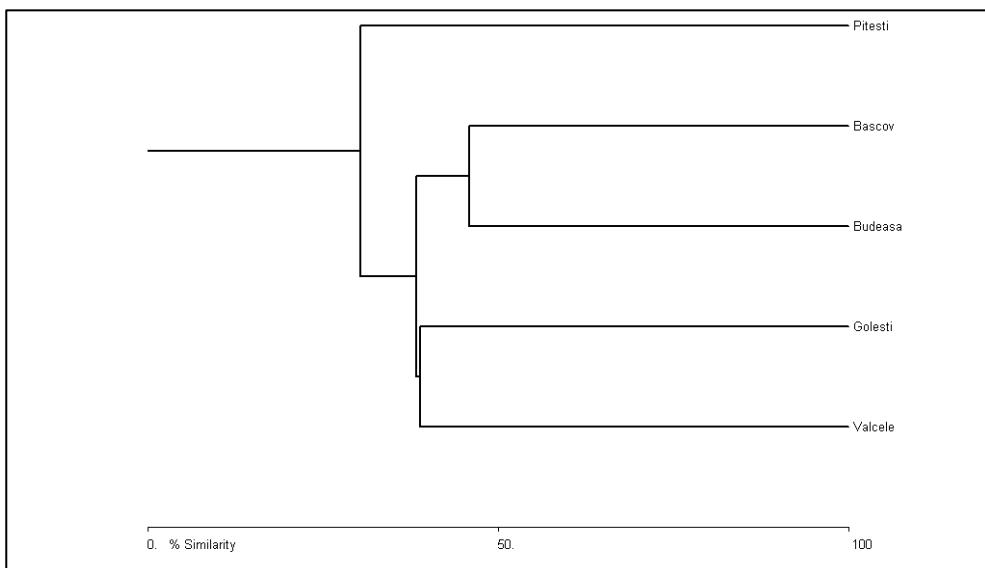


Figure 6 - The Jaccard Cluster Analysis (Single Link).

CONCLUSIONS

- 71 species of birds (18.58% of all species identified in Romania) represented by 4713 individuals were observed on the basins Vâlcele, Budeasa, Bascov, Pitești, and Golești in the prevernal season (March, April) 2013;
- the Golești Basin had the biggest number of species (44) and individuals (2923); the smallest number of species (14) registered the avifauna of Bascov Basin and the smallest number of individuals (285) registered the avifauna of Budeasa Basin;
- 3 species (4.23%, *Aythya fuligula*, *Aythya ferina*, and *Fulica atra*) were eudominant, 1 species (1.41%, *Anas platyrhynchos*) was dominant, 4 species (5.63%) were subdominant, 6 species (8.45%) were recedent and 57 species (80.28%) were subrecedent;
- the eudominant species sum together 58.79% of all observed individuals;
- the Golești Basin is the most favorable for Anseriformes;
- the migration of the birds from the prevernal season was astonishing, the increase of the number of species from March to April being accompanied by the decrease of the individuals;
- Anseriformes was permanently overdominant;

- according to the Bray-Curtis index, the biggest similarity was established between Piteşti and Bascov avicoenosis and according to the Jaccard index, the biggest similarity was established between Bascov and Budeasa avicoenosis;
- the difference between the avifauna of the basins is strongly influenced by the surface and the depth of each basin, the position on the course of the river, the vegetation and the anthropogenetic pressure;
- 9 species of birds (12.67% of all observed species in the prevernal season in 2013) are included in the annex I of the Birds Directive.

REFERENCES

- BARCO Aurelia, NEDELCU E., 1974 - *Judeţul Argeş*. Editura Academiei, Bucureşti. p. 168.
- CONETE Denisa, 2011 - *Cercetări ecologice asupra avifaunei unor lacuri de baraj din zona mijlocie a văii Argeşului*. Teză de doctorat. Institutul de Biologie al Academiei Române. Bucureşti. p. 370.
- CONETE Maria Denisa, MESTECĂNEANU A., GAVA R., 2006 - *Speciile de păsări din situl AIA „Lacurile de acumulare de pe Argeş” protejate pe plan național și european*. Argesis, Studii și Comunicări, Științele Naturii, Muzeul Județean Argeş. Piteşti. **XIV**: p. 103-115.
- CONETE Denisa, MESTECĂNEANU A., GAVA R., 2010 - *Ecological researches about the avifauna of the Budeasa Basin (Argeş River, Romania) in the hiamal and prevernal aspects (2008 – 2009)*. Analele Universității din Oradea, Fascicula Biologie, University of Oradea Publishing House. **XVII (1)**: p. 90-94.
- CONETE Denisa, MESTECĂNEANU A., GAVA R., 2012 - *Ornithological researches on the Goleşti Dam Lake (Argeş County, Romania) during 2003 – 2010*. Analele Universității din Oradea, Fascicula Biologie, University of Oradea Publishing House. **XIX (1)**: p. 84-92.
- GAVA R. 1997 - *Acumulările hidroenergetice de pe râul Argeş, posibile ARII de Importanță Avifaunistică*. Lucrările simpozionului ARII de Importanță Avifaunistică din România. Publicațiile S.O.R. Cluj Napoca. **3**: p. 39-42.
- GAVA R., MESTECĂNEANU A., CONETE Denisa, 2004 - *The reservoirs of the Argeş River valley – important bird areas*. Limnological Reports, Internat. Assoc. Danube. Res., Novi Sad, Serbia and Muntenegru. **35**: p. 619-631.
- GAVA R., MESTECĂNEANU A., CONETE Denisa, MESTECĂNEANU F., 2004 - *Recensământul păsărilor de baltă din ianuarie de pe lacurile din bazinul mijlociu al râului Argeş, în perioada 2000 – 2004*, Argessis, Studii și Comunicări, Științele Naturii, Muzeul Județean Argeş. Piteşti. **XII**: p. 125-132.
- MĂTIEŞ M., 1969 - *Cercetări avifenoologice de-a lungul bazinului mijlociu și superior al Argeșului între 1 ianuarie – 31 mai 1968*. Muzeul Județean Argeş. Studii și Comunicări. **II**: p. 73-90.
- MESTECĂNEANU A., CONETE Denisa, GAVA R., 2003 - *Date despre prezența a 12 ordine de păsări (Aves), cu dinamica anseriformelor pe lacul Piteşti în iarna 2002 - 2003*, Studii și Comunicări, Științele Naturii, Muzeul Olteniei. Craiova. **XIX**: p. 195-201.
- MESTECĂNEANU A., CONETE Denisa, GAVA R., 2004 - *Date despre prezența păsărilor pe lacul Piteşti în toamna anului 2003*, Studii și Comunicări, Complexul Muzeal de Științele Naturii "Ion Borcea", Ed. "Ion Borcea". Bacău. **XIX**: p. 212-217.

- MESTECĂNEANU A., CONETE Denisa, GAVA R., 2010 - *Ecological research-studies regarding the avifauna during the hiemal period from the basins area of the Argeş River between 2000 and 2010.* Annals. Food Science and Tehnology. Universitatea Valahia. Târgovişte. **11 (2)**: p. 127-135.
- MUNTEANU D., MĂTIEŞ M., 1983 - *Modificări induse de lacurile de acumulare în structura și dinamica avifaunei.* Analele Banatului. Științele Naturii. Muzeul Banatului. Timișoara. **1**: p. 217- 225. (in Romanian).
- *** <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:020:0007:01:EN:HTML> (accessed: November 5, 2013).

**POLLUTER PAYS PRINCIPLE – A TOOL INVOLVED IN
ENVIRONMENTAL POLICY AND LEGISLATION TO PROMOTE
ENVIRONMENTAL PROTECTION**

CRISTIAN POPESCU

University of Pitesti, Târgul din Vale Street, no.1, 110040, Pitesti, Argeș, Romania,
e-mail: christian_popescu2000@yahoo.com

ABSTRACT. Conservation and protection of natural heritage is a responsibility and a priority of a civilized society. The importance of protecting the natural, nature conservation and sustainable development of the society led to the creation of a comprehensive legislative framework, consistent and adequate and principles of general application environment. Creating and implementing an effective legal framework and appropriate for the protection and preservation of natural heritage involves mainly the identification of binding principles with general application and to induce the formation of responsible environmental behavior. One of these principles is the Polluter Pays Principle (PPP). This principle exists in environmental law and policy is now applied and recognized at international, European and national levels. The purpose of this paper is to contribute to the understanding of how PPP involved in environmental legislation and policy and PPP promote to create environmentally policies and eco – responsibility for environment protection.

Key words: principle of environmental, ecological responsibility, legislation, institution, ecological damage.

REZUMAT. Principiul Poluatorul Plătește - un instrument implicat în politica și legislația de mediu pentru a promova protecția mediului. Conservarea și protecția patrimoniului natural constituie o responsabilitate și o prioritate a societății civile. Importanța acordată protecției factorilor naturali, conservării patrimoniului natural și dezvoltării sustenabile a societății a condus la crearea unui cadru legislativ complex, coerent și adecvat și a unor principii cu aplicabilitate generală în domeniul mediului. Crearea și implementarea unui cadru legislativ eficient și adecvat pentru protecția și conservarea patrimoniului natural presupune, în principal, identificarea unor principii obligatorii cu aplicabilitate generală și care să inducă formarea unei conduite responsabile pentru mediu. Unul dintre aceste principii este Principiul Poluatorul Plătește (PPP). Acest principiu existent în legislația și politica de mediu este aplicat și recunoscut la nivel internațional, european și național. Scopul acestui studiu contribuie la înțelegerea faptului cum PPP este implicat în politica și legislația de mediu și cum PPP promovează crearea unor politici prietenoase cu mediul și eco-atitudinea pentru protecția mediului.

Cuvinte cheie: principiu de mediu, responsabilitate ecologică, legislație, instituție, dauna ecologică.

INTRODUCTION

Principles serve to emphasize and orientation of development and application of rules of law (Hughes, 2002; Duțu, 2010). Far from being similar to the classical principles of law, they contribute to make the regulation, the assessment and management of environmental risk; they were gradually incorporated into legal acts (Nicolas, 2005).

Depending on the extent and their influence on the content of legislation and environmental policy principles are grouped into two categories: fundamental principles and general principles. The fundamental principles are found at all levels established environmental law: national, regional and international. The polluter pays principle is one such principle (Duțu, 2010).

In the environmental law, the legal responsibility became, under the impact of the technical-scientific revolution a „hot zone” because of the ecological crisis seriously affected by the consequences of industrialization and automation, the irrational exploitation of natural resources and other factors (Neagu, 2007; Dascălu, 2012). Polluter pays principle is integrated in a classic civil liability: is an author who acts more or less inadvertently, causes damage by action, between action and injury author is a causal relationship, he must pay (Teleagă, 2004).

Voicing a particular idea of environmental responsibility, PPP was formed as an economic principle and turned into a principle of public policy with important legal consequences (Duțu, 2012). The rationale underlying the principle of internalization of external environmental costs is whether the real value of the environment, and its components, are reflected in the costs of using it, the environment will be sustainable used and managed and not exploited wastefully (Preston, 2005). The payment typically goes to the government in the form of a tax. In such cases, the principle polluter pays is used to promote an environmental agenda rather than to insure that real polluters pay compensation to real victims of their activities (Cordato, 2001).

The effort of all the factors that are involved in the environmental protection led to the development principles that are internationally recognized, that are found in environmental law and policy of different countries (Ciobotaru et al., 2011). This principle not only establishes the polluter's obligation to repair the damage, but the latest is charged with the social cost of pollution that it generates, that is all the effects of pollution, not only on the assets of individuals, but also on nature itself, and all these independent of the fault. Therefore it expresses responsibility in a large sense, including any obligation to make the observance of law to pay civil penalties or criminal offenses (Drăgan, 2011; Dascălu, 2012).

RESULTS AND DISCUSSIONS

Polluter pays principle is a fundamental principle that is applied and recognized at all levels and for industries or activities involved in the environment

legislation and public policy to promote eco-responsibility. The principle now plays an important role in national and international environmental policy.

PPP is recognized worldwide and is referred to in national legislation, as well as in many regional and international declarations and agreements. The Principle was introduced in 1987 in the Single European Act (Mužáková & Kubová, 2013).

The first mention of the PPP at the international level occurred in the 1972 Recommendation by the Organization for Economic Co-operation and Development („OECD“) Council on Guiding Principles concerning International Economic Aspects of Environmental Policies (Bailey et al., 2012). There the OECD announced: The principle to be used for allocating costs of pollution prevention and control measures to encourage rational use of scarce environmental resources and to avoid distortions in international trade and investment is the so-called Polluter-Pays Principle (PPP). The 1972 Recommendation continued, stating that the polluter should be responsible for costs associated with pollution prevention and control. It also emphasized „the necessity for removal“ of subsidies that would prevent polluters from bearing the full cost of pollution which they caused.

Since the 1972 Recommendation, the PPP has been reaffirmed by other international declarations. Its adoption by the 1992 Rio Declaration is one such example. Principle 16 of the Declaration states: „National authorities should endeavor to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment“. The Principle no. 13 of the Rio Declaration also states that states should develop national law regarding liability and compensation for victims of pollution and other environmental damage. States will also cooperate to develop further international law regarding liability and compensation for pollution effects caused by activities under their jurisdiction or control to areas under the jurisdiction of other states.

The incorporation of the PPP in multiple international declarations and treaties demonstrates its widespread acceptance as a legitimate legal principle (Bailey et al., 2012).

The main function of the polluter-pays principle is to internalize the social costs borne by the public authorities for pollution prevention and control (de Sadeleer, 2002).

The Polluter Pays Principle (PPP) is an environmental policy principle reflecting the idea that the costs of pollution should be borne by those who cause it (Bugge, 1996). The PPP has been said to provide several benefits including promotion of economic efficiency, legal justice, harmonization of international policies, and definition of cost allocation within an economy.

As economic activity increases and the global population grows with a speed never seen before, the proliferation of pollution is ever more damaging to the environment and to human health. In order to try to deal with those problems, the

European Community bases its environmental policy on a number of action principles. One of these principles is aimed specifically at the problem of pollution and reads that the „polluter should pay” (Bleeker, 2009).

An alternative and more useful approach is to think of the PPP in terms of efficiency. This is a more economic rationale which sees the principle as a means towards achieving a more efficient allocation of resources in economic production. Pollution is a negative environmental externality (or side-effect) of economic activity. The PPP calls for the internalization of such negative externalities in the cost of the product. In other words, an application of the PPP in this sense means that the costs of pollution of a product are reflected in its price and therefore borne by the producers and consumers (the polluters) of that particular product rather than the entire society (de Sadeleer, 1999). Consequently, the prices of products go up according to the amount of pollution they cause (*ceteris paribus*). Consumer preferences for lower prices will therefore be an incentive for producers to produce less polluting, more eco-friendly products (Jans & Vedder, 2008). An economic orientation towards the PPP seems more useful in practice than approaching the principle from the point of view of the equity. The PPP is essentially an economic principle translated into law. Nevertheless, these two interpretations of the origin of the PPP are complementary rather than conflicting (Bleeker, 2009).

Forcing polluters to pay the costs of their activities is also said to enhance economic efficiency. Appropriately applied, policies based on a polluter pays principle (PPP) should enable us to protect the environment without sacrificing the efficiency of a free market economic system. A correct interpretation of the polluter pays principle would define pollution as any by product of a production or consumption process that harms or otherwise violates the property rights of others (Cordato, 2006). The polluter would be the person, company, or other organization whose activities are generating that by-product. And finally, payment should equal the damage and be made to the person or persons being harmed. „Damage to the environment” and „costs to the environment” are nebulous and subjective concepts where the use of any resource, including the air, water and one’s own property, can be defined as harming or „potentially harming” that resource and therefore the environment (Cordato, 2006).

The PPP is the core of environmental responsibility and ensuring the right to a healthy and ecologically balanced. This principle establishes and warrants polluter responsibility for producing environmental damage. Polluter is obliged to bear all the negative effects of its products to persons, property or the environment. Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Basel, 22 March 1989, requires the parties to achieve a protocol setting out appropriate procedures regarding liability and compensation for damages that may result from transboundary of hazardous wastes and other wastes. In the national legislation of the Government Emergency Ordinance no. 195/2005, regarding the environmental protection, provides that the polluter should bear the cost to repair the damage and remove the consequences thereof, restoring previous conditions damage occurred, according to the „polluter pays principle” (PPP).

Polluters are required to cover the costs of measures to prevent and/or reduce the negative environmental consequences of economic activities and pay for the damage caused by pollution. Preserving, protecting and improving the aquatic environment in terms of sustainable use of water resources, based on the PPP.

Supporting environmental costs have an impact on production costs, but help to ensure the right to a healthy and ecologically balanced environment and improving the quality of life on Earth. One economic instrument on the PPP and support environmental policies is given by the pollution tax. From the economic point of view, lack of timely expenditure environment entails performing much higher costs. Preserving, protecting and improving the aquatic environment in terms of sustainable use of water resources, based on the principles of precaution, prevention, avoiding damage at source and polluter pays [art. 1 (6) of Law water no. 107/1996]. The PPP is enshrined in a series of acts of national legislation, including: Law Water no. 107/1996, Government Emergency Ordinance no. 195/2005, and Law on ambient air quality no. 104/2011.

CONCLUSIONS

The first mention of the PPP at the international level occurred in the 1972 Recommendation by the Organization for Economic Co-operation and Development („OECD”) Council on Guiding Principles concerning International Economic Aspects of Environmental Policies.

Currently polluter pays principle is found in numerous legal acts and it is an essential criterion for developing and defining environmental policies. Given the global, permanent and cross - border impact of the pollution PPP is recognized national, European and international level as a beneficial tool for limiting the negative effects of pollution on the environment.

PPP promotes sustainable development and eco responsibility.

REFERENCES

- BAILEY P., McCULLOUGH E., SUTER SONYA S., 2012 - *Can Governments Ensure Adherence to the Polluter Pays Principle in the Longterm CCS Liability Context?*. Sustainable Development Law & Policy. **12 (2)**: p. 46-51; 69-70.
- BLEEKER A., 2009 - *Does the Polluter Pay? The Polluter-Pays Principle in the Case Law of the European Court of Justice*. European Energy and Environmental Law Review. **1**: p. 289 – 306.
- BUGGE H. C., 1996 - *The Principles of Polluter Pays in Economics and Law, in Law and Economics of the Environment*. In: EIDE E., R. VAN DER BERGH (eds.). Law and Economics of the Environment. Juridisk Forlag. Oslo.
- CIOBOTARU V., FRĂSINEANU C., FRĂSINEANU I., ȚĂPURICĂ O. C., 2011 - *Politici ecologice de mediu*. Ed. Economică, Bucureşti. p. 232.
- CORDATO R. E., 2001 - *The Polluter Pays Principle: A Proper Guide for Environmental Policy*. Institute for Research on the Economics of Taxation Studies in Social Cost, Regulation, and the Environment. Washington D. C. No. **6**.

- CORDATO R., 2006 - *The Polluter Pays Principle - A Proper Guide for Environmental Policy*, online <http://iret.org/pub/SCRE-6.PDF>.
- DASCĂLU D. M., 2012 - *Polluter-Pays Principle - Expression of Tort Liability for Environmental Protection*. Analele Universității din Oradea. Fascicula Protecția Mediului. Oradea. **XVIII**: p. 295 - 302.
- DE SADELEER N., 1999 - *Les principes du pollueur-payeur, de prevention et de precaution: essai sur la genese et la portee juridique de quelques principes du droit de l'environnement*. Bruylant. Brussels. p. 437.
- DE SADELEER N., 2002 - *Environmental Principles: From Political Slogans to Legal Rules*. Oxford University Press Oxford. p. 482.
- DUȚU M., 2010 - *Dreptul mediului*. Ed. C.H. Beck. București. p. 520.
- DUȚU M., 2012 - *Politici publice de mediu*. Ed. Universul Juridic, București. p. 272.
- HUGHES D. et al., 2002 - Environmental law. 4th ed. London, Butterworths.
- JANS H., VEDDER H., 2008 - *European Environmental Law*. 3rd ed., Europa Law Publishing. Groningen.
- MUŽÁKOVÁ K., KUBOVÁ P., 2013 - *Main Consequences of Implementation - Polluter Pays Principle with Analysis of Most Common Causes of Accidents in Czech Republic*. Asian Journal of Business and Management. **1**: p. 99-105.
- NEAGU M. M., 2007 - *Răspunderea juridică în dreptul mediului înconjurător*. Analele Universitatis Apulensis, seria Jurisprudentia. Alba Iulia. **10**: p. 266.
- PRESTON B. J., 2005 - *The Role of the Judiciary in Promoting Sustainable Development: The Experience of Asia and the Pacific Asia Pacific*. Journal of Environmental Law. **109**: p. 193-194.
- TELEAGĂ C., 2004 - *Principiul precauției și viitorul răspunderii civile*. Revista Română de Dreptul Mediului. București. **1(3)**.
- ***Environment Directorate, Organization for Economic Co-operation and Development (OECD). The Polluter-Pays Principle: OECD Analyses and Recommendations, at 9, OECD Doc. OCDE/GD (92)81 (1992).
- ***OECD Council Recommendation (C (72)128) on Guiding Principles concerning International Economic Aspects of Environmental Policies (Paris, 26 May 1972).

THE PONTIAN PALEONTOLOGICAL SITES IN MEHEDINȚI COUNTY (ROMANIA)

FLORINA DIACONU

Iron Gates Regional Museum, Independenței Street, no. 2, 220160, Drobeta Turnu-Severin,
Mehedinți, Romania, e-mail: florinadiaconu@yahoo.com

RAMONA ELIZA DIACONU

Drobeta Turnu-Severin, Mehedinți, Romania, e-mail: ramonaelizadiaconu@yahoo.com

ABSTRACT. In the Mehedinți County most Pontian fossil deposits outcrop at the surface, being exposed to natural factors of erosion. On the other hand, human interventions have led to the disappearance of paleontological sites, but there are many cases where, due to exploitation of mineral resources identified new places which later became protected areas. In this study, 14 Pontian sites were described, of which only one is declared a protected natural area, i.e. the Malovăț Reserve. Some sites have been submitted in terms of location, geologic framework, geological age, previous research, inventory paleontological, scientific importance, and others just reported. This study has been realized to assess the conservation status of paleontological sites from Mehedinți.

Key words: Pontian sites, conservation status, Mehedinți County, Romania.

REZUMAT. Situri paleontologice pontiene din județul Mehedinți (România). În județul Mehedinți majoritatea depozitelor pontiene fosilifere aflorează la suprafață, fiind astfel expuse factorilor naturali de eroziune. Pe de altă parte, intervențiile antropice au dus la dispariția unor situri paleontologice, dar sunt și numeroase cazuri care, datorită exploatarilor de resurse minerale au fost identificate locuri noi care, ulterior au devenit arii naturale protejate. În acest studiu au fost descrise 14 situri pontiene, dintre care, doar unul singur este declarat arie naturală protejată, și anume: Rezervația paleontologică Malovăț. Unele situri au fost prezentate din punct de vedere al localizării, cadrului geologic, vîrstelor geologice, cercetărilor anterioare, inventarului paleontologic, importanței științifică, iar altele doar semnalate. Acest studiu a fost realizat pentru evaluarea stării de conservare a siturilor paleontologice din Mehedinți.

Cuvinte cheie: situri pontiene, stare de conservare, județul Mehedinți, România.

INTRODUCTION

In Mehedinți County there are deposits of different ages, where one can find fossils that attest the life from the geological past and the environment conditions of those living beings. The protection of these beings and places where

they outcrop is asked by their palaeoecological importance (their living environment, animal associations and their way of life).

From all the paleontological sites on the area of the Mehedinți County, we will consider the Pontian ones present following their scientific importance in order to know these natural areas which, sometimes, can preserve on large territories some very important entities.

In the Mehedinți County most Pontian fossil deposits outcrop at the surface, being exposed to natural factors of erosion. On the other hand, human interventions have led to the disappearance of paleontological sites, but there are many cases where, due to exploitation of mineral resources new places which later became protected areas were identified.

The Pontian deposits occupy a big area on the Danube bank, too, starting from Drobeta Turnu Severin to the East and Southeast. From the outcrops, but also using drillings, there could be observed that the Pontian is represented by alternations of clays and marls (observed on the Danube bank at Ostrovul Corbului and Batoți), and in the superior part it is represented by grey-purple clay sands.

In this study, 14 Pontian sites were described, but only one of them is declared a protected natural area, i.e. the Malovăț Reserve. Some sites have been submitted in terms of location, geologic framework, geological age, previous research, inventory paleontological, scientific importance, and others just reported.

PREVIOUS RESEARCH

The Pontian deposits in Western Oltenia, with a rich and varied fauna, have long been in the attention of researchers who have tried to detail the stratigraphy of this level.

Monographs and doctoral theses regarding the Pontian deposits fossils from West of the Dacian Basin were elaborated Ionescu Argetoaia (Ionescu, 1918), Barbu (Barbu, 1954), Marinescu (Marinescu, 1978), Pană (Pană et al., 1981), Țicleanu (Țicleanu, 1992), Diaconu (Diaconu, 2005), Meilescu (Meilescu, 2005).

The Pontian deposits crop out along the Danube bank, which was investigated on several occasions (Diaconu, 2002a); mollusc faunas at Erghevița, Bistrița, Mojiei Valley, Cârjei Valley, Ostrovul Corbului, Obârșia de Câmp and Lower Pontian paleoflora at Batoți were thus identified.

Presentation of the scientific importance of the paleontological sites of Mehedinți County was carried out by the Diaconu, (Diaconu, 2000; 2004e; 2006). Diaconu (Diaconu, 2007) realized the floristic repertory of the mio-pliocene macrofloras from Danube - Motru sector (Mehedinți County).

Recently, Pătruțoiu (Pătruțoiu, 2010) analyzes the paleontological sites protected in Oltenia by highlighting the importance of fossils area, the problems regarding their protection and proposals for new protected areas.

MATERIAL AND METHODS

Previous research from the period (1999-2007) concentrated in the doctoral thesis under the title Reconstruction of carbogenerating environments of the Danube River and Motru (Diaconu, 2008) and recent observations in situ formed the basis of this study to assess the conservation status of paleontological sites of Mehedinți.

THE DESCRIPTION OF THE PONTIAN SITES

1. The Malovăț Palaeontological Reserve was stated as so by the Resolution no. 23/1980 of the District Council. The region: Malovăț - Valea Boereasca - Colibași - Cocorova is the place where the fossils are numerous and from where the fauna composition of the Pontian deposits (6 mil. years old), could be studied, represented by bivalves and brachiopods.

The Pontian marl clay deposits of Malovăț, placed on the valley with the same name, comprise a Pontian fauna from which Diaconu (Diaconu, 2002a) determinates a faunal association specific to Upper Pontian (Bosphorian). From Valley of Urdă, the right affluent of the Malovăț River, with the same stratigraphic succession, there had been identified (Diaconu, 2000) a fauna which also attests the Bosphorian. On the Boereasca Valley, up to the river, there can be seen clayey marls with *Phyllocardium planum planum* (Deshayes) which to superior side become sandy and comprise a fauna specific to Bosphorian.

2. The Pontian fossil sites

The **Negoiești Site** is located 60 km north of Drobeta Turnu Severin (Mehedinți County), on the right side of the River Motru. The marls compact from Leurdış Valley belonging to the lower Pontian are imprints of fossil molluscs and plants.

Vișenilor Valley Site. The Vișenilor Valley is the representative section for the Pontian deposits from the Danube-Motru sector (the perimeter of the Husnicioara mine). One of the most interesting outcrops of the Romanian and Dacian sands which are rich in fossils are placed on the superior course of Vișenilor Valley, where an alternation of fossiliferous grey sandy clay appears, yellowish sandy (Sands of Cocorova), white quartz sandy (Sands of Lazu), grey siltic clays with fossil plants, coals (Layers I, II, III, IV) in lithological succession.

The mollusc fauna identified (Diaconu, 2008) in Pontian deposits from Vișenilor Valley are illustrated in table 1.

In the mining perimeter Prunișor-Livezile, on **Bistrița Valley** (Bistrița village), the level fossil of the Vișenilor Valley was found by Pană (Pană et al., 1981).

Chioșmeni Site. On the left bank of the Chioșmeni brook, the left tributary to Topolnița, there is well preserved a layer mostly formed of lamellibranchiate and

gastropods (Diaconu & Enache, 2000). This fauna of molluscs (Tab. 1) is characteristic to Bosphorian.

The Chioșmeni Valley was previously researched by Niță Pion (Niță, 1958) that described and figured a series fauna of the molluscs from this valley. This site disappeared because of the depository sterile from Husnicioara open pit.

At the base of the **Gârdan Hill** exist the deposits of fossil grey sands from which was pointed out a Bosphorian fauna (Tab. 1) by Diaconu (Diaconu, 2002a).

The **Erghevița Valley Site** is located in the village of Erghevița, Mehedinți County. It is a valley which stretches from seasonal East to West locality with the same name and flows into the Danube near the Bistrița of Hinova village. On the Erghevița Valley there are visible the deposits of fine clayey sands, grey-greenish, over the grey marls, with a fauna of Pontian molluscs (Tab. 1) characteristic to Bosphorian (Lower Pontian).

Şimian Site. A similar fauna to the one from the Erghevița Valley is presented by Pătruțoiu (Pătruțoiu, 2000) in the north-west of Şimian village, where, over Bosphorian clays there follows a layer of yellow clayey sands. The site was discovered by Pătruțoiu in 1998, where has identified a rich fauna of molluscs (Pătruțoiu, 2000). Is the only place in the Western Basin where you can study the limit Pontian/Dacian (Pătruțoiu & Enache, 2000). Mollusc fauna contains robust forms Pontian indicating a long trend of brackish water, alongside new forms of freshwater.

Mojia Valley Site. In the deposits with purple marls, which are sometimes slightly sandy, from the right versant from the mouth of Mojia Valley, there is an abundant fossil fauna (Tab. 1) which is characteristic for the Lower Pontian (Odessian).

At **Ostrovul Corbului**, the purple marls deposits from the Danube bank contain a specific fauna for the Lower Pontian (Tab. 1). In the furrow from the eastern limit of Hinova, in the grey clayey sands, there is a *Phyllocardium planum planum* (Deshayes) layer.

Crăguiești Site. Crăguiești locality, included in the natural park Geopark Mehedinți Plateau, is located in the north-western part of Mehedinți County. Aflorimentul with plant fossils is situated on the hill above the village, called Culmea la Vale.

The geological succession comprises skinny fossil purple marls, fossils purple clays, skinny fossil purple clays and grey-brown clay. Plants generally appear in the purple marls.

The presence of the species fossils molluscs (Tab. 1) indicates the age of the Lower Pontian of grey clays and purple marls. The previous researches in this zone not refer a fossil plants, the site was discovered in 2006 (Diaconu, 2007). The Pontian flora from Crăguiești site is represents by the taxa in table 2. It is a portly flora with a tafocoenose very interesting, what has selected from several paleobiocoenoses.

The **Batoți Site** is located 25 km south of Drobeta Turnu Severin (Mehedinți County), on the left side of the Danube. The succession dominated by clayey deposits includes a rich fossil vegetal association.

The deposits rich in fossil flora from Batoți are mainly represented by stratified clays with fossil plant remains, besides which siltic clays and sandy silts, including carbonate sandstone concretions - also containing plant impressions, occur. The fossil plant sequence is part of clay soils, sometimes with fine sands attributed Odessian (Lower Pontian) by Marinescu (Marinescu, 1978) on the basis of the fossil content including *Valenciennius annulatus* Rousseau and *Paradacna abichi* Hoern.

Petrescu (Petrescu et al., 2002) were the first to study the fossil plant-bearing deposits from Batoți (Mehedinți County) focusing on the exceptional palynologic content of the Early Pontian. The macrofloral researches of the Pontian deposits with fossil plants from Batot, very important for the Pontian paleoflora of all Paratethys were made by Țicleanu (Țicleanu et al., 2002) and Diaconu (Diaconu, 2002b; 2003 and Diaconu, 2004a-2004d). Corroborating the results of the previous researches Diaconu (Diaconu et al., 2004), pointed out the importance of micro-and macroflora from Batoți in the frame of the paleofloristic heritage of Romania.

Flora of the Batoți comprises 50 taxa (Tab. 2). The flora from Batoți represents the only Lower Pontian assemblage described until now from Romania. The 50 identified taxa is an argument for a paleofloral assemblage of a very special scientific importance. From a palynological point of view, is not other similar microflora - as far as its richness and diversity are concerned - is known from Romania and its neighbouring areas.

The **Crivina Site** is located 40 km south from Drobeta Turnu Severin (Mehedinți County), on the left side of the Danube, being part of the Danube Green Corridor Natural Park. The out crop discovered in 2008 and researched by Diaconu (Diaconu, 2010).

The Early Pontian succession cropping out in the fossiliferous site is about 20 m thick, only a few meters contain fossil vegetal remains in well stratified clay, sometimes with local variegated features. Most of these rests occur as coarse vegetal detritus, frequently preserving more or less entire plant imprints, and rarely complete ones. An argument for the Lower Pontian represents the levels of fossil molluscs (Tab. 1) in the sequence deposits from Crivina. The flora from Crivina includes only 16 taxa (Tab. 2).

The Batoți site is covered by the building works carried out by Hidroconstrucția S. A. Porțile de Fier. In this situation, the Crivina site with a paleoflora similar to Batoți is the only outcrop for future researches. The taxa identified show a paleoflora assemblage of a very special scientific importance. All these arguments plead for preserving the Lower Pontian deposits rich in fossil plants from Crivina as sites special scientific interest (Diaconu, 2011).

At **Obârșia de Câmp Site** are found Pontian deposits with reddish ferruginous clay in which have been identified the fossils of molluscs (Tab. 1) belonging Lower Pontian (Odessian).

Table 1 - The repertory of the Pontian mollusc from paleontological sites (Mehedinți).

No.	Species determined / the place of collection	Malovăț	Valley of Urdă	Boereasca Valley	Negoiești	Vîșenilor Valley	Bistrița Valley	Chioșmeni Valley	Gârdan Hill	Erghevița Valley	Mojiei Valley	Hinova	Ostrovul Corbului	Obârșia de Câmp	Crăguiești
1.	<i>Phyllocardium planum</i> <i>planum</i> (Deshayes)	+	+	+		+	+	+	+			+			
2.	<i>Ph. planum stevanovici</i> Marinescu					+									
3.	<i>Dreissenomya aperta</i> (Deshayes)	+					+	+	+						
4.	<i>Dreissena rostriformis</i> (Deshayes)	+	+	+	+			+	+	+				+	
5.	<i>D. rimestiensis</i> (Fontanes)					+									
6.	<i>D. polymorpha</i> (Deshayes)					+									
7.	<i>Limnocardium</i> <i>(Tauricardium) braci</i> (Brusina)	+				+								+	
8.	<i>L. (Tauricardium)</i> <i>subsquamulosum</i> Andrusov			+									+		
9.	<i>L. (Tauricardium)</i> <i>petersi nassirica</i> Eberzin	+		+				+	+						
10.	<i>L. (Euxinicardium)</i> <i>botenicum</i> Papaian.	+													
11.	<i>Paradacna abichi</i> R. Hoernes				+						+			+	
12.	<i>P. retowskii</i> Andrusow									+	+		+		
13.	<i>P. okrugici</i> (R. Hoernes)					+									
14.	<i>Valenciennius bonéi</i> Hanganu												+		
15.	<i>Valenciennius</i> <i>annulatus</i> Rousseau					+								+	

Continues.

Table 1 - Continuation.

No.	Species determined / the place of collection	Malovăț	Valley of Urda	Boereasca Valley	Negoiești	Vîșenilor Valley	Bistrița Valley	Chișmeni Valley	Gârdan Hill	+ Enghevița Valley	Mojiei Valley	Hinova	Ostrovul Corbului	Obârșia de Câmp	Crăguiești
16	<i>Plagiodacna carinata</i> Deshayes														
17	<i>Caladacna steindachneri</i> Brusina	+								+					
18	<i>Lunadacna lunae</i> (Voitești)	+													
19	<i>Styloceracna heberti</i> (Cobălcescu)				+										
20	<i>Prosodacna munieri</i> Sabba	+	+	+				+							
21	<i>P. savae</i> Teissyre					+									
22	<i>P. sturi</i> (Cob.)			+											
23	<i>P. sturi sabae</i> Andreescu									+					
24	<i>P. mrazecii</i> Teissyre					+									
25	<i>Pontalmyra constantiae</i> Sabba	+	+	+				+	+	+					
26	<i>P. subcarinata</i> (Deshayes)					+	+				+				+
27	<i>P. placida</i> Ștefănescu					+				+					
28	<i>Pseudocatillus medius</i> Eberzin					+									
29	<i>P. pseudocatillus</i> (Barb de Marny)									+					
30	<i>Plagiodacna arcaeformis</i> Wenz						+								
31	<i>Viviparus neumayri neumayri</i> (Brusina)	+	+	+						+					
32	<i>V. neumayri popescui</i> (Cobălcescu)					+		+							
33	<i>V. achatinoides achatinoides</i> (Deshayes)	+	+							+					
34	<i>V. achatinoides glogovensis</i> (Sabba)								+						
35	<i>Bulimus (Tylopoma) speciosus</i> (Cob.)			+				+							

Continues.

Table 1 - Continuation.

No.	Species determined / the place of collection	Malovăt	Valley of Urda	Boereasca Valley	Negoiești	Viișoilor Valley	Bistrița Valley	Chioșmeni Valley	Gârdan Hill	Erghevița Valley	Mojiei Valley	Hinova	Ostrovul Corbului	Obârșia de Câmp	Crăguiești
36	<i>B. (Tylopoma) berbestiensis</i> (Fontanes)				+										
37	<i>Lithoglyphus decipiens</i> Brusina				+										

Table 2 - The floristic repertory of the Pontian floras from Batoți (BT), Crivina (CV) Crăguiești (CR) and actual correspondents.

No.	TAXON	ACTUAL CORESPONDENT	BT	CV	CR
1.	<i>Pinus</i> sp.		+		
2.	<i>Pseudotsuga</i> cf. <i>taxifolia</i> Britt.	<i>P. taxifolia</i> Britt.	+		
3.	<i>Taxodium dubium</i> (Sernberg) Heer	<i>T. distichum</i> Rich.	+		
4.	<i>Sequoia gigantea</i> L.	<i>S. gigantea</i> L.	+		
5.	<i>Glyptostrobus europaeus</i> (Brongn.) Unger	<i>G. pensilis</i> (Stount) Koch	+		
6.	<i>Magnolia</i> sp. aff. <i>M. acuminata</i>	<i>M. acuminata</i> L.	+		
7.	<i>Sassafras subtriloba</i> (Konno) Tanai et Onoe	<i>S. tzumu</i> Hemsl	+		
		<i>S. sassafras</i> Krarst	+		
8.	<i>Liquidambar europaea</i> Al. Braun	<i>L. styraciflua</i> L.	+		+
9.	<i>Platanus platanifolia</i> (Ett.) Knobloch	<i>P. occidentalis</i> L.	+		
10.	<i>Alnus cecropiaeefolia</i> (Ettingsh.) Berger	uncertain	+	+	
11.	<i>Alnus ducalis</i> (Gaudin) Knobloch	<i>A. serrulata</i> (Ait.) Wild.	+		
12.	<i>Alnus</i> sp.				+
13.	<i>Laurophylum</i> sp.			+	
14.	<i>Betula insignis</i> Gaudin	<i>B. luminifera</i> Winkler	+		
15.	<i>Betula pseudoluminifera</i> Givulescu	<i>B. luminifera</i> Winkler	+		
16.	<i>Betula</i> cfr. <i>macrophylla</i> (Goepp.) Heer	<i>B. papryfera</i> Marsh.			
17.	<i>Carpinus grandis</i> Ung.	<i>C. betulus</i> L.	+	+	
18.	<i>Ostrya</i> sp. aff. <i>O. virginiana</i> (Miller) C. Koch	<i>O. virginiana</i> (Mill.) K.Koch	+		
19.	<i>Fagus silesiaca</i> Walth. et Zast.	<i>F. grandifolia</i> Her.	+	+	+
20.	<i>Fagus sylvatica</i> L.	<i>F. sylvatica</i> L.	+		
21.	<i>Fagus pliocaenica</i> Saporta	<i>F. sylvatica</i> L.	+		
22.	<i>Castanea</i> cf. <i>sativa</i> Miller	<i>C. sativa</i> Mill.	+	+	

Continues.

Table 2 - Continuation.

No.	TAXON	ACTUAL CORESPONDENT	BT	CV	CR
23.	<i>Castanea kubinyii</i> Kovats	<i>C. vesca</i> Gaertn. (syn. <i>C. sativa</i> Mill.)	+		
24.	<i>Castanea gigas</i> (Goepp.) Iljinsk.		+		
25.	<i>Castanea atavia</i> Ung.	<i>C. sativa</i> Mill.	+		
26.	<i>Castanea</i> cf. <i>crenata</i> Sieb. et Zucc.	<i>C. crenata</i> Siebold & Zucc.	+	+	
27.	<i>Quercus drymeja</i> Ung.	<i>Q. serrata</i> Thbg.	+	+	
28.	<i>Quercus pontica</i> C. Koch <i>miocaenica</i> Kubat	<i>Q. pontica</i> C. Koch	+	+	
29.	<i>Quercus</i> cf. <i>kodorica</i> Kolakovski	<i>Q. mirbeckii</i> Durieu and <i>Q. hartwissiana</i> Steven	+		
30.	<i>Quercus</i> cf. <i>macrantheroides</i> Andreanszky	uncertain	+		
31.	<i>Quercus kovatsi</i> E. Kovacs	<i>Q. petraea</i> (Matt.) Liebl.	+	+	
32.	<i>Quercus</i> cf. <i>pseudocastanea</i> Goeppert	<i>Q. muehlenbergii</i> Engelmann	+		
33.	<i>Quercus</i> cf. <i>muehlenbergii</i> Engelmann	<i>Q. muehlenbergii</i> Engelm.	+		
34.	<i>Quercus</i> sp.		+		
35.	<i>Ulmus pyramidalis</i> Goeppert	<i>U. americana</i> Wild.	+	+	
36.	<i>Zelkova zelkovefolia</i> (Ung.) Buz. et Kotl.	<i>Z. crenata</i> Spach – <i>Z. carpinifolia</i> Pallas	+		
37.	<i>Juglans acuminata</i> Al. Braun	<i>J. regia</i> L.	+		
38.	<i>Carya serraefolia</i> (Goepp.) Krause	<i>C. amara</i> (Michx.f.) Nutt. ex Elliott and <i>C. tomentosa</i> Sarg.	+	+	
39.	<i>Pterocarya paradisiaca</i> (Ung.) Ilj.	<i>P. caucasiaca</i> C. A. Mey.	+	+	
40.	<i>Acer tricuspidatum</i> Brønn	<i>A. rubrum</i> L.	+		
41.	<i>Acer integrerrimum</i> (Viv.) Massal.	<i>A. pictum</i> Thbg.	+		
42.	<i>Acer</i> cf. <i>campestre</i> L. Giv.	<i>A. campestre</i> L.	+		
43.	<i>Berchemia multinervis</i> (Al. Br.) Heer	<i>B. volubilis</i> D.C.= <i>B. scadens</i> (Hill.) C. Koch	+		
44.	<i>Rhamnus</i> cf. <i>gaudini</i> Heer	<i>R. grandifolius</i> Fisch. et. Meyer	+		
45.	<i>Vitis teutonica</i> Al. Braun	<i>V. cordifolia</i> Michx. and <i>V. vulpina</i> L. = <i>V. cordifolia</i> Michx.	+		
46.	<i>Cornus</i> sp.	<i>C. mas</i> L.	+	+	
47.	<i>Populus populina</i> (Brognt.) Knobloch	<i>P. canadensis</i> Moench.	+	+	
48.	<i>Byttneriophyllum tiliaefolium</i> (Al. Br.) Knobloch et Kvacek	No have	+		
49.	<i>Salix</i> sp.		+		
50.	<i>Typha latissima</i> A. Br.	<i>T. latifolia</i> L.	+		
51.	<i>Phragmites oenningensis</i> Al. Br.	<i>Ph. communis</i> Trin.	+		
52.	<i>Diospyros anceps</i> Heer	<i>D. virginiana</i> L.	+		
53.	<i>Lonicera</i> sp.	No have	+		
54.	<i>Dicotylophyllum elongatum</i> Givulescu		+	+	

PROPOSALS FOR NEW PROTECTED AREAS

Mehedinți County has a rich paleontological inventory, particularly Myo-Pliocene formations. A series of outcrops or newly discovered different occasions offer great „fossil deposits”, true outdoor paleontology museums. Openings spectacular as those of Vișenilor Valley, Batoți, Crivina, Malovăț or Erghevița attracted the attention of researchers who have published comprehensive inventory, especially molluscs, and plant fossils. A special place Crivina and Erghevița sites first plant fossils, and the second for the transition fauna the Pontian from Dacian.

The succession dominated by clayey deposits from Crivina includes a rich fossil vegetal association. The fossil vegetal remains appear, for the most part of their, as coarse vegetal detritus, frequently preserving more or less entire leaf remains and rarely complete ones.

The arguments for declaring the Batoți site as protected area are:

- In the deposits of this site were identified 50 species of macrofloras.

- By the stratigraphical position, the flora from Batoți is the only Pontian Early known till now in Romania; from the palynology point of view it is not known such a rich and varied microflora both in Romania and in the neighboring country.

- Based on the identified palaeoflora and on their actual correspondents, there is possible to make palaeoecology and palaeogeographical interpretations, following the realization of a reconstitution of the environment conditions specific to that period.

- In Southeast of Batoți 14 skeleton fragments of *Elephas trogontherii* had been found (Paveloiu, 1985); they are of great importance in knowing the evolution of the Quaternary living beings. This is the reason why the region was intended to be protected by including it in a natural reservation.

- Batoți will be declared a natural region that comprises values of the natural patrimony, which needs its protection for preserving those values of national scientific interest.

Erghevița is the only site where you can study the Pontian/Dacian of the Western Basin Dacic. The site has the advantage of being in a hidden area of vegetation and relatively hard accessible. The Fauna of the Erghevița completes an inventory that includes forms Pontian palaeontological sturdy, well-developed, indicating a long evolution of brackish water, along with new Dacian forms of freshwater.

CONCLUSIONS

The research of Pontian paleontological sites allows the following general observations on these levels:

- Malovăț Reserve is only declared a protected natural area in Mehedinți County.

- Vișenilor Valley site is the representatives section for the Pontian deposits from the Danube-Motru sector and one of the most interesting outcrops of the Romanian and Dacian.

- The Chioșmeni Valley site disappeared because depository sterile from Husnicioara open pit.
- The Erghevița Site is the only place in the Western Basin where you can study the limit Pontian/Dacian and with paleontological content of the Pontian and Dacian molluscs.
- The Batoți site is a deposit of reference concerning the importance of micro- and macroflora from Batoți in the frame of the paleofloristic heritage of Romania. But this site is covered for strengthening bank of Danube. In this situation, the Crivina site with a paleoflora similar to Batoți is the only outcrop for future researches.

REFERENCES

- BARBU I. Z., 1954 - *Flora fosilă din Terțiarul Olteniei*. Anuarul Comit. Geol. București. **XXVII**: p. 1-101.
- DIACONU Florina, 2000 - *Rezervații și puncte fosilifere din județul Mehedinți*. Natura și Omul. Comunicări și Referate. Ploiești. p. 133-141.
- DIACONU Florina, 2002a - *Observații recente în punctele fosilifere pliocene dintre Dunăre și Motru*, Drobeta. Ed. Radical, Drobeta Turnu Severin. **XI-XII**: p. 199-207.
- DIACONU Florina, 2002b - *Date noi privind studiul florei pontiene de la Batoți (județul Mehedinți)*. Oltenia. Studii și comunicări. Științele Naturii. Craiova. **XVIII**: p. 37-44.
- DIACONU Florina, 2003 - *Flora pontiană de la Batoți – un patrimoniu paleofloristic mehedințean*. Drobeta. Drobeta Turnu Severin. **XIII**: p. 213-217.
- DIACONU Florina, 2004a - *New floristic elements in the Pontian deposits from Batot (Mehedinți District)*. Studii și cercetări, Geologie-Geografie. Bistrița. **9**: p. 73-84.
- DIACONU Florina, 2004b - *The comparative study of the coal forming Pontian and Dacian-Romanian flora from the sector Danube-Motru, SW Romania*. Acta Paleontologica Romanie. Editura Supergraph. Cluj-Napoca. **4**: p. 105-111.
- DIACONU Florina, 2004c - *New contribution in the study of the pontian flora from Batoți (Mehedinți County)*. Studia Universitatis Babeș-Bolyai. Geologia. Cluj-Napoca. **2**: p. 95-104.
- DIACONU Florina, 2004d - *Câteva considerații privind studiul florei pontiene de la Batoți (județul Mehedinți)*. Oltenia. Studii și Comunicări. Științele naturii. Craiova. **XX**: p.11-14.
- DIACONU Florina, 2004e - *Rezervațiile fosilifere - mărturii ale trecutului - educația patrimoniului*. Cultură și Ecuatie. Ed. Lumina. Drobeta Turnu Severin. p. 100-106.
- DIACONU Florina, 2005 - *Reconstituirea paleomediilor de formare a zăcămintelor de cărbuni plioceni dintre Dunăre și Motru*. Teză de doctorat, Universitatea din București.
- DIACONU Florina, 2007 - *The floristic repertory of the mio-pliocene microfloras from Danube - Motru sector (Mehedinți District)*. Oltenia. Studii și Comunicări, Științele naturii. Editura Muzeului Olteniei. Craiova. **XXIII**: p. 191-196.
- DIACONU Florina, 2008 - *Reconstituirea mediilor carbogeneratoare pliocene dintre Dunăre și Motru*. Editura Universitară Craiova. p. 321.
- DIACONU Florina, 2011 - *Contribution concerning the Pontian flora in southwest of Oltenia (Romania)*. Acta Palaeontologica Romaniae. Editura Supergraph. Cluj-Napoca. **VII**: p. 123-137.

- DIACONU Florina, ENACHE C., 2000 - *Punctul fosilifer de pe Valea Chioșmeni - Mehedinți*. Oltenia. Studii și Comunicări, Științele naturii. Craiova. **XVI**: p. 37-42.
- DIACONU Florina, ȚICLEANU N., PETRESCU I., BARBU V., MEILESCU C., 2004 - *Importanța micro- și macroflorei de la Batoți (județul Mehedinți), pentru patrimoniul paleontologic al României*. Environment & Progress. Cluj-Napoca. **2**: p. 113-116.
- IONESCU ARGETOAIA I.P., 1918 - *Pliocenul din Oltenia*. An. Inst. Geol. Rom. București. **VIII**: p. 261-382.
- MARINESCU Fl., 1978 - *Stratigrafia neogenului superior din sectorul vestic al Bazinului Dacic*. Ed. Academiei R. S. R. București. p. 155.
- MEILESCU C., 2005 - *Evoluția paleoclimatică în Neogenul superior din NV Olteniei pe baza analizelor palinologice*. Teză de doctorat, Universitatea Babeș-Bolyai. Cluj-Napoca.
- PANĂ I., ENACHE C., ANDREESCU I., 1981 - *Fauna de moluște a depozitelor cu ligniți din Oltenia*. ICSITPMI Craiova.
- PAVELOIU T., 1985 - *Prezența lui Elephas trogontherii (POHLIG. 1885) la Batoți - Mehedinți*. Drobeta, Drobeta Turnu Severin. **VI**: p. 355-363.
- NIȚĂ PETRE-PION, 1958 - *Contribuțiuni la stratigrafia Pliocenului dintre văile Topolnița - Coșustea*. St. și Cerc. Geol., Geofiz., Geogr., Seria Geologie. București. **III/3-4**: p. 245 - 262.
- PĂTRUȚOIU I., 2000 - *Date noi pentru stabilirea limitei Pontian-Dacian în vestul Bazinului Dacic*. Oltenia. Studii și comunicări. Științele naturii. Craiova. **XVI**: p. 48-50.
- PĂTRUȚOIU I., ENACHE C., 1999 - *Contribuții la stabilirea limitei Pontian-Dacian în zona vestică a Bazinului Dacic*. St. și Ec. Muzeul Jud. Bistrița-Năsăud. **5**.
- PĂTRUȚOIU T., 2010 - *Rezervații paleontologice plio-pleistocene din Oltenia*. Teză de doctorat, Universitatea Babeș-Bolyai. Cluj Napoca.
- PETRESCU I., BICAN BRIȘAN Nicole, MEILESCU C., PĂTRUȚOIU I., 2002 - *The palynology of the Pontian from Batot-Mehedinti (South - Western Romania)*. Acta Paleontol. Cluj-Napoca. **III**.
- ȚICLEANU N., 1992 - *Studiul genetic al principalelor zăcăminte de cărbuni neogeni din România pe baza paleofitocenozelor caracteristice, cu privire specială la Oltenia*. Teză de doctorat, Universitatea din București.
- ȚICLEANU N., PETRESCU I., DIACONU Florina, MEILESCU C., PĂTRUȚOIU I., 2002 - *Fossil plants from Pontian deposits at Batoți - Mehedinți*. Studia, Univ. Babeș-Bolyai. Geologia, special ISSUE. Cluj-Napoca. **1**: p. 351-364.

THE STRATIGRAPHY OF THE VALAH BASIN (PLEISTOCENE) WITH BIOSTRATIGRAPHIC ARGUMENTS (ROMANIA)

ION STĂNOIU

Geological Institute of Romania, Caransebeș Street, no. 1, 012271, Bucharest, Romania,
e-mail: stanoiu-ion@gmail.com

ABSTRACT. In this article the stratigraphy of the Quaternary deposits from Romanian Plain and the Sub-Carpathian Piedmonts (between Adjud and Drobeta Turnu Severin) was restructured; it was outlined a new paleogeographic unit (the Valah Basin, Pleistocene); it was outlined a tectonic structure (Valah Nappe) localized to Pliocene-Pleistocene boundary (at ~ 2.58 My); was proposed a new stratigraphic scale of the Quaternary from the Valah Basin (valid for the entire Paratethis Domain); was demonstrated presence anew geologic unit (Danubian) from the Eastern Carpathians Orogen, under the Laramic Getic Megastructure (Nappe) and over Teleajen-Macla-Audia Unit; it was found that within lithostratigraphic unit of the Cândești Beds included several lithostratigraphic units of different ages, delimited through discordances; there were stated two tectogenetic phases (Vrancea Valah Tectogenetic Phase camped to ~ 2.58 My and Pasaden Focșani Tectogenetic Phase camped to 1.0 My) marked by very obvious discordances of the deposits and through discontinuities by deformation. In the framework of the Valah Basin new lithostratigraphic units were defined; there were redefined some older lithostratigraphic units; there were outlined two depositional units (central depositional unit and marginal depositional unit with two subunits: northern marginal depositional subunit and southern marginal depositional subunit); have been made he ambient nature clarifications and regional correlations were made.

Key words: Valah Basin, Pleistocene, Buridavian, Ordessensian, lithostratigraphy, biostratigraphy.

REZUMAT. Stratigrafia Bazinului Valah (Pleistocen) cu argumente biostratigrafice (România). În acest articol s-a restructurat stratigrafia depozitelor cuaternare din Câmpia Română și din Piemonturile Subcarpatice (între Adjud și Drobeta Turnu Severin); s-a conturat o nouă unitate paleogeografică (Bazinul Valah, Pleistocen); s-a conturat o structură tectonică (Pârâna Valahă) precizată la limita Pliocen-Pleistocen (la ~ 2,58 milioane ani); s-a propus o nouă scară stratigrafică a Cuaternarului din Bazinul Valah (valabilă pentru întregul Domeniu Paratethis); s-a demonstrat prezența unei noi unități geologice (Danubianul) în Orogenul Carpaților Orientali, sub Megastructura (Pârâna) Getică Laramică și peste ?Unitatea Teleajen-Macla-Audia; s-a constatat că în cadrul unității lithostratigrafice a Stratelor de Cândești au fost incluse mai multe unități lithostratigrafice de vârste diferite, delimitate prin discordanțe; s-au precizat două faze tectogenetice (Faza Tectogenetică Valahă Vrâceană cantonată la ~ 2,58 milioane ani și Faza Tectogenetică Pasadenă Focșani cantonată la 1,0 milioane ani) marcate prin discordanțe foarte evidente ale depozitelor și prin discontinuități deformaționale. În cadrul Bazinului Valah s-au definit noi unități lithostratigrafice; s-au redefinit unele unități lithostratigrafice mai vechi; s-au conturat două unități depozitionale (unitatea depozitională centrală și unitatea depozitională marginală cu două subunități: subunitatea depozitională marginală

nordică și subunitatea depozitională marginală sudică); s-au făcut precizări de natură ambientală și s-au făcut corelări regionale.

Cuvinte cheie: Bazinul Valah, Pleistocen, Buridavian, Ordessensian, litostratigrafie, biostratigrafie.

INTRODUCTION

In this article we used the terminology employed by Grasu (Grușu et al., 1999; 2002), etc. on foreland basin (Dickinson, 1964) with flysch and molasse stages (Sinclair, 1997), with molasse and premolasse phases (Ensele, 1992) and with morphostructural and depositional aspects (DeCelles & Giles, 1966) as: orogenic prism, flexural dome, wedge-top depositional area, foredeep depositional area, forebulge depositional area etc. It appears that this terminology, which is a breakdown of the terminology used by Ion Dumitrescu (Dumitrescu et al., 1962) is easily applicable to the Carpathian Foredeep's study: the orogenic prism represents the overthrust's head, sometimes blind and „inter layered” in foredeep basin's deposits; wedge-top depositional area (superimposed to the orogenic prism) corresponds to the internal, epirogenic sidewall of the foredeep (Dumitrescu et al., 1962), or to the internal area of the foredeep (Dumitrescu et al., 1968; 1970); Foredeep depositional area and forebulge depositional area corresponds to the external, epiplatformic, epicratonic flank of the, foredeep (Dumitrescu et al., 1962) and to the Sarmato-Pliocene external area (Dumitrescu et al., 1968; 1978).

Săndulescu (Săndulescu, 1984) integrated the molasse from the Carpathian Nappe to Moldavides, the latest remaining molasse deposits being assigned to the Foredeep sensu stricto (s. str.).

From a morphological perspective, in the concavity of the Mehedinți Bend (Stănoiu, 2005) from the Carpatho-Balkan Orogen, between the South Carpathians and the Balkans, looms the Valah Depression (Liteanu, 1961). The depression of this great morphological unit is represented by the Romanian Plain. Between the Carpathian Mountains and the Romanian Plain are distinguished two major morphological units stacked over the Carpathian Foredeep: 1. Sub-Carpathians, situated outside the Carpathians; 2. Sub-Carpathian Piedmonts, located between the Sub-Carpathians and Romanian Plain. South of the Danube, Sub-Carpathians and Sub-Carpathian Piedmonts are missing, here, between the Balkans and the Romanian Plain Pre-Balkans interposes.

The progressive decreasing from east to west, of the Cenozoic deformation's intensity-transpresional, with shortening for the external part of the South Carpathians Orogen (Dumitrescu & Săndulescu, 1968; Dumitrescu et al., 1962; Săndulescu, 1984; Krézsek, 2012; etc.), and the virtual absence of these tectogenese outside the Balkan Orogen (Săndulescu, 1984; Bergerat et al., 2010; Ivanov, 1998), had several consequences: 1. The synchronous transition from flysch facies of the Premolasic Moldavides from Eastern Carpathians to molasse facies (Dumitrescu & Săndulescu, 1968; Săndulescu, 1984) of the Getic Foredeep from the South Carpathians, characterized by abundant conglomerates and the

presence of evaporites; 2. The gradual transition from Vrancea Bend region where Foredeep deposits are intensely deformed by major Miocene-Quaternary tectonic structures, thrusted with shortening (Băncilă, 1958; Dumitrescu et al., 1962; Săndulescu, 1984; Stănoiu, 2012-2013), to the Mehedinți Bend region, where Foredeep deposits occur almost undistorted as homoclinal with rare discordances (Marinescu, 1978), imposed by oblique convergence and important dextral rotation (Krautner et Krstic, 2002; Krézsek et al., 2012) associated especially with large-scale strike-slip type deformations, accompanied predominantly by openings; 3. The reduction to extinction from east to west (Mehedinți Bend region), in the same sense, of the Moldavides, the Carpathian Foredeep, the Subcarpathians and of the Sub-Carpathian Piedmonts; 4. The absence of the Foredeep, the Subcarpathians and of the Subcarpathian Piedmonts north of the Balkans; 5. The large scale of the Valah Basin, the Moldav Basin (Dacic Basin, Saulea et al., 1969), the Carpathian Foredeep, the Subcarpathians and Sub-Carpathian Piedmonts in the northern part of Valah Depression, adjacent to the Carpathians; 6. An intense deformation of the northern flank's deposits (adjacent Carpathians) from the Moldav Basin to the southern flank's deposits (Stănoiu, 2012-2013); 7. A greater thickness of the northern flank's deposits (defined by a piedmont accumulation) from the Moldav and Valah Basins versus lower thickness of the southern flank's deposits (Saulea et al., 1969; Jipa & Olariu, 2009; Stănoiu, 2012-2013); 8. A coarse appearance and greater frequency of detrital deposits of the northern flank of the Moldav and Valah Basins compared with deposits from the southern flank (Saulea et al., 1969; Jipa & Olariu, 2009; Andreescu et al., 2011; Stănoiu, 2012-2013); 9. A higher sediment filling rate of the two largest basins in the southern flank than in the northern one (Olariu & Jipa, 2009; Stănoiu, 2012-2013).

The transtensional opening, along the direction of the Timok-Țicleni-Scoarța and Vârciorova-Baia de Aramă-Săcel-Govora faults (with significant strike-slip type deformations) prevalent in Paleogene-Lower Miocene from the Mehedinți Bend region (Western part of the Valah Depression) was replaced progressively to the east by transpresional shortenings, especially subsequent to the inversion of Middle Miocene prevalent in the Eastern Carpathians (especially in the Vrancea Bend region), as shown in most of the existing information, in particular (Krautner & Krstic, 2002; Stănoiu, 2004; Krézsek et al., 2012).

A synthesis of existing information shows that in the region of the Carpathian Orogenic Foreland Basin (especially in the Eastern Carpathians) important tectonic structures can be distinguished in the overthrust bloc: 1. The Laramic Nappe (Megastucture) emerged in the Laramic Tectonogenetic Phase, belonging to the Dacides; 2. Cenozoic tectonic structures characteristic of the Moldovides represented by the Old Styric Nappe (Megastucture) with three major digitations (the Curbicortical, Macla and Audia), by the New Styric Nappe (Megastucture) with two digitations (Tarcău and the Marginal Folds), represented by the Moldav Nappe (Megastucture) with two major digitations (Pietricica and Mărginești - Perchiu, Săndulescu, 1984) and by the Valah Nappe (Megastucture) with two major digitations (a lower one, Scoarța and an upper one, Chiliile)

(Fig. 1, 2). Following the conclusion of the above, mentioned Cenozoic tectonic megastructures that correspond to some compression episodes, four well-individualised, well-outlined subunits (the Old Styric Basin, the New Styric Basin, the Moldav Basin and the Valah Basin; well definite paleogeographic, tectonic, lithostratigraphic, morphologic etc.), synchronous with some tension, free intervals were formed. Four main tectonic-stratigraphic cycles correspond to the four basins: 1. The Old Styric Cycle (Burdigalian-Badennian: Langhian); 2. The New Styric Cycle (Badennian: Cossovian-Lower Sarmatian); 3. The Moldav Cycle (Upper Sarmatian: Bessarabian-Pliocene: Romanian); 4. The Valah Cycle (Pleistocene: Buridavian-Ordessensian: ~ 2.58-0.01 My).

Between the Outer Dacides (which in this case appear in front of the Laramic Megastructure) and the Moldavides (represented by the Curbicortical Flysch Unit) lies the Danubian (the Perimoldavian Cordillera: Săndulescu, 1984), overlapped in the Eastern Carpathians by the Outer Dacides (Fig. 2). The existence of Danubian under the Laramic Plan, under the Laramic Getic Megastructure (Nappe), form the Eastern Carpathians Orogen is justified by the presence of the following rocks (reported by Bancila, 1958; Marinescu, 1962) along the Lutu Rosu Line: greenish-purple marly-limestone with *Aptychus*, marly-limestone with *Calpionella alpina* and lumachele breccia with *Aptychus*; white limestone with *Lithoceras* sp., limestone breccias with silicolite and crystalline schists; white and gray limestone etc.

The Vrancea Valah Tectonogenetic Phase is the last major converging event, with crust shortening (materialized in the Valah Nappe of the Vrancea Bend area) of the Carpathian Orogen, of the Moldavides (the Eastern Carpathian Foreland Basin), and of the Carpathian Foredeep (the Foreland Basin molasse phase).

The Valah Nappe is very well individualized (Stănoiu, 2012-2013) in the Vrancea Bend area (where major tectonogenesis has been going on up to the Present: the Vrancea Earthquakes) along a distance of over 100 km between the Trotuș and the Teleajen Valleys. This tectonic structure is argued by the severely warped deposits (folded and faulted) of the Miocene-Pliocene (inclusive of the gravels of the Motru-Vâlsan Member situated in the upper part of the Romanian) belonging to the Soveja Unit, thrust over synchronous deposits (warped only below the Valah Plane) of the Moldav Basin, Milcov Unit. The Valah Plane (with some 45° surface dip towards the Orogen inside) is very well outlined by the Casin-Jitia-Berca-Urlați Linement sealed (unconformably covered) by Valah Basin deposits beginning with the gravels of the Odobești Formation (Pleistocene, Buridavian: ~ 2.58 - 1.0 My). All these argue that the Valah Nappe emerged in the Vrancea Valah Tectonogenetic Phase (~ 2.58 My) at the Romanian-Burdigalian boundary, at the limit between the Pliocene and the Quaternary (set according to the latest proposals) (Fig. 1, 2).

The Valah Basin, the Moldav Basin, the Eastern Carpathian Foreland Basin, the Carpathian Foredeep Basin, etc. fall into the episutured, post-collisional peripheral basins situated mostly on the subducted continental lithosphere (the

epiplatform external flank: the foredeep and forebulge depozones) and over the orogene wedges of the last overthrust tectonic structures of the Carpathian Orogen (the inner epirogenic flank: the wedge-top depozone).

The Valah Basin, corresponding to the Valah Cycle (Pleistocene, Buridavian-Ordessensian, ~ 2.58-0.01 My), was formed in the Vrancea Valah Tectonogenetic Phase, set (Stănoiu, 2012-2013) at the boundary between the Pliocene and the Pleistocene (~ 2.58 My according to the latest proposals), between the Romanian and the Buridavian, between the Motru Valley Formation (Romanian, warped as effect of the Vrancea Valah Tectonogenetic Phase) and the Odobești Formation (Buridavian, unconformable, unwarped) inside the Cândești Beds (Stănoiu, 2012-2013).

What has been said (Stănoiu, 2012-2013) show that initially, Mrazec and Tesseyre (Mrazec & Tesseyre, 1901), had included two lithostratigraphic units (the gravels of the Motru-Vâlsan Member and the gravels of the Odobești Formation) into the Cândești Beds (Cândești Gravels). Those two units are of different age (Romanian and Pleistocene), warped at very different intensities and separated by a major unconformity with sedimentation gap (controlled by the Vrancea Valah Tectonogenetic Phase). The units in question belong to two distinct tectonic-stratigraphic units (the Valah Nappe and the post-tectonic cover of units subject to the Valah Tectonogenesis represented by rocks of the Valah Basin northern marginal depositional subunit) (Fig. 6).

The unwarped Valah Basin, subsequent to the formation of the Valah Nappe, corresponding with the Valah Cycle (Pleistocene, Buridavian-Ordessensian, ~ 2.58-0.01 My), emerged in the Vrancea Valah Tectonogenetic Phase relating to the strike-slip sinister episode (Dinu, 2006), which is the last major episode connected with sinister transcurrent warpings along the NNE-SSW direction. The Valah Basin wedge-top depozone is represented by the northern marginal depositional subunit of the basin, unconformably overlapping the front edge of the blind Moldav Nappe of the Soveja Unit (severely warped as effect of the Vrancea Valah Tectonogenetic Phase) where it forms the post-tectonic cover of the Valah Tectonogenetic units. The Valah Basin forebulge depozone is represented by the southern marginal depositional subunit, approximately marked by flexion (Săndulescu, 1984) suggestive of the flexural dome. The Valah Basin Foredeep depozone is represented by the central depositional subunit overlapping the depocentral unit (intensely subsiding) of the Slatina-Titu-Măicănești-Focșani Perimeter (and of the Bucharest Perimeter, in the Ordessensian) situated largely at the forefront of the blind Moldav Nappe, Milcov Unit.

The formation of the Moldav Nappe (Subcarpathian Nappe: Săndulescu, 1984) was followed by the emergence of the Moldav Basin (Dacic Basin: Saulea, 1969) corresponding with the Moldav Cycle (Upper Sarmatian-Pliocene), the outcome of the Moldav Tectonogenetic Phase (Săndulescu & Visarion, 2000), corresponding with the dextral transtensional episode in the upper Miocene, intra-Sarmatian (Dinu, 2006). The wedge-top depozone (northern marginal depositional subunit) of the Moldav Basin (warped as effect of the Valah Tectonogenesis)

represents the post-tectonic cover of units subject to the Moldav Tectonogenesis (Moldav Cycle deposits in the Comănești area, Pătârlagele, etc.), unconformably overlaying all Moldavide units (part of the Valah Nappe) as far as the Dacide Unit, proves the importance of the Vrancea Valah Tectonogenetic Phase and the wide expansion of the Moldav Basin. The forebulge depozone of this basin (less outlined, unwarped) is represented by the southern marginal depositional subunit of the Moldav Basin (with frequent detritic deposits: Saulea et al., 1969; Jipa & Olariu, 2009), approximately overlapped by the southern marginal depositional subunit of the Valah Basin. The Moldav Basin Foredeep depozone, warped only in the forefront of the Valah Nappe (where it lies under the Valah Plane), is represented by the central depositional unit of the Moldav Basin, featuring a wealth of clayey-sand deposits (Saulea et al., 1969; Jipa & Olariu, 2006).

RESULTS AND DISCUSSIONS

1. The Valah Basin (Fig. 1-3, 7, 9).

The Valah Basin, which mostly overlapped the Moldav Basin (outlined by Saulea et al., 1969; Jipa & Olariu, 2009), highlights a lesser extension and movement outwards towards the latter, controlled by the movement of the depositional units and the depo-centres and by the reduce intensity of the Moldav and Valah tectogenesis in the same direction.

1.1. Main environments.

Was approximated (Stănoiu, 2006; 2007; 2008; 2012-2013) that in the Valah Basin's evolution some main environments (areas) occur: 1. Dacic Ambiance looks mostly the kind of low alluvial plains characterized by unconsolidated terrain, very paludal (excessive lake type paludal sequences), drained by Dacic River Network represented by braided-anastomosed-meandering valleys without terraces; 2. Odobești Ambiance is characterized by a moderate paludal field, poorly consolidated, represented predominantly by alluvial fans, composed mainly of gravel from Carpathian sequences, with clayey-sandy sequences, drained by Odobești River Network, predominantly torrential, without terraces; 3. Frătești Ambiance is characterized by poorly consolidated, moderate paludal, more marshy than the Odobești Ambience terrain characterized by abundant gravel of Balkan, Pre-Balkan and Dobrogean origin, drained by Frătești River Network consisting predominantly of braided-anastomosed-meandering valleys, associated with torrential valleys without terraces; 4. Valah Ambiance is defined as a consolidated (firmly) and dry terrain drained by Valah River Network made up of straight terraced valleys.

1.2. Depositional ensemble (Fig. 3, 7, 9).

Existing information highlights (Stănoiu, 2006; 2007; 2008; 2012-2013) spatio-temporal sharing of the Pleistocene facies and ambiances (2.58 to 0.01 My) from the Valah Basin paleogeographic unit (suggested by Liteanu, 1961; Jipa, 1999), synthesized in a depositional assembly controlled tectonically, morphologically, environmentaly and climaticaly, with two main units: 1. A central

depositional unit, distal relative to the Carpathians and the Balkans (including Sub-Carpathians, Pre-Balkans, Dobrogea and Moldav Tableland), which represent the source area; 2. A marginal depositional unit, proximal compared with the morphological entities listed above, representing the source area. In the marginal depositional unit it outlines two subunits: 1. Northern marginal depositional subunit (Carpathian), proximal relative to the Carpathian regions (including the Sub-Carpathians) that constitute the source area; 2. Southern marginal depositional subunit (Balkan), proximal in relation to Balkan regions (including Pre-Balkans and Dobrogea Tableland) which were the source area. The connection between the northern marginal and southern marginal depositional subunits is achieved in the western part of the Valah Basin, in the concave region of Mehedinți Bend, in Bălăciței Piedmont.

Central depositional depressional unit overlaps the northern and north-eastern part of the Romanian Plain (including Siret Plain) which coincides with the Slatina-Titu-Măicănești-Focșani Perimeter of an intense subsidence, progressively amplified from west to east. Central depositional unit, especially Slatina-Titu-Măicănești-Focșani Perimeter represents a deposition region of the Valah Basin with Focșani Depression depositional centre where the rate of Pliocene-Quaternary subsidence is 0.86 km/My and the thickness of Badenian-Quaternary deposits exceeds 9000 m (Tărăpoancă, 2004; Tărăpoancă et al., 2003) and where Vrancea Valah Phase tectogenesis highlights highest intensity accompanied by thrusted tectonic structures (Valah Nappe). Northern marginal depositional subunit overlaps the Sub-Carpathian Piedmonts characterized (Zugrăvescu et al., 1998; 1999; 2000) by present up-lifting processes. Southern marginal depositional subunit overlaps the southern and north-eastern part of the Romanian Plain, adjacent to Pre-Balkans and Dobrogea Tableland.

Slatina-Titu-Măicănești-Focșani Perimeter was partially emphasized by Vâlsan (Vâlsan, 1916) as the divagation area, by Mihailescu (Mihailescu, 1937; 1947) as the area of subsidence, by Posea (Posea, 2002) as the Titu Subsidence Stripe etc.

General geological context reveals that in Ordessensian (~ 1.0 to 0.01 My) the Pleistocene depositional ensemble from the Valah Basin changed by the advance of the Dacic Ambience from the central depositional unit over Bucharest Perimeter (described by E. Liteanu, in 1952, under the name of Bucharest City Area) which in Buridavian time belonged to the southern marginal depositional subunit; this phenomenon fits in to the outward shift of the depositional units. Bucharest Perimeter, which in Buridavian time belonged to the central depositional unit (controlled by Dacic Ambience), can be interpreted as a subunit of the central depositional unit which in Ordessensian make the transition between typical southern marginal depositional subunit and the typical central depositional unit from Slatina-Titu-Măicănești-Focșani Perimeter.

The above-mentioned depositional assembly is shown also for Dacic (Moldav) Basin's Pliocene (Romanian) by: 1. The Motru-Vâlsan Member (Gravels) (argued by the information provided by: Liteanu & Feru, 1964; Saulea et

al., 1969; Mihăilă, 1971; Enache, 1976; Pană et al., 1981; Jipa & Olariu, 2009; Andreescu et al., 2011) that corresponds to the northern marginal depositional subunit; 2. Izvoarele Formation (Lubenescu et al., 1987), characterized by the abundance of sands and clays, which corresponds to the central depositional unit; 3. Traikovo Formation (Andreescu et al., in press, from Andreescu et al., 2011) defined by the abundance of gravels, which corresponds to the southern marginal depositional subunit.

Existing information (Saulea et al., 1969; Papaianopol et al., 1987; Jipa & Olariu, 2009) argues that the depositional ensemble of the Valah Basin characterize also the Moldav (Dacic) Basin. The central depositional unit of the Moldav Basin overlaps approximately the central depositional unit of the Valah Basin which has a smaller area. Southern marginal depositional subunit of the Moldav Basin is poorly highlighted. Northern marginal depositional subunit of the Moldav Basin is very extensive in all the tectono-stratigraphic units integrated in the Valah Nappe (up to Dacides Unit), and is represented by post-tectogenetic cover of the units with Moldav Tectogenesis, deformed as a result of Vrancea Valah Tectogenetic Phase. Regarding the equivalence of structural, morphological and depositional elements of Moldav Basin and structural, morphological and depositional elements of the foreland basin, might be appreciate that the northern marginal depositional subunit of the Moldav Basin corresponds to the wedge-top depositional area partially superimposing the orogenic prism of Moldav Nappe, the central depositional unit corresponds to the Foredeep depositional area placed to the Moldav Thrust's front and the southern marginal depositional subunit corresponds approximately to the forebluge depositional area marked by the flexure depicted by Săndulescu (Săndulescu, 1984).

1.3. Discontinuity moments (Fig. 3, 7, 9).

The evolution of Valah Basin during the Pleistocene highlight the existence of some tectonical, lithostratigraphical, environmental, climatic etc. discontinuity moments (Stănoiu, 2012-2013) correlated at global and regional scale, controlled predominantly by terrestrial and cosmic causes, which have contributed to the stratigraphic scale subdivisions proposed in this article: 1. Vrancea Valah Moment (Stănoiu et al., 2010a; 2010b) stated (Stănoiu, 2011-2012) at ~ 2.58 My at the boundary between the Pliocene (Romanian) and Pleistocene (Buridavian); 2. Focșani Pasaden Moment (Stănoiu et al., 2010a; 2010b) stated (Stănoiu, 2011-2012) at ~ 1.0 My at the boundary between Buridavian and Ordessensian; 3. Getic Pasaden Moment appreciated ~ 0.78 My in age, at the boundary between Vranceanian (~ 1.0 to 0.78 My) and Focșanian (~ 0.78 to 0.01 My); 4. Hierasus Moment (name suggested by the name of Siret Valley during Burebista and Decebal kings) said to ~ 0.01 My age at the boundary between the Pleistocene (Focșanian) and Holocene. It is noted the large scale of the lithostratigraphic, tectonic, climatic and environmental discontinuities corresponding to Focșani Pasaden Moment, especially of tectonic and climatic discontinuities corresponding to Vrancea Valah Moment, both very evident throughout the Paratethys region.

1.4. Litostratigraphy.

The lithostratigraphic assembly of Pleistocene (Buridavian-Ordessensian, ~ 2.58 to 0.01 My) from the Valah Basin described by Stănoiu (2012-2013) in an article published on 30.11.2012, overlap the above-mentioned depositional assembly, demonstrating that both have undergone a common tectonic, environmental, climatic and morphological control.

1.4.1. Central depositional unit (Fig. 3, 7, 8, 9).

Central depositional unit of the Valah Basin, characterized by a uniform lithology, clayey and sandy, without discordances, is located in two areas: 1. Slatina-Titu-Măicănești-Focșani Perimeter, characterized by the presence of a clayey-sandy lithology throughout Pleistocene (defined as Slatina-Titu-Măicănești Formation) and the highest subsidence in Romania strongly amplified from west to east; 2. Bucharest Perimeter, located in the surroundings of Bucharest City (Liteanu, 1952) is characterized by abundant clayey and sandy lithology (in Coconi-Mostiștea Group: Coconi and Mostiștea Formations) and the emergence of a typical conditions for central depositional unit (both Dacic Ambiance drained by Dacic River Network) since Ordessensian.

1.4.1.1. Slatina-Titu-Măicănești-Focșani Perimeter.

1.4.1.1.1. Slatina-Titu-Măicănești Formation (Stănoiu, 2006; 2007; 2012-2013) is represented by the clayey-sandy lithological sequence from Slatina-Titu-Măicănești-Focșani Perimeter, Pleistocene in age (Buridavian-Ordessensian, ~ 2.58 to 0.01 My, between the Vrancea Valah and Hierasus Moments), has an average thickness of about 300 m (increasing from west to east especially due to subsidence amplification in the same direction) and is situated by gradual lithological transition over Izvoarele Formation rocks (Romanian: Lubenescu et al., 1987) and under the alluvial rocks of the valleys belonging to the Valah Fluvial Network of Holocene age. The decrease from east to west of the Vrancea Valah Tectogenesis' intensity from the Carpathians Foredeep and the subsidence amplification from west to east for Slatina-Titu-Măicănești-Focșani Perimeter had some impact on Slatina-Titu-Măicănești Formation: 1. Thickness increase from west to east; 2. Occurrence in the western part of gravel intercalations; 3. Outlining of two juxtaposed lithostratigraphic subunits (Titu-Măicănești Member and Slatina-Titu Member).

1.4.1.1.1.1. Titu-Măicănești Member has an average thickness of about 300 m, consists of clays and sands, occurs in the eastern part (subsided) of the Slatina-Titu-Măicănești-Focșani Perimeter and it is placed, through gradual lithological transition, over Ialomița-Buzău Member's rocks (Izvoarele Formation) with similar lithology and under the rocks of the alluvial plain of Valah River Network' valleys.

1.4.1.1.1.2. Slatina-Titu Member occurs in the western part of Slatina-Titu-Măicănești-Focșani Perimeter. It is placed (through gradual lithological transition) over Jiu-Argeș Member's rocks (Izvoarele Formation, Romanian in age) with a relatively similar lithology, has an average thickness of 100 m and shows a

clayey-sandy lithology with gravels intercalations and with fossils of molluscs and mammals indicating (Andreeșcu et al., 2011) QM₁-QM₃ and MN16b-MN17 areas.

1.4.1.1.1.2.1. Lower Morunglav Beds are represented by the lower part of Slatina-Titu Member (highlighted in 63104-Dobrețu well and especially in 60160-Morunglav well) characterized by the abundance of gravels, poorly argued by Andreeșcu (Andreeșcu et al., 2011) as belonging to Frătești and Tetoiu Formations.

1.4.1.1.1.2.2. Upper Morunglav Beds are represented by the upper part of Slatina-Titu Member highlighted in the two wells mentioned above and characterized by a reduced percentage of gravels.

1.4.1.2. Bucharest Perimeter.

Bucharest Perimeter arose as a consequence of an enlargement to the south of the Dacic Ambience from Slatina-Titu-Măicănești-Focșani Perimeter over the distal edge of southern marginal depositional subunit at the beginning of Ordessensian as a result of Focșani Pasaden Tectogenetic Phase. The consequence of this phenomenon was the emergence of Coconi and Mostiștea Formations (Coconi-Mostiștea Group) controlled by the Dacic Ambience (characteristic for the central depositional unit) over the Frătești Formation controlled by Frătești Ambience (characteristic to the southern marginal depositional subunit).

1.4.1.2.1. Coconi-Mostiștea Group.

Coconi-Mostiștea Group, clayey and sandy, is represented by the Coconi and Mostiștea Formations.

1.4.1.2.1.1. Coconi Formation was defined by Liteanu (Liteanu, 1955) as the marly complex and was named Coconi Beds by Alexeeva (Alexeeva et al., 1983) and the Coconi Formation by Andreeșcu (Andreeșcu et al., 2011). Coconi Formation belongs to Vranceanian age (at least the lower part), is consecutive to Focșani Pasaden Moment (~ 0.1 My), it has a pelitic lithology, shows an average thickness of about 100 m (gradually increasing toward north to Slatina-Titu-Măicănești-Focșani Perimeter), it is placed (through gradual lithological transition) over Frătești Formation and under Mostiștea Formation, it is synchronous (at least the lower part) with Drincea-Olt Formation (specified at ~ 0.96 My, synchronous with QM₆), it contains molluscan fossils characteristic to QM₆ zone, distributed by no arguments to Copăceni Beds by Andreeșcu (Andreeșcu et al., 2011) and mammalian fossils (Rădulescu et al., 1907) which indicate the range from 1.1 to 1.0 My (Andreeșcu et al., 2011) for its age (Fig. 5).

1.4.1.2.1.2. Mostiștea Formation was defined by Liteanu (Liteanu, 1953), as the Mostiștea Sands, it was called Mostiștea Formation by Andreeșcu (Andreeșcu et al., 2011), it belongs, at least partially, to Focșanian age, it shows a sandy lithology, it has a thickness of about 50 m, it is located (by gradual lithological transition) over Coconi Formation, it contains a faunal association (Macarovic & Kennel, 1962; Munteanu, 2006) equivalent to QM₈ biozone situated beneath 0.13 My time-line (Andreeșcu et al., 2011). Frătești Formation (including Copăceni Beds), Coconi and Mostiștea Formations represent overlapping lithostratigraphic unit's characteristic to Bucharest Region located south of Chitila-Slobozia Linement, as was defined by Liteanu (Liteanu, 1952; 1953; 1955).

Shaping (Andreeescu et al., 2011; Fig. 2) these lithostratigraphic units north of the mentioned linement inside the monotonous clayey-sandy Slatina-Titu-Măicănești Formation from Slatina-Titu-Măicănești-Focșani Perimeter it is arbitrary and confusing.

1.4.2. Marginal depositional unit.

Marginal depositional unit's stratigraphic sequence shows a more heterogeneous lithology to stratigraphic sequence from the central depositional unit, with abundant gravels in Buridavian and two discordances controlled by Valah Vrancea Tectogenetic Phase and Focșani Pasaden Tectogenetic Phase. The Buridavian from the marginal depositional unit corresponds to Odobești-Frătești Group, characterized by the abundance of gravel and the Ordessensian corresponds to Drincea-Galați Group with dominant pelitic rocks represented by loess-paleosoil alternation (Craiova-Galați Formation: Focșanian) and red clay (Drincea-Olt Formation: Vrânceanian).

In the southern marginal depositional subunit to Odobești-Frătești Group corresponds Frătești Formation which is controlled environmentally by Frătești ambiance and is drained by Frătești River Network, and in the northern marginal depositional subunit to the above-mentioned group corresponds Odobești Formation controlled by Odobești Ambiance and drained by Odobești River Network. In Ordessensian, litofacial differences between southern and northern marginal depositional subunits diminish.

1.4.2.1. Southern marginal depositional subunit (Fig. 3, 7, 9).

In Buridavian, lithostratigraphic assembly of the southern marginal depositional subunit is defined by Frătești Ambiance drained by the Frătești River Network that controlled the formation of Frătești Formation deposits (which belongs to Odobești- Frătești Group) characterized by the abundance of gravels. In Ordessensian, lithostratigraphic assembly of the southern marginal depositional subunit is defined by Valah Ambience drained by the Valah River Network that control the formation of Drincea-Galați Group's deposit (Drincea-Olt and Craiova-Galați Formations) characterized by the red clay and by the alternation of loess-paleosoil. Description for almost all lithostratigraphic units from the southern marginal depositional subunit was included in the articles written by E. Liteanu (Liteanu, 1952; 1953).

It should be noted that the Bucharest Perimeter area (characterized by Coconi-Mostiștea Group) which in Buridavian belonged to southern marginal depositional subunit, has been integrated into the central depositional unit starting from Ordessensian by the invasion of Dacic Ambiance.

1.4.2.1.1. Odobești-Frătești Group.

In the southern marginal depositional subunit the Odobești-Frătești Group is represented by Frătești Formation.

1.4.2.1.1.1. Frătești Formation (including Vlădeni and Copăceni „Formations”).

Frătești Formation defined by Liteanu (Liteanu, 1952) as the Frătești Gravels was called Frătești Formation by Alexeeva (Alexeeva et al., 1983), shows

an average thickness of 150 m, it is controlled by Frătești Ambiance drained by Frătești River Network, it is represented predominantly by gravels of balkan, prebalkan and dobrogean origin, associated with sands and clays, which defines the Buridavian age (~ 2.58 to 1.0 My) in the southern marginal depositional subunit (balkan and subordinate prebalkan and dobrogean), is placed discordantly (as a result of Vrancea Valah Tectogenetic Phase) over rocks of different ages (including the Late Romanian) and supports discordantly Drincea-Olt Formation, specified at 0.96 My and concordantly Coccoci Formation, located within Bucharest Perimeter.

1.4.2.1.1.1.1. Vlădeni Member (Fig. 4).

Andreescu (Andreescu et al., 2011) separated Vlădeni Formation that highlights almost identical characteristics as Frătești Formation chronostratigraphically specified from ~ 2.58 My to 1.0 My (Stănoiu, 2012-2013). Vlădeni „Formation” it is located in the classic area of southern marginal depositional subunit (characterized by the Frătești Formation) between the Dobrogean Tableland in the east and the central depositional unit to north-west. Vlădeni „Formation” the same as Frătești Formation sits discordantly over rocks aged between Lower Aptian and Romanian. Northwest (toward the central depositional unit) thickness increases and clasts become finer, realizing the transition to rocks typically for the bottom of Copăceni-Coconi sequence (Andreescu et al., 2011), which actually belong to Titu-Măicănești Member of Slatina-Titu-Măicănești Formation. Vlădeni „Formation” supports discordant the red clay (Drincea-Olt Formation) of 0.96 My in age which in turn supports the alternation of loess-paleosoil (Craiova-Galați Formation) that develops between 0.92 to 0.01 My. Vlădeni „Formation” integrates completely in the lithostratigraphical sequence of southern marginal depositional subunit, occupying the typical place of Frătești Formation. Only the absence of conglomerates, replaced by coarse sandstones makes the only difference from Frătești Formation, what could possibly justify the use of the name of Vlădeni Member for the Frătești Formation.

1.4.2.1.1.1.2. Copăceni Beds (Andreescu et al., 2011) and Uzun Beds

(Alexeeva et al., 1983) represents lens-like sequences predominantly pelitic, present at the top of Frătești Formation characterized by the abundance of gravels (Fig. 5). Andreescu (Andreescu et al., 2011) admitted that Copăceni Beds may represent a new formation or a member of the Coconi Formation. Uncertainties on Copăceni Beds are determined by the gravel sequence F₄, located at the end of Frătești Formation (Andreescu et al., 2011), which gradually disappear north of central depositional unit (clayey-sandy) from Slatina-Titu-Măicănești-Focșani Perimeter. This situation made the pelitic rocks of the Coconi Formation to sit (by gradual lithological transition) over the pelitic rocks of Copăceni Beds. This finding allowed (Andreescu et al., 2011) as a specific molluscan fossils biozone QM₆, stationed in Coconi Formation, to be regarded as localized in Copăceni Beds which represents a pelitic seam on top of the Frătești Formation specified within ~ 2.58 to 1.0 My age interval. Consequently (Andreescu et al., 2011) it was possible to raise the age of Frătești Formation up to 0.8 My, above QM₆ biozone

without convincing arguments. General geological situation highlights (Stănoiu, 2012-2013) that the upper limit of the Frătești Formation is located at ~ 1.0 My because this formation supports discordantly Drincea-Olt Formation, specified at 0.96 My, synchronous to Leerdam Interglacial. In the region where the Coconi Formation is placed directly on Copăceni Beds (as a result of northern gradual disappearance of F₄ sequence of gravels), the upper limit of the Frătești Formation (defined by the presence and abundance of gravels) should stratigraphically scale down under 1.0 My and not to be younger than 0.8 My, as admitted by Andreescu (Andreescu et al., 2011).

1.4.2.1.2. Drincea-Galați Group (Fig. 3, 7, 8, 9).

There are arguments which justify the inclusion of Drincea-Olt and Craiova-Galați Formations in the great lithostratigraphical unity of Drincea-Galați Group: a. Drincea-Olt and Craiova-Galați Formations are controlled by Valah Ambiance; b. Drincea-Olt and Craiova-Galați Formations are represented by a relatively uniform lithology defined by the presence of clays and loess-paleosoil alternation; c. The gradual lithological transition between Drincea-Olt Formation and Craiova-Galați Formation highlighted only when the Craiova-Galați Formation starts at 0.92 My with Dorst Glacier; d. The equivalence of Drincea-Olt Formation with the oldest paleosoil sequence of Craiova-Galați Formation; e. The location of Drincea-Olt and Craiova-Galați Formations in Ordessensian, from ~ 1.0 to 0.01 My, consecutively after Focșani Pasaden Moment which marks a significant discontinuity. This discontinuity has multiple significance: 1. Tectonical, explained by the discordance, with a sedimentation gap between Drincea-Olt Formation and older rocks, including Odobești-Frătești Group; 2. Ambiental, evidenced by the shift from Odobești-Frătești Ambiance defining Odobești-Frătești Group to Valah Ambiance, defining Drincea-Olt and Craiova-Galați Formations; 3. Lithostratigraphical, revealed by the sudden shift from Odobești-Frătești Group defined by abundant gravels to Drincea-Olt and Craiova-Galați Formations characterized by clayey rocks and loess-paleosoil alternation; 4. Sequential, driven by the frequency shift from 0.041 My periodicity to 0.1 My periodicity evidenced by Müller and MacDonald in 2000 (Müller & MacDonald, 2000) (Fig. 6); 5. Climatic, marked by the beginning of a new general cooling of the climate argued by the presence of loess, by the curve of climatic evolution in the last three million years recorded by Müller and MacDonald (Müller & MacDonald, 2000, in figure 16), by the oxygen isotope scale presented by Husen and Reiner in 2011 (Husen & Reiner, 2011) for alpine glacier events, etc.

1.4.2.1.2.1. **Drincea-Olt Formation** (Stănoiu, 2007; 2008; 2012-2013). In the southern marginal depositional subunit, Drincea-Olt Formation (Ordessensian in age, controlled by the Valah Ambiance from the marginal depositional unit) does not appear starting from Ordessensian in the Bucharest Perimeter region which belongs to the central depositional unit (controlled by Dacic Ambiance).

Drincea-Olt Formation corresponds to the Basal Ordessensian, it has its onset around 1.0 My, it is consecutive to Focșani Pasaden Moment controlled by Focșani Pasaden Tectogenetic Phase specified at ~ 1.0 My (at the top of the

Jaramillo Event), it is represented predominantly by a red clay with ferromanganese concretions, it has an average thickness of about 10 m, it is specified at 0.96 My (Shelkoplias, 1983), it has an age older than 0.92 My, onset of Craiova-Galați Formation mentioned above (Shelkoplias, 1983), it is synchronous with Leerdam Interglacial and MIS₂₅, it is controlled by Dacic Ambiance and by Focșani Pasaden Climatic Moment, which is one of the most important periods of relatively warm and humid climate of the Pleistocene, subsequent to Focșani Pasaden Tectogenetic Phase specified at ~ 1.0 My (Stănoiu, 2012-2013), it sits discordantly over rocks of various ages, including over Frătești-Odobesti Group (Odobesti and Frătești Formations) aged between ~ 2.58 to 1.0 My (Stănoiu, 2012-2013).

It appears that the formation of Drincea-Olt Formation's deposits was controlled by timing between Focșani Pasaden Climatic Moment and Valah Ambiance emerged only a moment after Focșani Pasaden Tectogenetic Moment (~ 1.0 My) and prior to 0.92 My (onset of Craiova-Galați Formation) in Leerdam Interglacial, between Linge Glacial, corresponding to the upper sequence of Dobrogea-Frătești Group and Dorst Glacial, corresponding to the lower sequence of Craiova-Galați Formation, MIS₂₂ synchronous (Fig. 8, 9).

Drincea-Olt Formation, who never sits over rocks newer than Buridavian, is an excellent lithostratigraphic reference for the entire Paratethys region from Hungary to Ukraine.

Red clay with ferro-manganese concretions of Drincea-Olt Formation („The Red Clay”, name used by the peasants of Oltenia) can be confused with the red clay associated with paleosoil sequences from Craiova-Galați Formation and can be easily reworked in newer deposits, more particularly in the river terraces of the valleys belonging to Valah River Network.

1.4.2.1.2.2. Craiova-Galați Formation (Stănoiu, 2007; 2008; 2012-2013). Craiova-Galați Formation's debut said to be Dorst Glacier Event at 0.92 My (Shelkoplians, 1983), having the upper limit located at Hyerasus Moment (~ 0.01 My, at the beginning of the Holocene, when global warming has not been favorable to the formation of loess), it is controlled by a Valah Ambiance and by the onset (after the Focșani Pasaden Moment) of a period of colder climate (as in figure 16 in Müller and MacDonald, 2000), it is represented by an alternation of loess-paleosoil with subaerial and marsh gastropods (Sevastos, 1910; Liteanu, 1961; Enciu, 2007), it has a thickness of 70 m, with a heterochrone lower limit (Enciu, 2007), it is located over the rocks of various ages, including the red clay from Drincea-Olt Formation with which appear to merge into a single senior lithostratigraphical unit: Drincea-Galați Group, Ordessensian in age (~ 1.0-0.01 My), (Fig. 3, 7, 8, 9).

Gradual lithological transition (loess-paleosoil alternation at the begining of Dorst Glacier) between Drincea-Olt and Craiova-Galați Formations (which implies the existence of loess interlayeres at least in the upper part of Drincea-Olt Formation), and the confusion that can be made between the red clay of Drincea-Olt Formation and the red clays associated with paleosoil sequences of Craiova-Galați Formation could explain the age of 1.0 My attributed sometimes to the onset of Craiova-Galați Formation.

1.4.2.1.2.2.1. Panciu and Zăbrăuț lithostratigraphic subunits. In Craiova-Galați Formation there are (Stănoiu et al., 2010) two lithostratigraphic subunits with a very arbitrary boundary between them: 1. Panciu Subunit (Vranceanian), at the bottom; 2. Zăbrăuț Subunit (Focșanian) at the top (with frequent fluvial structures and sequences). Zăbrăuț Subunit is connected with river terraces belonging to present Valah River Network (including the Danube), which started at about the limit between Panciu Subunit and Zăbrăuț Subunit (Stănoiu et al., 2010), at ~ 0.78 My (Fedorov, 1978; Shapoval et al., 1994; Shapoval, 1996; Mușinschi, 1999; Andreescu et al., 2011), synchronous with the maturation of the Valah River Network's valleys (with terraces), consecutively after Danube capture in the Gorge which has resulted in an emergence of present Pannonian-Dacic Danube (Stănoiu, 2008). Zăbrăuț Subunit is synchronous with some important alpine glaciations, outlined by Husen and Reitner in 2011 (Gunz at MIS₁₆, Mindel at MIS₁₂, Riss at MIS₆, Wurm at MIS₂₋₄), which seems to confirm the relationship of determination between mountain ice ages and the main terraces of the valleys belonging to present Valah Fluvial Network.

Consequently to the Focșani Pasaden Tectogenetic Moment, Dacic Ambiance from Slatina-Titu-Măicănești-Focșani Perimeter invaded Bucharest Perimeter region. In Ordessensian Dacic Ambiance from Bucharest Perimeter began to gradually withdraw to the north into Slatina-Titu-Măicănești-Focșani Perimeter in a Prebalkan related region and to the west in Dobrogean related region. Simultaneously advance occurred in the same sense for the Valah Ambiance which controlled Drincea-Galați Group's deposit formation from southern marginal depositional subunit related to Prebalkans and Dobrogea. Thus, Valah Ambiance who controlled the formation of Drincea-Galați Group's deposits, reached the Slatina-Titu-Măicănești-Focșani Perimeter barely at the beginning of the Holocene when climatic warming and persistence until the end of the Pleistocene of intense palud Dacic Ambiance (unfavorable for loess formation) does not have allowed the formation of loess. This statement has several consequences: 1. The lack of loess in most of the Slatina-Titu-Măicănești-Focșani Perimeter; 2. Diachronic aspect of the lower limit of Craiova-Galați Formation (oldest on the proximal marginal depositional unit and newest in the distal edge); 3. Craiova-Galați Formation debut at different times; 4. Drincea-Olt Formation (discordant) often occurs as lenses placed over the basement of different ages and under Craiova-Galați Formation that starts at different times.

1.4.2.2. Northern marginal depositional subunit (Fig. 1, 2, 3, 7, 9).

The almost complete sequence of the lithostratigraphic entities belonging to northern marginal depositional subunit was excellent described by Mateescu (Mateescu, 1927) in the region situated between Putna and Râmnecul Sărat Valleys with the two, bottom and top, discordances bordering the Cândești Gravels (assigned to Levantine assigned then to Pliocene).

1.4.2.2.1. Odobești-Frătești Group.

In the northern marginal depositional subunit the Valah Basin starts with Odobești-Frătești Group (Buridavian) characterized by the abundance of gravels and is represented by Odobești Formation.

1.4.2.2.1.1. Odobești Formation (Stănoiu, 2012-2013). Odobești Formation represents the upper, discordant lithostratigraphical unit which was embedded in Cândești Beds (Mrazec & Tesseyre, 1901), it is characterized by the abundance of gravels with sands and clays sequences, it is controlled by Odobești Ambiance drained by Odobești River Network, has a thickness up to ~ 500 m (to the east), occurs predominantly in Sub-Carpathian Piedmonts between Trotuș and Danube Valleys and has the stratotype in Măgura Odobești Hill from the convexity of Vrancea Bend of the Carpathian Orogen.

Odobești Formation Lithon, which mostly represents the wedge-top depositional area of the Valah Basin (corresponding to the post-tectonic cover of the units with Valah Tectogenesis), develops in the external part of Sub-Carpathian in Sub-Carpathian Piedmonts as a quasi horizontal plate, slightly inclined to the external undeformed orogen, which sits more discordant over some tectonic structures and tectonostratigraphical units: 1. Over the overthrust plane of Valah Nappe from Soveja Unit; 2. Over the front of the Valah Nappe from Soveja Unit; 3. Over the deposits of Moldav Basin from Milcov Unit. Progressive decrease from east to west of the intensity of Valah tectogenesis from Western Carpathians Foredeep had several consequences over Odobești Formation it controlled: 1. Reducing the percentage of gravels in the same direction; 2. Reduction in thickness in the same direction; 3. Decrease in the same sense of Sub-Carpathian Piedmonts scale as well as the absence of this morphological units north of the Balkans; 4. Individualization of several lithostratigraphic subunits within Odobești Formation (Măgura Odobești Member, Perșunari Member, Tetoiu Member).

1.4.2.2.1.1.1. Măgura Odobești Member (Stănoiu, 2012-2013). Măgura Odobești Member has a very obvious discordant position (Fig. 3, 6, 7, 9; Photo. 1), it is representative for Odobești Formation, it occurs in the region of Buzău Valley and Trotuș Valley, it has the stratotype in Măgura Odobești Hill, it consists predominantly of sands and gravels associated with clays and shows a thickness of up about 500 m. Măgura Odobești Member's Lithon (and Odobești Formation's Lithon) has the form of a quasi horizontal plate, slightly inclined toward external part of the orogen, undistorted, which sits discordantly (Photo. 1) over different lithostratigraphic entities: 1. Over Motru Valley Formation's rocks consisting of Râmnă Member (Râmnă Formation) (Andreeescu & Țicleanu, 1977) corresponding to the lower part of Romanian and of Motru-Vâlsan Member (including Pralea Gravels with coal and mammals remnants) corresponding to the Upper Romanian (including Valahian) (Andreeescu et al., 2011); 2. Over Pleșcoi Beds rocks (Pană et al., 1968), referred to ~ 3.2 My, approximately at the Pelendavian-Valahian limit (Andreeescu et al., 2011); 3. Over Pliocene rocks from the Milcov Unit (including gravels from Pralea equivalent with Motru-Vâlsan Member and clayey-sandy rocks

of Meotian) that in front and below the overthrust plane of the Valah Nappe (Caşin-Jitia-Berca-Urlaţi Linement) are redressed to vertical and even reversed.

High frequency of conchoidal oblique lamination (Stănoiu et al., 2010) (Photo. 6, in Stănoiu et al., 2010), which argues large scale sediment gravity slides in plastic state (Photo. 2), resulted in an overstatement of the value of the Măgura Odobeşti Member's thickness and probably caused appreciation as which Cândeşti Gravels (assigned to Lower Pleistocene) underwent deformation controlled by Valah Tectogenesis arguing the lower postpleistocene age attributed for this tectogenesis.

1.4.2.2.1.1.2. Perşunari Member (Stănoiu & Istrate, in press). Perşunari Member has a thickness of about 50 m, it is represented by undeformed rocks (gravels, sands and clays with interlayered sands) and sits discordant over rocks intensely deformed (Old Styric, New Styric and Moldav Cycles) on the front of the Valah Nappe (located in Soveja Unit), which includes Moldav Nappe rocks (Old Styric and New Styric Cycles) and rocks from the posttectonic cover from units with Moldav Tectogenesis (Moldav Cycle). To Perşunari Member may belong too the alternation of sands, gravels and clays signalled by Liteanu (Liteanu et al., 1967) under the red pelitic complex of Teleajen and Prahova Valleys. Perşunari Member's Stratotype is located in the Perşunari village region (located in Tohăneanca Valley, a tributary on the left side of the Budureasca Valley) where sits discordant over intensely deformed (folded and faulted) Valah Nappe rocks from Soveja Unit, reaching over Istra Limestone (Kersonian) (Micu, 1976; 1978) reworking them.

1.4.2.2.1.1.3. Tetoiu Member. Tetoiu Member has been named by Andreescu (Andreescu et al., 2011) as the Tetoiu Formation, develops in the western part of the northern marginal depositional subunit (between Motru and Dâmboviţa Valleys), it is composed predominantly of sands and gravels, has an average thickness of 30-50 m, discordantly overlap the Motru Valley Formation rocks (Râmnă Member, clayey at the bottom and Motru-Vâlsan Member characterized by the abundance of gravels at the top) and is attributed to Romanian age, mostly described by Liteanu (Liteanu et al., 1976) and Mihăilă (Mihăilă, 1971).

1.4.2.2.1.1.4. Bălăciţa Member (Beds). The Bălăciţa Member (Beds) makes the transition between Odobeşti Formation characteristic for the Buridavian from the northern marginal depositional subunit and synchronous Frăteşti Formation belonging to the southern marginal depositional subunit. Bălăciţa Member (Beds) develop in the western end of the Valah Basin (in Bălăciţa Piedmont, in the concavity of Mehedinţi Bend), has an average thickness of about 30 m, sits discordant over ancient rocks and also supports the red clay of the Drincea-Olt Formation (Boengiu, 2008; Liteanu, 1978).

Evidence suggests that some of the old terraces of the main tributaries of the Danube valley from Valah Depression would represent remnants saved from erosion of Odobeşti Formation (Gravels) which extended toward internal part of Carpathian Orogen over Carpathian Foredeep's tectono-stratigraphic units prior of

the Vrancea Valah Tectogenetic Phase. Among these may be mentioned: 1. Terrace VI of Teleajen Valley called „Fântâna Rece Alluvial Level” (Niculescu, 1963), which supports red clay; 2. Gravels plated with lateritic red clays from southeast Vulcăneşti (Hanganu, 1966); 3. Discordant gravels flaps atop the Caşin Valley slopes, shown on the Geological Map of Romania, scale 1:50,000, sheet Caşin Monastery; 4. Discordant patch of gravels featured on Geological Map of Romania, scale 1:50,000, sheet Pucioasa south-east of the Glodeni town; 5. At least some gravel from Bran Hill (Posea, 2002); 6. The high terrace, plated with red clay, located on top of the left side of the Jiu Valley, upstream of Târgu Jiu town (I. Huică, verbal information), etc. In this regard there are several precedents: 1. Ionescu-Argetoaia (Ionescu-Argetoaia, 1918) acknowledged that discordant gravels representing the Odobeşti Formation belong to Danube alluvia; 2. Liteanu and Ghenea (Liteanu & Ghenea, 1953) attributed Odobeşti Formation's gravels to the Danube terraces; 3. Enciu (Enciu, 2007) acknowledged that the gravels that are now assigned to Odobeşti Formation belongs to the Lower Danube Formation; 4. Pécsi (Pécsi, 1982; Pécsi et al., 1984; Pécsi et al., 1988, in Gabris et Nádor, 2005) found that old terraces deposits of the Danube (t. VII and t. VIII) from Visegrád Gorge belong to a pediment or to a lacustrine and coastal-deltaic Pannonian, etc.

1.4.2.2.2. Drincea-Galaţi Group.

The Vranceanian from the northern marginal depositional subunit is represented by Drincea-Galaţi Group (Drincea-Olt and Craiova-Galaţi Formations) composed predominantly of red clay and loess-paleosoil alternation.

1.4.2.2.2.1. Drincea-Olt Formation (Stănoiu, 2007; 2008). Drincea-Olt Formation was discussed in chapter **1.4.2.1.2.1**. Red clay, the name under which it is known Drincea-Olt Formation, has been mentioned in the northern marginal depositional subunit region. Mateescu (Mateescu, 1927) mentions red clay (Lower Pleistocene) discordant over Cândeşti Beds (assigned in that time to Upper Levantine) from Putna and Râmnicol Sărăt Valleys region. Liteanu (Liteanu et al., 1971) describes the red clay (Middle Pleistocene) in Nişcov Valley and north of Râmnicol Sărăt Valley over Cândeşti Gravels and under loess deposits. Red deposits located over Tetoiu Member's rocks and under loess sequence are mentioned in the Getic Piedmont by Liteanu (Liteanu et al., 1976), Mihailă (Mihailă, 1971) and Parichi (Parichi, 2001). Red clay with ferro-manganese concretions appears well developed in Bălăciţa Piedmont, over Bălăciţa Member (Beds)'s rocks and under Craiova-Galaţi Formation's rocks described by Liteanu (Liteanu et al., 1973), Boengiu (Boengiu, 2008), etc.

1.4.2.2.1.1. Năianca Member (Stănoiu & Istrate, in press). Năianca Member consists of undeformed rocks represented by clays and sandy-clays with gravels (reddish in colour), it has a thickness of about 30 m and has the stratotype on Năianca Valley where sits discordant over the undistorted gravels of Perşunari Member, over the non-deformed rocks of Pietroasele Formation and over Istriţa Limestone, heavily distorted, belonging to the Soveja Unit (Valah Nappe), part of the wedge-top depositional area (overlapping orogenic prism of the blind Moldav

Nappe) from Moldav Basin (Dacic). Geological Map of Romania, scale 1:50,000, sheet Călugăreni, shows Năianca Member's rocks assign to the Upper Pleistocene (Riss-Würm). Also, Năianca Member probably should include the red pelitic complex rocks described by Liteanu (Liteanu et al., 1967) in Teleajen and Prahova Valleys region.

1.4.2.2.2.2. Craiova-Galați Formation. Craiova-Galați Formation was described in the southern marginal depositional subunit, in chapter 1.4.2.1.2.2.

1.4.2.2.2.2.1. Panciu Member and Zăbrăuț Member. In the eastern extremity of the northern marginal depositional subunit, in Focșani Depression (Stănoiu et al., 2010a), the two subdivisions of Craiova-Galați Formation (Panciu Member, Vranceanian in age and Zăbrăuț Member, Focșanian in age) appear well substantiated. Here it is a very obvious connection between the present Valah River Network valleys' terraces (Siret, Zăbrăuț, Şușița, Putna, Milcov) and the upper part of Craiova-Galați Formation (Zăbrăuț Member) as shown in Ghenea (Ghenea et al., 1971), Grumăzescu (Grumăzescu, 1973), Folea (Folea, 2006), Necea (Necea, 2010), etc.

1.4.2.2.2.2.2. Budureasca Member. In the eastern part of the northern marginal depositional subunit over Năianca Member's rocks (Drincea-Olt Formation) is emerging Budureasca Member (Stănoiu & Istrate, in press) of Craiova-Galați Formation, represented by a sequence of sands and clayey-sands with loess-like aspect, which allowed intercalations, sometimes lenticular, of clays and sandy-clays, gray-blackish, rarely reddish in colour. Budureasca Member, with a thickness of about 40-50 m, shows the presence of fluvial erosion channels represented by gravels. Budureasca Member would represent the transition between typical Craiova-Galați Formation controlled by Valah Ambiance (firm and dried ground) from northern marginal depositional subunit and Slatina-Titu-Măicănești Formation from central depositional unit.

1.4.2.2.2.3. Pietroasele Formation (Stănoiu & Istrate, in press). Pietroasele Formation is represented by colluvial deposits consisting of often reddish clays with Istrița limestone blocks (Kosovian), located over the limestone rocks mentioned and under Năianca Member rocks. Pietroasele Formation rocks, synchronous with Focșani Pasaden Tectogenetic Phase (~ 1.0 My), are shown on the Geological Map of Romania, scale 1:50,000, Istrița sheet, at the boundary between the Lower Pleistocene and Pliocene. The presence of reddish clays and Năianca Member rocks above suggests an age immediately after Focșani Pasaden Tectogenetic Phase specified at ~ 1.0 My.

1.5. Stratigraphic scale (Fig. 3, 7, 9).

Existing stratigraphic scales are very hard to use for the Valah Basin due to its scarcity of fossils (most often by their lack of) and the scarcity of information regarding the age of the Quaternary deposits. This finding has imposed the need for stratigraphic scales based on lithostratigraphic criteria as suggested by Ghenea (Ghenea, 1980).

After achieving a satisfactory overall spatial-temporal ordering of the lithostratigraphic units from the Valah Basin, a local stratigraphic scale of

Quaternary (Pleistocene, ~ 2.58-0.01 My) occur. The scale it is operable throughout the Paratethys region which shows a lithostratigraphical sequence almost identical to the Valah Basin. This stratigraphical scale is based on lithostratigraphic criteria completed with existing chronostratigraphic information and it is easy to use.

According to the stratigraphic scale seted (Stănoiu, 2012-2013), during the Pleistocene (~ 2.58-0.01 My) are outlined two subdivisions (Buridavian, ~ 2.58 My to 0.01 My and Ordessensian ~ 1.0-0.01 My) pegged to the three major discontinuity moments (Vrancea Valah Moment, Focșani Pasaden Moment and Hyerasus Moment). The boundary between the Pliocene (Romanian) and Pleistocene (Buridavian) is pegged to the Vrancea Valah Moment (~ 2.58 My), triggered by the Vrancea Valah Tectogenetic Phase marked by a lithological discontinuity between Odobești-Frătești Group and the lithostratigraphic units of Romanian from below and the discordance (angular stratigraphic deformation with sedimentation gaps) of Odobești-Frătești Group from the base (specified in the age range ~ 2.58-0.01 My), etc. The limit of Buridavian and Ordessensian is pegged by Focșani Pasaden Moment (~ 1.0 My), triggered by the Focșani Pasaden Tectogenetic Phase marked by the discordance (with sedimentation gap) from the base of Drincea-Olt Formation (red clay) and the lithological discontinuity between Drincea-Olt Formation (specified at 0.96 My) and Odobești-Frătești Group (specified in the age range ~ 2.58-1.0 My) from below. The limit between Pleistocene (Ordessensian, aged from ~ 1.0 to 0.01 My) and Holocene is punctuated by Hyerasus Moment (the name was suggested by the name of the Siret Valley during Burebista and Decebal kings time) marked by the cessation of loess formation (triggered by climate warming) and by the lithological discontinuity of Craiova-Galați Formation (consisting mainly of loess-paleosoil alternation) and alluvial plain rocks of present Valah River Network. The ~ 1.0 My isochrone, which corresponds to the Focșani Pasaden Moment, was considered by Steininger and Rögl (Steininger & Rögl, 1984) the limit of the Lower Pleistocene and Middle-Upper Pleistocene from the Mediterranean Area.

The Buridavian (name suggested by the Buridavensis province of Dacia under Burebista and Decebal kings) corresponds to Odobești-Frătești Group (Odobești and Frătești Formations). Ordessensian (name suggested by the Ordessensis province of Dacia under Burebista and Decebal kings, Ordessus being the name of Argeș River) corresponds to Drincea-Galați Group (Drincea-Olt and Craiova-Galați Formations, very obvious in Paratethys region) and Coconi-Mostiștea Group (Coconi and Mostiștea Formations) of Bucharest Perimeter.

The Ordessensian is likely to be divided into two subdivisions, bounded by Getic Pasaden Moment at ~ 0.78 My: 1. Vranceanian (name suggested by the Vrancea region); 2. Focșanian (name suggested by the city of Focșani). Vranceanian (~ 1.0 to 0.78 My) is pegged at the bottom of Focșani Pasaden Moment (~ 1.0 My) and the upper part is framed by Getic Pasaden Moment. Getic Pasaden Moment from ~ 0.78 My is marked by the appearance of terraces for the valleys from the Valah River Network and by the final capture of Danube at the

Gorge which resulted in the appearance of the present Pannonian-Dacic Danube. Focșanian is pegged to Getic Pasaden Moment (~ 0.78 My) at the bottom and Hyerasus Moment (0.01 My) at the top. In the marginal depositional unit the Vranceanian is represented by Drincea-Olt Formation and (at least partially) by the Panciu Member (Craiova-Galați Formation). In the central depositional unit the Vranceanian is represented by the median part of Slatina-Titu-Măicănești Formation (in Slatina-Titu-Măicănești-Focșani Perimeter) and (at least partially) by the Coconi Formation (Coconi-Mostiștea Group) of Bucharest Perimeter. In the marginal depositional unit the Focșanian is represented (at least partially) by the Zăbrăuț Member (Craiova-Galați Formation). In the central depositional unit the Focșanian is represented by the upper part of Slatina-Titu-Măicănești Formation (form the Slatina-Titu-Măicănești-Focșani Perimeter) and (at least partially) by the Mostiștea Formation (Coconi-Mostiștea Group) of Bucharest Perimeter.

Slatina-Titu-Măicănești Formation from the central depositional unit (Slatina-Titu-Măicănești-Focșani Perimeter) belongs to the Pleistocene (~ 2.58 to 0.01 My, Buridavian-Ordessensian).

Regarding the parallelization of molluscs-based biozone performed by Andreescu (Andreescu et al., 2011), the Buridavian corresponds to QM₁-QM₅ biozones; the Ordessensian corresponds to QM₆-QM₉ biozones, up to 0.01 My; the Vranceanian corresponds to QM₆ biozone; the Focșanian corresponds to QM₇-QM₉ biozones, up to 0.01 My, (Fig. 3, 7, 8, 9).

It is found that the stratigraphic scale proposed by Andreescu (Andreescu et al., 2011), based on molluscan biozones, does not work in the Dacic Basin (characterized by scarcity of fossils and often by their absence) because the boundaries between the chronostratigraphic subdivisions do not coincide with the boundaries between the lithostratigraphic units outlined.

Stratigraphic scale proposed in this article, based on lithostratigraphic criteria (supplemented by chronostratigraphic, tectonic, climatic and biostratigraphic information) is operational in most of the Paratethys region, from Hungary to Ukraine, been characterized by lithostratigraphic units almost identical to the Valah Basin and framed by the three very obvious discontinuity moments.

The Valah Moment (~ 2.58 My) finds its counterpart in the lower part of the Beds with Paludine and the Lower Complex of Danube Series from the Pannonian Basin, which shows in the marginal depositional units a discordant position and a coarse detrital lithology (Krstic et al., in Papaianopol et al., 2003; Buday, 1962; Holouzka & Minarikova, 1977) similar to Odobești-Frătești Group, Buridavian in age. Drincea-Galați Group (Drincea-Olt and Craiova-Galați Formations), Ordessensian in age, shows an identical lithology and a very large spread in almost all Paratethys region, from Hungary to Ukraine. Odobești-Frătești Group from the Valah Basin, which defines the Buridavian, has an equivalent in the Upper Beds with Paludine, rich in psephitic sequences attributed to Eo-Pleistocene (Krstic et al., in Papaianopol et al., 2003) and the Lower Complex of the Danube Series assigned to the Lower Pleistocene (Buday, 1962; Holouzka & Minarikova, 1977). Drincea-Galați Complex (Drincea-Olt Formation represented

by red clay and Craiova-Galați Formation represented by loess-paleosoil alternation) defining Ordessensian and also Focșani and Hyerasus Pasaden Moments are very evident throughout the Paratethys region. The Upper Complex of the Danube Series (Holouzka & Minarikova, 1977) correlates: with Drincea-Galați Complex, with Coconi-Moșteea Complex, with the upper part of Slatina-Titu-Măicănești Formation, partially (upper equivalent part of Zăbrăuț Member) with the terraces of the valleys belonging to the present Valah River Network (including the present Pannonian-Dacic Danube: Stănoiu, 2008; 2012-2013; Stănoiu et al., 2010a; 2010b) from the Valah Basin, with the terraces of the valleys from the (present) „Valah” River Network of the Pannonian area and with the upper clayey-sandy part, without discordances, of Pannonian-Pleistocene age, from the central depositional units (depressions) from the Pannonian Basin.

1.6. The evolution of the Valah Basin.

In the median part of the Dacian occurred the fluvial continentalization of the Moldav Basin (Olariu & Jipa, 2009) dominated by Dacic Ambiance, drained by Dacic River Network, which resulted in the formation of the very palud Dacian-Romanian Plain on the territory of Sub-Carpathian, Carpathian Piedmonts and Romanian Plain. The consequence of this ambient was the emergence of Jiu-Motru Group (Jiu-Motru Formation: Andreescu & Țicleanu, in Andreescu et al., 1984), Parscovian-Romanian in age, predominantly clayey-sandy with coal and a heterogeneous lithology. In the central, intensely subsiding, depositional unit (Foredeep depositional area) the Dacic Ambiance continued until the early Holocene, favoring shaping of the Slatina-Titu-Măicănești Formation, typical for the Pleistocene from the Valah Basin, located over Izvoarele Formation (Romanian) and under the alluvial plain (Holocene) of Valah River Network's valleys (recent).

Amplification of tectonic processes, controlled by Vrancea Valah Tectogenetic Phase (specified at ~ 2.58 My), had several consequences: 1. Formation of Valah Nappe; 2. Triggering Valah Basin's formation; 3. Sub-Carpathians and Carpathian territories up-lifting synchronous with the subsidence of central depositional unit; 4. The abundance of gravels in the Odobești-Frătești Group (obviously discordant) which marks the onset of Valah Basin; 5. The obvious deformation, as a result of Vrancea Valah Tectogenetic Phase, of the Miocene-Pliocene deposits from the Valah Nappe which include Moldav Nappe deposits assigned to Old Styric and New Styric cycles and also the posttectogenetic covering deposits from the units with Moldav Tectogenesis assigned to Moldav Cycle.

Sub-Carpathian Piedmonts appearance (in accelerated expanding outwards) and the Frătești Ambiance imposed as between Sub-Carpathian Piedmonts and Pre-Balkans to emerge the Buridavian in age Romanian Plain with two subdivisions: 1. Dacic Buridavian Romanian Plain (controlled by Dacic Ambiance) superimposed to the central depositional unit, which is a very paludal low alluvial meadow; 2. Frătești Buridavian Romanian Plain (controlled by Frătești Ambiance)

superimposed to southern marginal subunit which represents a moderate paludal, relatively high alluvial plain.

Buridavian Romanian Plain areal reduction as a result of Sub-Carpathians Piedmonts extending outward (partially completed), determined as beginning with Ordessensian, synchronous to Focșani Pasaden Tectogenetic Phase (referred to ~ 1.0 My), to outline the Ordessensian Romanian Plain (superimposed about present Romanian Plain) with two subunits: 1. Dacic Subunit controlled by Dacic Ambiance superimposed to central depositional unit (Slatina-Titu-Măicănești-Focșani and Bucharest Perimeters); 2. Valah Subunit controlled by Valah Ambiance superimposed to southern marginal depositional unit. The Valah Subunit of the Ordessensian Romanian Plain shows a continuous extension to the north and west to central depositional unit imposed by the extension in the same sense of the Valah Ambience, with the simultaneous gradually reduction of the Dacic Subunit's areal controlled by the retreat in the same sense of the Dacic Ambience. Thus, it was in the early Holocene to complete the Valah Romanian Plain (present) controlled entirely by the Valah Ambiance and drained by Valah River Network (present).

The importance of the Focșani Pasaden Tectogenetic Phase specified at ~ 1.0 My, at the boundary between Buridavian and Ordessensian ages, well highlighted in the Valah Basin and throughout the Paratethys region (by the discordant position of the Drincea-Olt Formation over rocks of various ages, including the Romanian) imposed shaping the Valah Cycle (corresponding to Valah Moment (~ 2.58 My) and Focșani Pasaden Moment (~ 1.0 My); 2. Ordessensian Subcycle placed between Focșani Pasaden Moment (~ 1.0 My) and Hyerasus Moment (~ 0.01 My) at the boundary between the Pleistocene and Holocene.

Consequently, in the Sub-Carpathian Piedmonts development, during Valah Cycle (corresponding to the Valah Basin), are also outlined two subcycles: 1. Buridavian Subcycle (~ 2.58 to 1.0 My), triggered by the Vrancea Valah Tectogenetic Phase, characterized by a rapid piedmont accumulation net represented predominantly by Odobești Formation gravels; 2. Ordessensian Subcycle (~ 1.0 to 0.01 My), triggered by the Focșani Pasaden Tectogenetic Phase and controlled by a predominant glaciis-type accumulation, represented predominantly by clays, sands and loess-paleosoil alternation characteristic to Drincea-Galați Group (Drincea-Olt and Craiova-Galați Formations).

CONCLUSIONS

Stratigraphy of the Valah Basin (Pleistocene) with biostratigraphic arguments.

The Valah Nappe formed by the Vrancea Valah Tectonogenetic Phase (~ 2.58 My), is very obvious (Stănoiu, 2012-2013) in the Vrancea Bend area along a distance of over 100 km between the Trotuș and the Teleajen valleys. This tectonic structure, which favoured the formation of some hydrocarbon deposits, is

argued by the (severely warped) Miocene-Pliocene overthrust deposits of the Soveja Unit (inclusive of the gravels of the Motru-Vâlsan Member situated in the upper part of the Romanian) overlapping the synchronous deposits (warped only under the Valah Plane ($\sim 45^\circ$ surface dip towards the orogene inside) is very well outlined by the Caşin-Jitia-Berca-Urlaţi Linement sealed (unconformably covered) by Valah Basin deposits that begin with the Odobeşti Formation gravels (Pleistocene, Buridavian, $\sim 2.58\text{-}1.0$ My).

The Valah Basin (Pleistocene: Buridavian-Ordessensian, $\sim 2.58\text{-}0.01$ My), subsequent to the Valah Nappe, was formed by the Vrancea Valah Tectonogenetic Phase.

The Moldav Basin (Dacic Basin: Saulea et al., 1969), Upper Sarmatian-Pliocene, subsequent to the Moldav Nappe (Sub-Carpathian Nappe: Săndulescu, 1984), is the outcome of the Moldav Tectonogenetic Phase.

It was estimated that the deposits of the Pleistocene from the Dacic Basin emphasizes four more important environments: 1. Dacic Environment represented by a very paludal, unconsolidated field, of a low fluvial plain type, drained by woven-anastomosed-meandered valleys, without terraces, of the Dacic Fluvial Network; 2. Valah Environment represented by a consolidated, dry field, drained by the straight valleys, with terraces of the Valah Fluvial Network; 3. Odobeşti Environment represented by a moderate consolidated field, moderately paludal, drained by predominantly torrential valleys of the Odobeşti Environment; 4. Frăteşti Environment represented by a moderate consolidated field (less consolidated compared to the one of Odobeşti Environment), moderately paludal (more paludal compared to the one of Odobeşti Environment), of a high fluvial plain type, drained by woven-anastomosed-meandered predominantly valleys and by subordinated torrential valleys, without terraces of the Frăteşti Fluvial Network.

Spatial and temporal distribution of environments and facies, controlled morphologically, tectonic and climatic, is classified in a depositional system with two important units: 1. Marginal depositional unit, proximal to the Carpatho-Balkan Chain; 2. Central depositional unit, distal to the Carpatho-Balkan chain. Within the marginal depositional unit two more important subunits are defined: a) northern marginal depositional subunit (Carpathian), proximal to the Carpathians; b) southern marginal depositional subunit (Balkan and Dobrudjan subordinated), proximal to the Balkans (subordinated to Pre-Balcan and Dobrudja). Within the Ordessensian two more important units are defined: Ordessensian Marginal Unit and Ordessensian Central Unit (Slatina-Titu-Măicăneşti-Focşani Perimeter and Bucharest Perimeter).

The evolution of Dacic Basin during the Pleistocene emphasizes four important moments of tectonic, climatic, environmental lithostratigraphic, biostratigraphic discontinuity (the Vrancea Valah Moment, specified at ~ 2.58 My; Focşani Pasaden Moment, specified at ~ 1.0 My; Getic Pasaden Moment, specified at ~ 0.78 My; Hierasus Moment, specified at ~ 0.01 My), which can be correlated at regional and global scale.

A stratigraphic scale drawn up on lithostratigraphic criteria, filled with the other information was proposed. This is because existent stratigraphic scales are inoperable given the insufficiency of chronostratigraphic information and continental environments characterised by rarity and most of the times, by lack of fossils.

The Buridavian is situated between the Vrancea Valah Moment and the Focşani Pasaden Moment and the Ordessensian is situated between the Focşani Pasaden Moment and the Hierarus Moment. 1. The Ordessensian is divided in two stages: Vraneanian, between the Focşani Pasaden Moment and the Getic Pasaden Moment; 2. The Focşanian, between the Getic Pasaden Moment and the Hierasus Moment.

The marginal depositional unit is characterised by a very heterogenous lithostratigraphy and by two important discordances controlled by the Vrancea Valah Tectogenetic Phase and the Focşani Pasaden Tectogenetic Phase. Here, the Buridavian is represented by Odobeşti-Frăteşti Group (~ 2.58-1.0 My), discordant is defined by the predominance of gravel, it discordantly supports Drincea-Olt Formation (red clay, specified at 0.96 My) and is represented by two more important lithostratigraphic units: 1. Odobeşti Formation is characteristic to northern marginal depositional subunit and is controlled by Odobeşti Environment; 2. Frăteşti Formation is characteristic to the southern marginal depositional subunit and is controlled by Frăteşti Environment. In the northern marginal depositional subunit and on the distal margin of the southern marginal depositional unit, Ordessensian is represented by Drincea-Galaţi Group, spread in the entire region of Paratethys, controlled by the Valah Environment and is composed of two lithostratigraphic units: 1. Drincea-Olt Formation (red clay with ferruginous and manganese concretions), situated discordantly on rocks of different ages (including over Buridavaian Terminal), specified at 0.96 My, corresponding to Leerdam Interglacial, placed approximately in the 1.0-0.93 My interval, controlled by the Valah Environment and the Focşani Pasaden Climatic Moment (warm and relatively wet climate, immediately subsequent to the Focşani Pasaden Tectogenetic Moment); 2. Craiova-Galaţi Formation is composed of the loess-paleosol alternation, it emphasizes the inferior heterochronic limit, has the beginning specified at 0.92 My, is situated approximately in the 0.92-0.01 My interval and is likely to be divided in two lithostratigraphic units: a) the Panciu Member, corresponding to Vraneanian, approximated in the 0.1-0.78 My interval; b) Zăbrău Member, corresponding to the Focşanian (~ 0.78-0.01 My), synchronous to the four important alpine glaciations (Günz, Mindel, Riss, Würm), synchronous to the terraces of the Valah Fluvial Network valleys that began at ~ 0.8 My, together with the finalisation capture of the Danube from the Gorge and with the formation of Panono-Dacic Danube (present).

In the central depositional unit, overlapping the Slatina-Titu-Măicăneşti-Focşani Perimeter (intensely subsiding), Buridavian-Ordessensian is represented by a single major lithostratigraphic unit (Slatina-Titu-Măicăneşti Formation, which highlights transitions at all lithostratigraphic entities from the marginal depositional unit), characterized by a uniform lithology (predominantly clayey and sandy),

without discordances, controlled by a Dacic Environment, divided into two lithostratigraphic entities: 1. Clayey and sandy Slatina Member with gravel intercalations, located in the Western side of the Romanian Plain; 2. Titu-Măicănești Member, net predominantly clayey and sandy, with larger thicknesses located in the more subsiding Eastern side of the Romanian Plain. In the central depositional unit, on the Bucharest Perimeter overlapping the distal margin of the southern marginal subunit, Ordessensian is represented by two more important lithostratigraphic units controlled by the Dacic Environment: 1. Pelitic Coconi Formation, situated over Frătești Formation, argued from a paleontological point of view for the ~ 1.0-0.8 My interval, probably equivalent to the Vranceanian; 2. Sandy Mostiștea Formation, situated over the Coconi Formation, argued from a paleontological point of view for the superior part of the Ordessensian, probably equivalent to Focșanian.

During the Ordessensian, a progress of the Valah Environment (together with the Craiova-Galați formation controlled by it) was noticed from the distal margin of the Southern marginal subunit, towards the central depositional unit, concomitant with the withdrawal, in the same direction, of Dacic Environment, resulting in diachronism of the inferior limit of the Craiova-Galați Formation and the absence of the loess in most of the central depositional unit.

The existence of two important tectogenetic moments emphasized though corresponds to several lithostratigraphical units set out by well-defined discontinuity moments in the entire Paratethys habitat.

The existence of two important tectogenetic moments emphasized though differences has been noticed, in the entire marginal depositional unit: 1. The Vrancea Valah Tectogenetic Moment is specified at ~ 2.58 My, at the limit of Pleistocene (Buridavian) and Pliocene (Romanian) and it is very well emphasized at the contact between the Sub-Carpathian Piemonts and the Sub-Carpatians where it's marked through a very clear difference, materialized though a very important deformational discontinuity: the rocks of the Odobești Formation, which appear as a quasi-horizontal plate, are laying discordantly over the Miocene and Pliocene rocks, highly deformed (wrinkled, fissured, often reaching a vertical position); 2. The Pasaden Focșani Tectogenetic Moment is specified at ~ 1.0 My, at the limit between Buridavian and Ordessensian and it is very well marked through the discrepancy between the rocks of Drincea-Olt Formation and the rocks of older lithostratigraphical units.

It has been considered (against international recommendations) that the name, „Cândești Beds (Gravels)” (sensu Mrazec & Tesseyre, 1901) could eventually be preserved as the Lithogroup (Gravels) Cândești with the meaning of comprehensive lithostratigraphical supra-unity in which two lithostratigraphical overlaid units are included, very different from each other: 1. The Odobești Formation (Gravels) belongs to the Buridavian, it is divided into several lithostratigraphical sub-units (Odobești Măgura Member, Perșunari Member, Tetoiu Member), covered discordantly by the Drincea-Olt Formation, specified at 0.96 My and appears in the Sub-Carpathian Piedmonts between Siret and Danube as a

continuous plate, very little deformed (slightly wavy and fissured), very clearly different over the Miocene and Pliocene deposits (including the Motru-Vâlsan Rocks), from the Sub-Carpathian, more heavily deformed; 2. The Motru-Vâlsan Member (Gravels) which belongs to the superior side of the Romanian heavily deformed in the Sub-Carpathians. The Motru-Vâlsan Member lays (through progressive lithologic transition) over the Râmna Member (Râmna Formation: Andreescu & Țicleanu, 1977; including the Pleșcoi Beds, specified at 3.2 My), predominantly sandy-clayey and fossiliferous. Both (the Motru-Vâlsan and Râmna Members) belong to the Motru Valley Formation (Romanian). It must be mentioned that Andreescu (Andreescu et al., 2011) defined the Cândești Formation by correlating the Motru-Vâlsan Member (Gravels, Romanian Terminal), from the West side of the northern marginal depositional sub-unit with the Odobești Formation (Gravels; Pleistocene, Buridavian) from the east side of the northern marginal depositional sub-unit.

SELECTIVE REFERENCES

- ANDREESCU I., 1971 - *Contribuții la stratigrafia Dacianului și Romanului din zona de curbură a Carpaților Orientali*. D. S. S. Inst. Geol. București. **LVIII**, 4: p. 131-155.
- ANDREESCU I., 1982 - *Biocronologia și biostratigrafia Pliocenului superior și Pleistocenului inferior din Bazinul Dacic*. An. Univ. Buc., Geol. București. **XXXI**: p. 55-66.
- ANDREESCU I., 1983 - *Biochronology and Chronostratigraphy of the Upper Pliocene and Lower Pleistocene in the Dacic Basin*. An. Ins. Geol. Geofiz. București. **59**: p. 153-160.
- ANDREESCU I., CODREA V., ENACHE C., LUBENESCU V., MUNTEANU T., PETCULESCU A., STUCA E., TERZEA E., 2011 - *Reassessment of the Pliocene/Pleistocene (Neogene/Quaternary) boundary in the Dacian Basin (Eastern Paratethys), Romania*. Muz. Olteniei, Craiova. Oltenia. Stud. Com. St. Nat. Craiova. **27(1)**: p. 197-220.
- BADEA L., 2000 - *Morfologia villafranchiană*. Anal. Univ. Spiru Haret. Geogr. București. **3**: p. 15.
- BADEA L., NICULESCU G., SENCU V., 1976 - *Harta geomorfologică, sc. 1:1000.000*, Atlas R. S. România. Edit. Acad. Rom. București.
- BARBARA M. A., THOMPSON R., (eds.), 2005 - *Quaternary Climates. Environments and Magnetism*. Cambridge University Press. Cambridge.
- BĂLESCU S., LAMANTE M., MERCIER N., HUOT S., BĂLTeanu D., BILLARD A., HUS J., 2003 - *Luminescence chronology of Pleistocene loess deposits from Romania: testing methods of age correction for anomalous fading in alkali feldspars*. Quaternary Science Review. **22**: p. 967-973.
- BOENGIU S., 2008 - *Piemontul Bălăciței. Studiu geografic*. Edit. Univ. Craiova.
- CODREA V., 1998 - *Geologia Cuaternarului - Noțiuni de bază*. Cluj-Napoca. p. 233.
- ENCIU P., 2007 - *Pliocenul și Cuaternarul din vestul Bazinului Dacic*. Edit. Acad. Rom. București. p. 228.
- GHENEÀ C., BANDRABUR T., MIHĂILĂ M., GHENEÀ A., GIURGEA P., 1971 - *Harta Cuaternarului din România, sc. 1:1.000.000*; folio no. 2 from *Atlasul Geologic*. Inst. Geol. București.

- GRADSTEIN F. M., OGG J. G., SMITH A. G. (eds.), 2004 - *A geologic time scale*, 2004. Cambridge University Press. Cambridge. p. 589.
- HUSEN van D., JÜRGEN R. M., 2011 - *An Outline of the Quaternary Stratigraphy of Austria*. Quaternary Science Journal. **60**, 2-2: p. 366-387.
- IORDANOVA D., HUS J., GEERAERTS R., 2007 - *Paleoclimatic implications of the magnetic record from loess-paleosol sequence Viatovo (N. E. Bulgaria)*. Geophys J. Int. **171**: p. 1036-1047.
- IOVANOVIC M., HAMBACH U., GAUDENI T., MARCOVIC G., 2010 - *Stratigraphy of the Loess-Paleosol Sequences (LPSS) of Voivodina*. Congr. Geol. Serb. Belgrade. p. 93-97.
- JIPA D. C., OLARIU C., 2009 - *Dacian Basin, depositional architecture and sedimentary history of Paratethys Sea*. Ge-Eco-Marina. Spec. Publ. Bucureşti. **3**: p. 264.
- KOVACS J., 2006 - *Wind-blown origin of the Neogene red clay in the Panonian Basin*. Int. J. Earth. Sci. (Geol. Rundsch). p. 171-178.
- LITT T., SCHMINCKE H. U., FRECHEN M., SCHLÜCHTER CH., 2008 - *Quaternary*; p. 1287-1347. In: Mc Can T. (ed.) *The geology of Central Europe: Mesozoic and Cenozoic*. Chapter 20, vol. **2**. Geol. Soc. of London.
- LITEANU E., 1952 - *Geologia Oraşului Bucureşti*. Comitetul Geologic. Seria E. Studii Tehnice şi Economice. Bucureşti. **1**: p. 3-77.
- LITEANU E., 1953 - *Geologia ţinutului de câmpie din bazinele inferioare ale Argeşului şi a teraselor Dunării*. Comitetul Geologic. Seria E. Studii Tehnice şi Economice. Bucureşti. **2**: p. 5-78.
- LITEANU E., 1961 - *Despre limita Terziar - Cuaternar în Depresiunea Valahă*. Comitetul Geologic. Seria E. Studii Tehnice şi Economice. Bucureşti. **5**: p. 65-108.
- LITEANU E., GHENEA C., 1966 - *Cuaternarul din România*. Comitetul Geologic. Seria H. Studii Tehnice şi Economice. Bucureşti. **1**: p. 1-119.
- MARKOVIC B. S., HAMBACH U., STEVENS T., KUKLA J. G., HELLER F., MCCOY D. W., OCHEA A. E., BUGGLE B., ZÖLLER L., 2011 - *The last million years recorded at the Stari Slanlamen (Northern Serbia) loess-paleosol sequence: revised chronostratigraphy and long-term environmental trends*. Quaternary Science Reviews; iss. 9-10, vol. **30**: p. 1142-1154.
- MATEESCU Șt., 1927 - *Cercetări geologice în partea externă a curburii sud-estice a Carpaţilor Români*. An. Inst. Geol. Bucureşti. **XII**.
- McCANN T., 2008 - *The geology of Central Europe: Mesozoic and Cenozoic*. The Geol. Soc. of London. **2**: p. 736.
- MIHAILĂ N., 1971 - *Stratigrafia depozitelor Pliocene între Valea Oltului şi Valea Vâlsanului (sectorul Râmnicu Vâlcea - Curtea de Argeş - Vâlsăneşti)*. Studii Tehnice şi Economice. Seria J. Stratigrafie. Institutul Geologic Bucureşti. **7**: 1-145.
- MÜLLER A. R., MAC DONALD J. G., 2008 - *Ice Ages and Astronomical Causes. Data, spectral analysis and mechanisms*. Published in association with Praxis Publishing. Springer.
- PANAIOTU C., PANAIOTU E., GRAMA A., NECULA C., 2001 - *Paleoclimatic record from loess-paleosol profile in Southern Romania*. Phys. Chem Earth (A). **26**: p. 893-898.
- PANAIOTU C. E., BĂLESCU S., LAMANHE M., PANAIOTU C. G., GRAMA A., 2004 - *Astronomical and luminescence dating of Lower Danube loess (Romania)*. Geophysical Research Abstract. Vol. **6**. EGU 04-A-02900-1.

- PAPAIANOPOL I., et al., 2003 - *Chronostratigraphie and neostratospes*. Romanian. Edit. Acad. Rom. Bucureşti.
- PHILIP L., GIBBARD P. L., MARTIN J., HEAD M. J., 2010 - *Formal ratification of the Quaternary System/Period and the Pleistocene Series/Epoch With a base at 2.5 Ma*. Walked and the Subcommission an Quaternary (2010). Journal of Quaternary Science. **25 (2)**: p. 26-102.
- POSEA Gr., 2002 - *Geomorfologia României*. Ed. Fundației România de Mâine, Bucureşti. p. 443.
- SARTOTRI M., 2000 - *The Quaternary climate in loess sediments: Evidence from rock and mineral magnetic and geochemical analysis*. PhD Thesis, Eidgenössische Technische Hochschule. Zürich. p. 231.
- SAULEA E., POPESCU I., SĂNDULESCU J., 1969 - *Atlas litofacial. VI-Neogen*, 1:200000. 11 maps, 2 plates. Inst. Geol. Bucureşti.
- SCOTT A. E., (editor-in-chief), 2007 - *Encyclopedia of quaternary science*. Elsevier. Amsterdam. p. 2600.
- SHLKOPLIAS N. V., 1983 - *The loess formacion in Ukraine*. TL - data.
- STĀNOIU I., 2006 - *Aspecte ale geologiei și geomorfologiei Cuaternarului din Muntenia și din Oltenia*. Argesis. Stud. Com., Ser. Șt. Nat. Pitești. **XIV**: p. 5-25.
- STĀNOIU I., 2007 - *Aspects of the Quaternary geology and geomorphology in the Walachian Depression-Drobeta*. Drobeta. Ser. Șt. Nat. Muz. Reg. Porților de Fier. Drobeta Turnu Severin. **XVII**: p. 38-64.
- STĀNOIU I., 2007 - *Aspects of the Quaternary geology and geomorphology in the Walachian Depression*. An. Univ. de Vest din Timișoara. Ser. Geografie. Timișoara. **XVII**.
- STĀNOIU I., 2008 - *The Danube evolution in the geologic and geomorphologic context of the vallachian depression*. Drobeta. Ser. Șt. Nat. Muz. Reg. Porțile de Fier. Drobeta Turnu Severin. **XVIII**: p. 38-43.
- STĀNOIU I.,ISTRATE C., SACRIERU P., 2010 - *Geological and geomorphological aspects of the Quaternary in the Focșani Depression*. Nota Conf., Geol. Soc. of Rom. Fac. Geol. Geophys. GeoEcoMar. Bucureşti.
- STĀNOIU I., FLOROIU I.,ISTRATE C., 2010 - *Aspecte geologice și geomorfologice ale Cuaternarului din regiunea Adjud-Buzău-Urlați cu argumente în favoarea amplificării fenomenului de diopirism din Subcarpați, sincron Tectogenezelor Moldavă, Valahă și Pasadenă*. Asociația Salinară Carol Crăciun. Revista Sării no. 6. Slănic Prahova.
- STĀNOIU I., 2012-2013 - *Aspecte ale geologiei și geomorfologiei Cuaternarului din Bazinul Dacic și implicații asupra diapirismului sării din Subcarpați* (apărută la 30.11.2012). Revista Sării no. 7-8. Asociația Salinară Carol Crăciun. Slănic Prahova. 2012-2013.
- THAMO-BOZSO E., MURRAY A., NADOR A., MAGYARI A., BABISZKI E., 2006 - *Investigation of river network evolution using luminescence dating and heavy mineral analysis of Late-Quaternary fluvial sands from the Great Hungarian Plain*. Quaternary Geochronology. **2**: p. 168-173.
- ZUGRĂVESCU D., POLONIC G., HOROMNEA N., DRAGOMIR V., 1998 - *Recent vertical crustal movements on the Romanian territory*. Rev. Rom. Geographys. Bucureşti. T. **42**: p. 3-14.

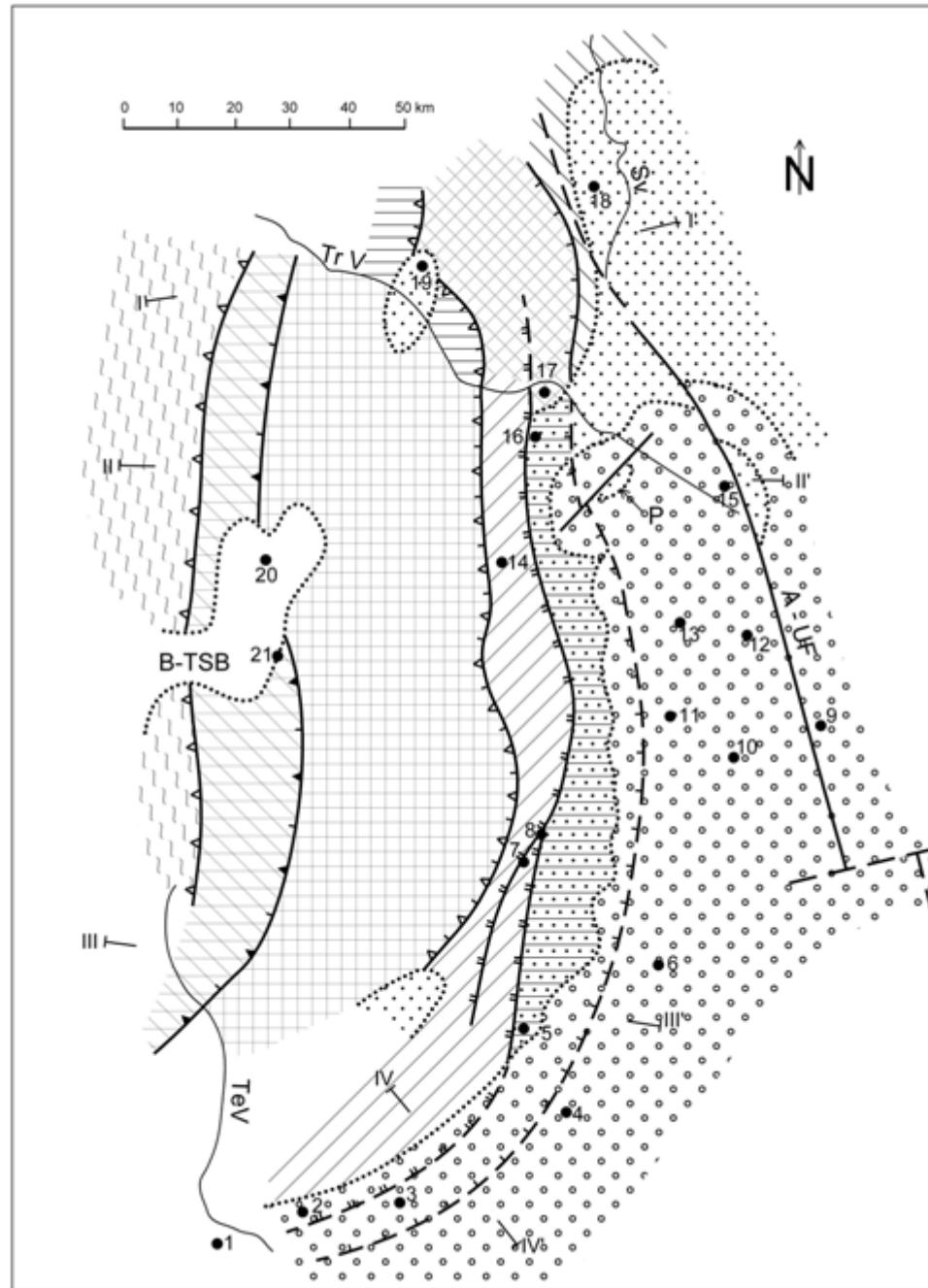


Figure 1 - Geologic sketch of the Vrancea Bend region (Legend in the figure 2).

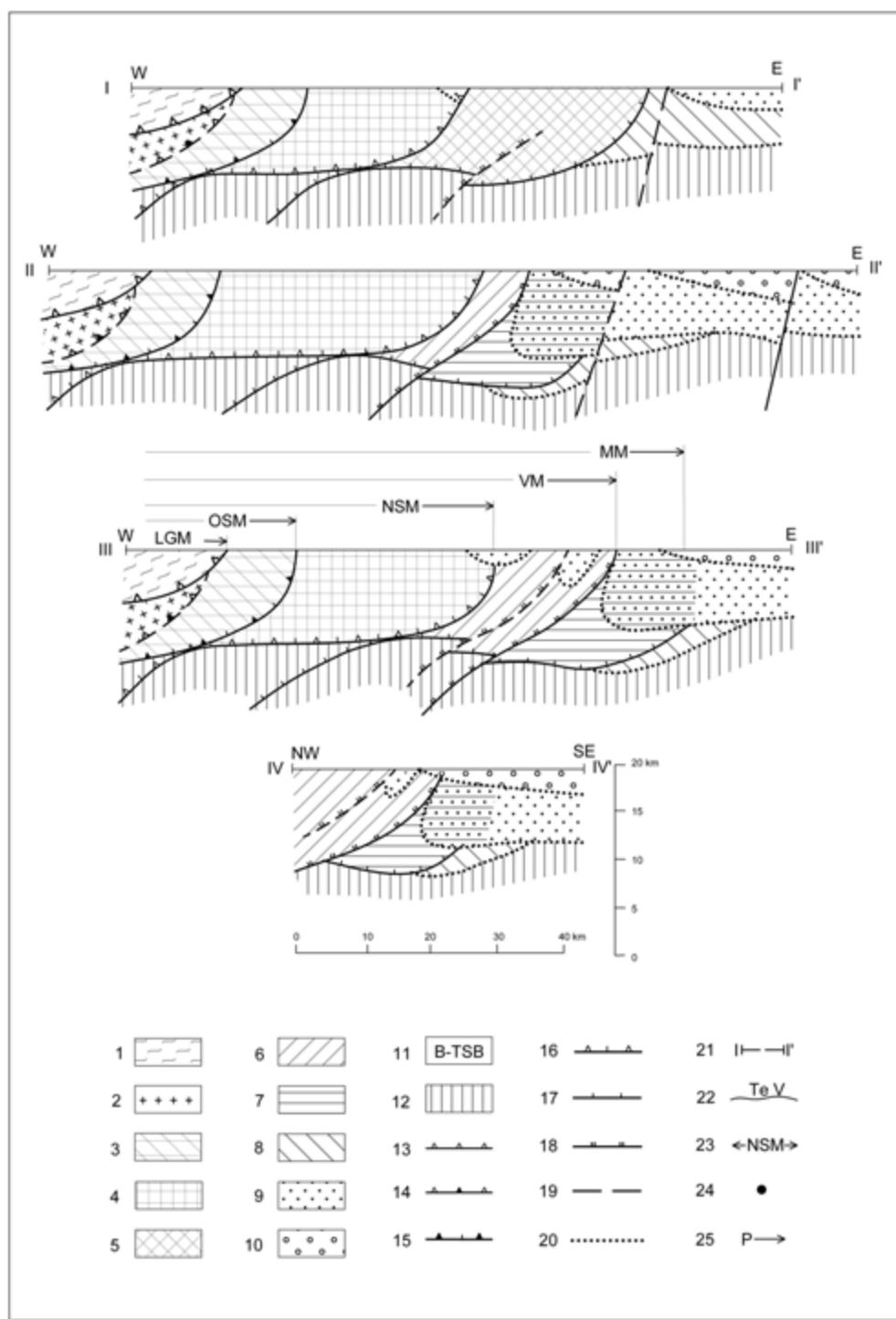


Figure 2 - Geologic cross-sections in the Vrancea Bend region.

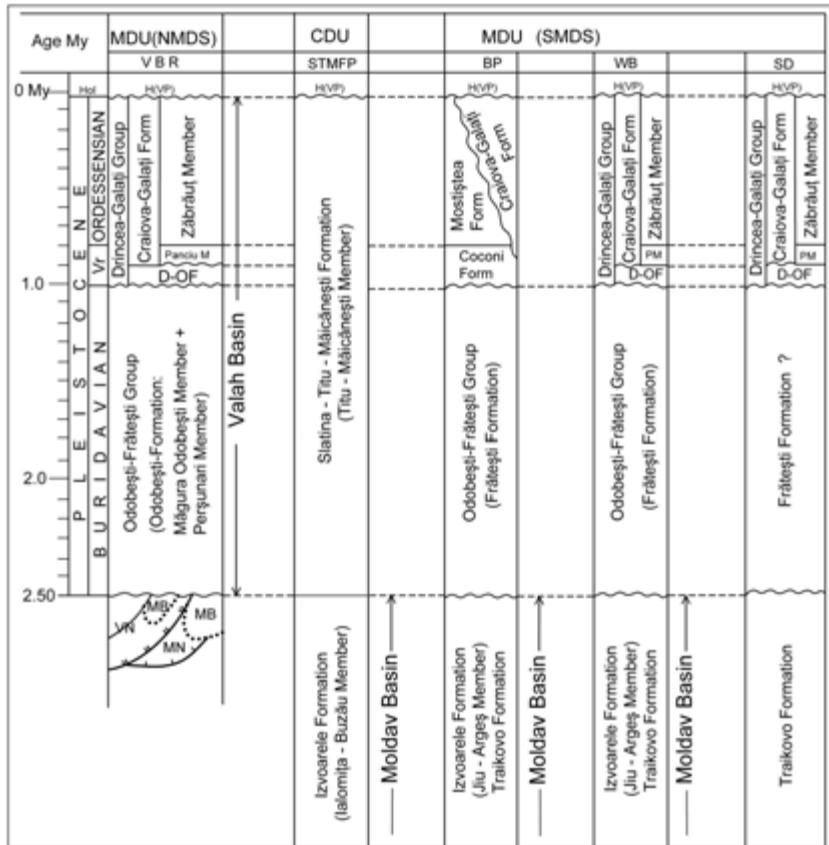


Figure 3 - Transversal correlations in the Valah Basin (Vrancea Bend-Danube Region).

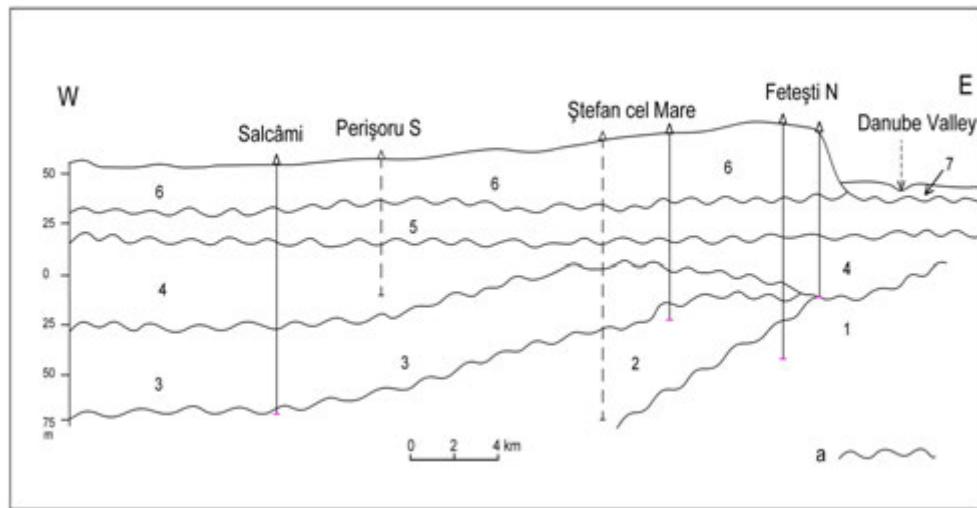


Figure 4 - Geologic cross-section on the Fetești-Salcâmi region (in Stănoiu, 2012-2013).

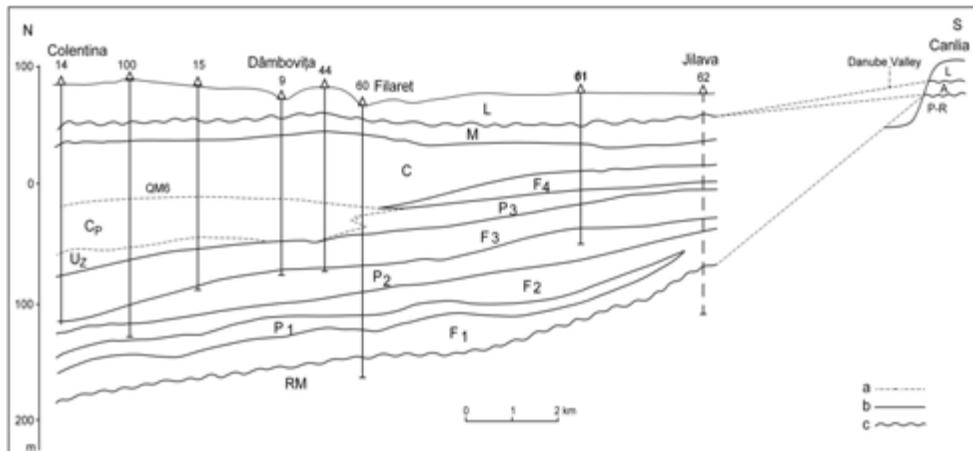


Figure 5 - Geologic cross-section on the Bucharest Perimeter (in Stănoiu, 2012-2013).

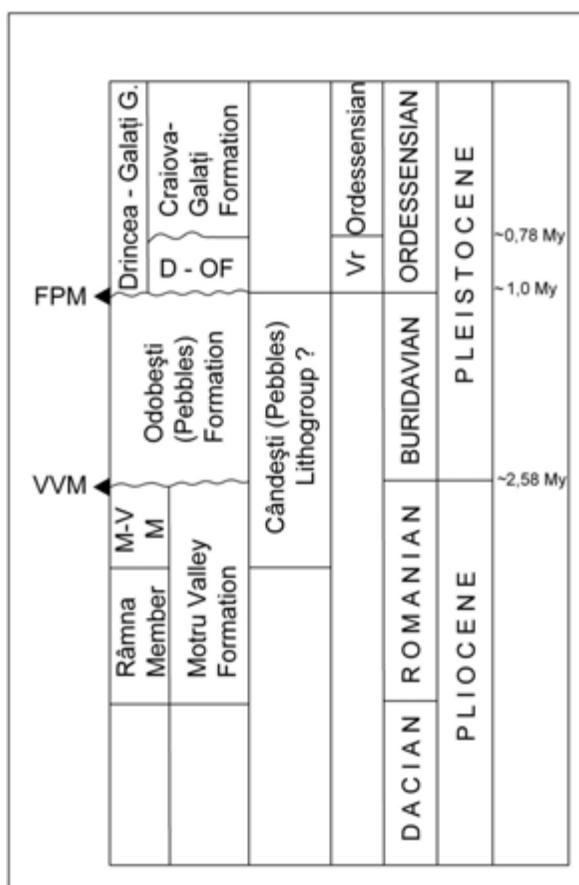


Figure 6 - Lithostratigraphic Units of the Cândești Beds (in Stănoiu, 2012-2013).

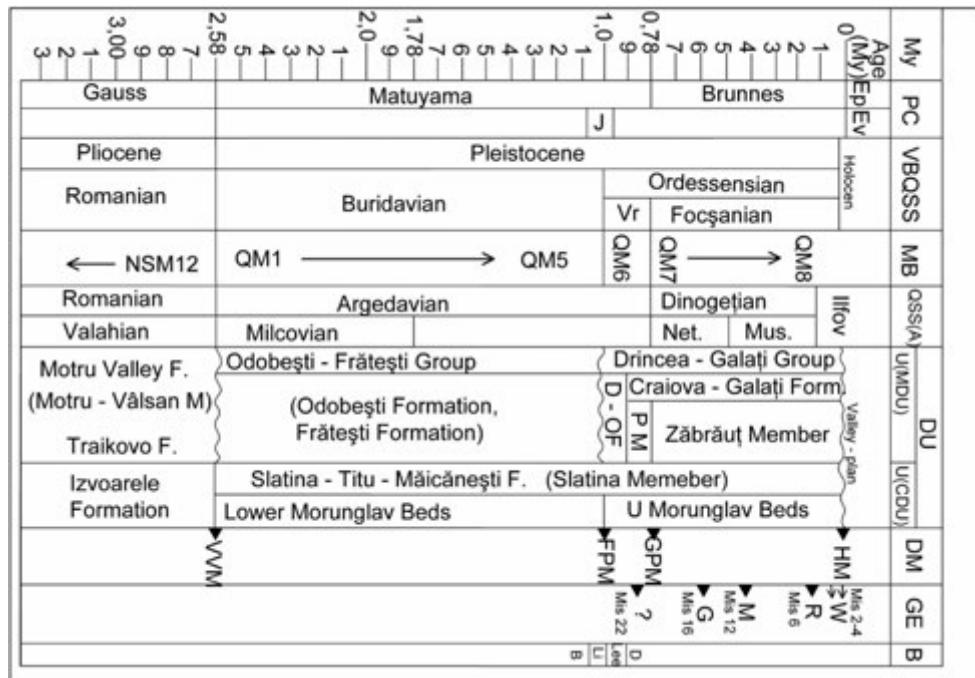


Figure 7 - Correlations in the Valah Basin (in Stănoiu, 2012-2013).

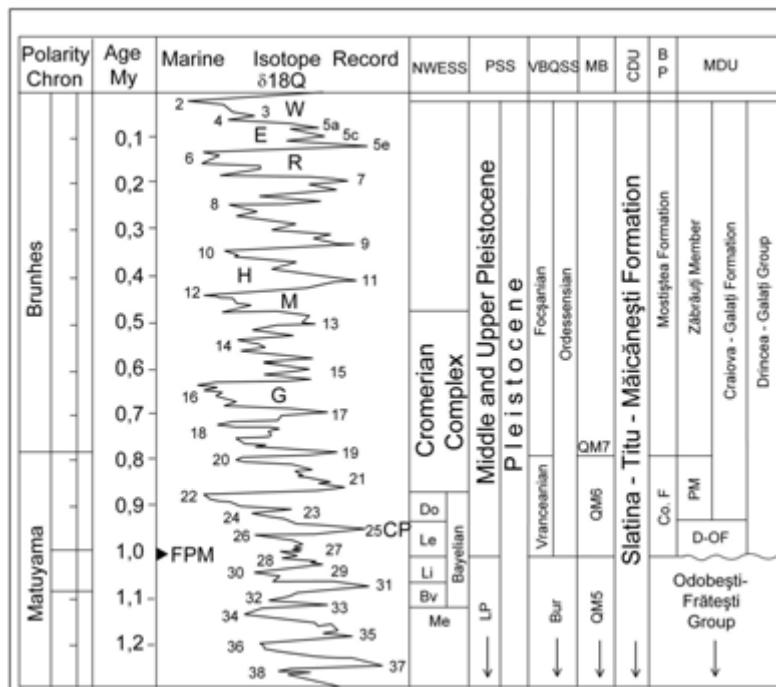


Figure 8 - Correlations in the Valah Basin.

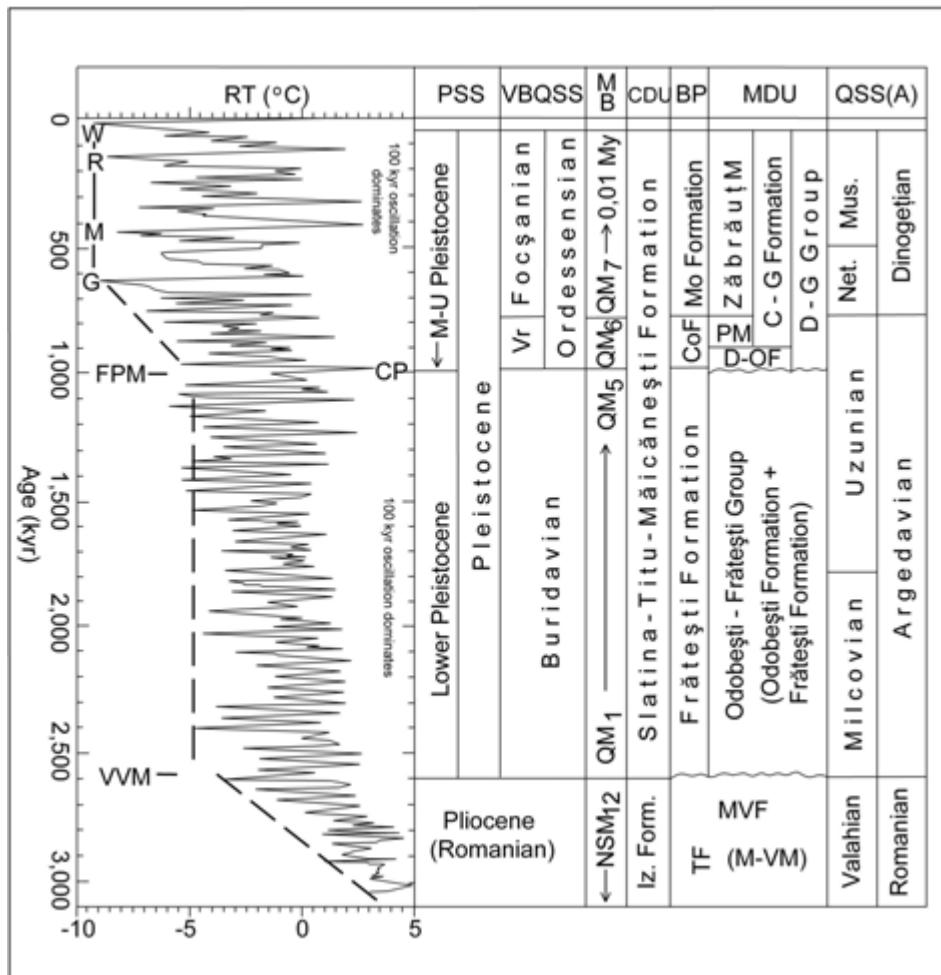


Figure 9 - Correlations in the Valah Basin.

Explications of the figures.

Figure 1 - Geologic sketch of the Vrancea Bend region;

Figure 2 - Geologic cross-sections in the Vrancea Bend region.

1-Laramic Getic Megastructure (Nappe) Unit. 2-Danubian Unit (Perimoldavic Cordiliere). 3-Teleajen-Audia Unit. 4-Tarcău-Vrancea Unit. 5-Cracău Unit. 6-Soveja Unit. 7-Milcov Unit. 8-Râșca Unit. 9-Moldav Basin. 10-Valah Basin. 11-Brașov-Târgu Secuiesc Basin. 12-Vorland. 13-Laramic Plane. 14-Laramic and/or Austric Plane. 15-Old Styric Plane. 16-New Styric Plane. 17-Moldav Plane. 18-Valah Plane. 19-Fault: A-UF-Adjud-Umbrărești Fault (Pecineaga-Camena Lineament = Solka Lineament: Photo. 3). 20-Discordance boundary. 21-Cross-section. 22-Valley (TeV-Teleajen Valley; TrV-Trotuș Valley; SV-Siret Valley). 23-Megastructures (Nappes): **LGM**-Laramic Getic Megastructure (Nappe); **OSM**-Old Styric Megastructure (Nappe); **NSM**-New Styric Megastructure (Nappe); **MM**-Moldav Megastructure (Nappe); **VM**-Valah Megastructure

(Nappe). **24**-Locality (1-Ploiești; 2-Urlați; 3-Mizil; 4-Buzău; 5-Berca; 6-Râmniciu Sărat; 7- Bisoca; 8-Jitia; 9-Umbrărești; 10-Focșani; 11-Odobești; 12-Mărășești; 13-Panciu; 14-Soveja; 15-Adjud; 16-Cașin; 17-Onești; 18-Bacău; 19-Comănești; 20-Târgu Secuiesc; 21-Covasna. **P**-Pralea.

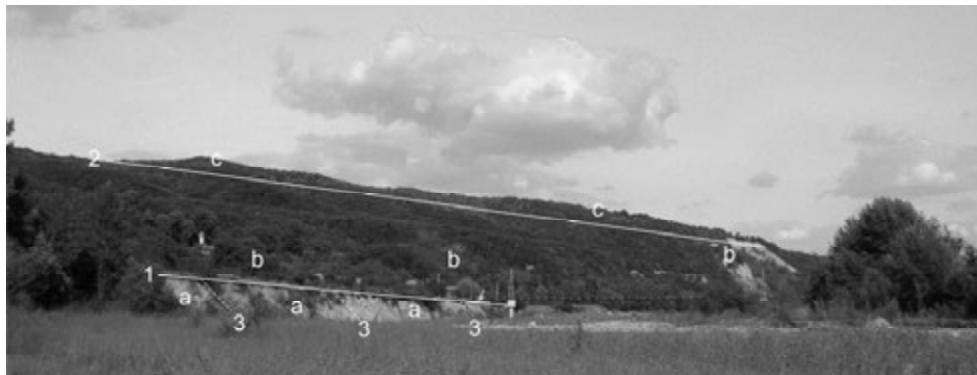
Figure 4 - Geologic cross-section on the Fetești-Salcâmi region: 1-Aptian; 2-Sarmatian; 3-Pontian-Romanian; 4-Frătești Formation (Vlădeni Member); 5-Drincea-Olt Formation; 6-Craiova-Galați Formation; 7-Valley plan; **a**-discordance boundary.

Figure 5 - Geologic cross-section on the Bucharest Perimeter: **P-R**-Pontian-Romanian; **F 1-4** -Frătești 1-4 (pebble); **P 1-3**-Clay; **Uz**-Uzun Beds; **Cp**-Copăceni Beds; **C**-Coconi Formation; **M**-Mostiștea Formation; **A**-Drincea-Olt Formation; **L**-Craiova-Galați Formation; **a**-Biur lithological boundary; **b**-Lithological boundary; **c**-Discordance boundary.

Figure 6 - Lithostratigraphic units of the Cândești Beds: **Vr**-Vrancean; **D-OF**-Drincea-Olt Formation; **M-VM**-Motru-Vâlsan Member; **VVM**-Valah Vrâncean Moment; **FPM**- Focșani Pasaden Moment.

Figure 3 - Transversal correlations in the Valah Basin.

Figure 7, 8, 9 - Correlations in the Valah Basin: **VBQSS**-Valah Basin Quaternary Stratigraphic Scale; **DV**-Depositional Units; **MDU**-Marginal Depositional Unit; **NMDS**-North Marginal Depositional Subunit; **SMDS**-South Marginal Depositional Subunit; **CDU**-Central Depositional Unit; **VBR**-Vrancea Bend Region; **STMTTP**-Slatina-Titu-Focșani Perimeter; **BP**-Bucharest perimeter; **WB**-West Bucharest; **SD**-South Danube; **QSS(A)**-Quaternary Stratigraphic Scale (Andreeescu et al., 2011); **MB**-Molusc Biozones (Andreeescu et al., 2011); **B**-Bayellian Stages (**D**-Dorst; **Lee**-Leerdam; **Li**-Linge; **B**-Bavel; **Me**-Menopian: after Kolsoten et Gibard, 1996; Gradstein et al., 2004; **NWESS**-North-West European Stratigraphic Stages (after Kolsoten et Gibard, 1996; Gradstein et al., 2004); **PSS**-Pleistocene Stratigraphic Scale (after Steininger & Rögl, 1984); **DM**-Discontinuity Moments (**VVM**-Vrancea Valah Moment; **FPM**-Focșani Pasaden Moment; **GPM**-Getic Pasaden Moment; **HM**-Hierasus Moment; **CP**-Climatic Pasaden Moment); **GE**-Glacial and Interglaciar Events (**G**-Günz; **M**-Mindel; **H**-Holsteinian; **R**-Riss; **E**-Eemian; **W**-Würm: after Husen & Jurgen, 2011); **PC**-Polarity Chron; **RT**($^{\circ}$ C)-Relative temperature (after Müller & MacDonald, 2008); **LP**-Lower Pleistocene; **Bur**-Buridavian; **H(VP)**-Holocen (Valley Plan); **M-U** Pleistocene-Middle Upper Pleistocene; **Vr**-Vrancean; **Net**-Netindavian; **Mus**-Musaisian; **Ifov**-Ifovian; **F**-Foreland; **VN**-Valah Nappe; **MN**-Moldav Nappe; **MB**-Moldav Basin; **Mo** Formation-Mostiștea Formation; **CoF**-Coconi Formation; **D-G Group**-Drincea-Galați Group; **C-G Formation**-Craiova-Galați Formation; **D-OF**-Drincea-Olt Formation; **PM**-Panciu member; **MVF**-Motru Valley Formation; **M-VM**-Motru-Vâlsan Member; **Iz. Form**-Izvoarele Formation; **TF**-Traikovo Formation.



Photography 1 - Milcov Valley, Pitulișa locality. Visible discordance between the Râmna Member (Romanian of the Moldav Basin) and the Măgura-Odobești Member (Buridavian: lower Pleistocene of the Valah Basin). **a**-Râmna Member (clays); **b**-Măgura Odobești Member (predominant pebbles); **c**-Craiova-Galați Formation (loess-paleosol alternance), Ordessian; **1**-discordance boundary between of the Romanian and Buridavian; **2**- discordance boundary between of the Măgura-Odobești Member and Craiova-Galați Formation; **3**-Romanian clays stratification (Stănoiu et al., 2010).



Photography 2 - Milcov Valley, between the Odobești locality and the Pitulișa locality. Măgura-Odobești Member Pebbles with gravity slides in the plastic state (Stănoiu et. al., 2010).



Photography 3 - Adjud-Umbrărești Fault (F), North of the Umbrărești locality, between the Quaternary and Pliocene rocks.

THE FUND „ACADEMICIAN NICOLAE BOȘCAIU” (II)

VALERIU ALEXIU

Argeș County Museum, Armand Călinescu Street, no. 44, 110047, Pitești, Argeș, Romania,
e-mail: alexiuv@yahoo.com

ABSTRACT. In this paper the next 278 titles (extracts, articles, notes, booklets, folders etc.) of the fund „Academician Nicolae Boșcaiu” are presented.

Key words: fund, Nicolae Boșcaiu, extracts, articles, booklets, folders.

REZUMAT. Fondul „Academician Nicolae Boșcaiu” II. În această lucrare sunt prezentate următoarele 278 de: titluri de extrase, articole, note, broșuri, pliante etc. din fondul „Academician Nicolae Boșcaiu”.

Cuvinte cheie: fond, Nicolae Boșcaiu, extrase, articole, broșuri, pliante.

The whole collective of the Argeș County Museum still remembers the lamented friend and collaborator of the institution, the Academician Nicolae Boșcaiu.

Many years ago, he accepted to help the Argeș County Museum with his advice and inducements and with his prestigious presence to different actions of reorganization and modernization of museum exhibitions and especially through participation in scientific meetings which have become traditional and known throughout the country due to their high scientific level: the year-book “Ecositeze și etnosinteză carpatică”.

Academician Nicolae Boșcaiu co-ordinated some thesis of our colleagues, members of the Department of Natural Sciences, which today form a true school of Argeș County phytosociology.

Last but not least, Academician Nicolae Boșcaiu brought in our county the most brilliant European botanists and phytosociologists to take part at the second international phytosociology trip in Romania, in July 1998, emphasizing the scientific importance of our institution, and consequently spreading the prestige of the scientific research in Argeș and worldwide.

We are honored to receive by courtesy of his family, as a recognition of the close collaboration between the well-known Academician and our institution, including research sheets, personal statements or autograph statements of the outstanding author's notes, books etc.

We present in this issues the next 278 titles of the fund „Academician Nicolae Boșcaiu” (continuing the numbering from the first part of the work) (Tab.1).

Table 1 - The list of the next 275 extracts from the fund „Academician Nicolae Boșcaiu”.

No	Author/Name	Title
471	Aramata Shigeo Calling card	Kushiro Public University of Economics.
472	Arnaiz C., Géhu J.-M., Géhu-Franck J. Extract	Bull. Soc. Bot. N. France, 33 (3-4), 1980: 65-83. <i>Apport à la connaissance des espèces du genre Rosa dans la région Nord-Pas-de-Calais (France).</i>
473	Aryavand Ahmed Extract	C.R. Acad. Sc. Paris, t. 280, 1975. <i>Taxonomie – Contribution à l'étude cytotaxonomique de Biebersteinia multifida DC (Géraniacées).</i>
474	Baudière André, Küpfer Philippe Extract	Bulletin de la Société Neuchateloise des Sciences Naturelles, Tome 91, 1968. <i>Sur les peuplements d'Astragales épineux de la partie orientale de la Chaîne Pyrénéene.</i>
475	Biondi Edoardo, Pedrotti Franco, Tomasi Gino Extract	Studi Trentini di Scienze Naturali. Acta Biologica, Vol. 58, Trento, 1981: 93-117. <i>Relitti di antiche foreste sul fondo di alcuni laghi del Trentino.</i>
476	Booklet	Göttinger Floristische Rundbriefe. Zeitschrift für Arealkunde, Floristik und Systematik.
477	Borza Alexandru History Store Magazine	Magazin istoric, Anul XII Nr. 9 (138) septembrie 1978: 2-3. <i>I Decembrie 1918: Vrem să ne unim cu țara ! Cel mai important moment al vieții mele.</i>
478	Borza Alexandru, Butură Valeriu Extract	Sudhoffs Archiv für Geschichte der Medizin und der Naturwissenschaften, Leipzig, 1938: 81-86. <i>Bäuerliche Pflanzenheilmittel in der Moldau (Rumänien).</i>
479	Borza Alexandru Booklet	Valul Roman de la Timișoara. Edit. G. Matheiu.
480	Borza Alexandru Booklet	Amintiri despre arheologul A. Cserni și săpăturile de la Apulum. Tipografia Națională SA Cluj, 1936.
481	Borza Alexandru Booklet	Biblioteca de popularizare a Grădinii Botanice din Cluj, retipărită din „Patria”, 1931. Printre flori.
482	Borza Alexandru Booklet	Frontul Național Studențesc, Divizia Cluj, 1940. <i>Cântece pentru studenți.</i>
483	Borza Alexandru Booklet	Apa ca factor geologic, Blaj, 1916.

Continues.

Table 1 - Continuation.

No	Author/Name	Title
484	Borza Alexandru Booklet	Biblioteca de popularizare a Grădinii Botanice din Cluj, retipărită din „Patria”, 1935. <i>Impresii din Basarabia</i> .
485	Borza Alexandru Booklet	Centrul de Studii și Cercetări privitoare la Transilvania, Sibiu, 1945. <i>L'Alac (Engrain, Triticum monococcum) chez les Roumaines. Étude Botanique et d'Histoire culturelle</i> .
486	Borza Alexandru Article	Bolșevismul în natură.
487	Borza Alexandru Article	Transilvania. An LI, 1920, nr. 1: 74-78. <i>Studii botanice în Câmpia Ardealului</i> .
488	Borza Alexandru Article	Transilvania – Revista Asociației pentru Literatura Română și Cultura Poporului Român, Nr.2, Sibiu, 191: 174-190. <i>Contribuțiuni la vegetația muntilor apuseni</i> .
489	Borza Alexandru Article	Ştiință și Tehnică, 12/1958: 32-33. <i>Florile Yunnanului</i> .
490	Borza Alexandru Article	Carpații. Vânătoare-Pescuit-Chinologie, Anul XIV, nr. 7, iulie 1946: 133-136. <i>Amintirile Amintirile turistice ale unui naturalist</i> .
491	Borza Alexandru Article	Guide de la Sixième Excursion Phytogéographique Internationale. Roumanie, 1931. <i>Botanic Excursion through „The Câmpia”</i> .
492	Borza Alexandru Article	Congresul jubiliar al Societății de botanică din R.S. Cehoslovacia (1962).
493	Borza Alexandru Article	Congresul jubiliar al Societății de botanică din R.S. Cehoslovacia (1962).
494	Borza Alexandru Article	Tribuna, Anul V, nr. 5, Cluj, 1961. <i>Un incunabul al operei medievale „Hortus Sanitatis”</i> .
495	Borza Alexandru Article	Unirea, nr. 84, 1915. <i>Josef Barth</i> .
496	Borza Alexandru Article	Ştiință și progres – Revista Științifică a Liceelor Militare, Anul IX, Nr. 3-4, 1944. <i>Reformatul botanic: Carol Linné</i> .
497	Borza Alexandru Article	Chronique, Anul I, Nr. 1, Ianuarie 1924. <i>La botanique en Roumanie</i> .
498	Borza Alexandru Speech from Dean	La moartea profesorului Ioan A. Scriban.
499	Borza Alexandru Article	Tribuna, 27 (1593) Anul V, nr. 32 (236) 10 august 1961. <i>O nouă „Floră a Europei”</i> .

Continues.

Table 1 - Continuation.

No	Author/Name	Title
500	Borza Alexandru Extract	Buletinul de Informații al Grădinii botanice și al Muzeului botanic de la Universitatea din Cluj, vol. II, No. 2: 53-62. <i>Raport asupra situației Muzeului botanic de la Universitatea din Cluj pe anul 1921.</i>
501	Borza Alexandru Extract	Buletinul de Informații al Grădinii botanice Cluj, vol. III, 1923: 88-97. <i>Dare de Seamă despre starea Grădinii Botanice din Cluj (1919-1922).</i>
502	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. V, 1925, Appendix II. <i>Dare de seamă despre starea Muzeului Botanic și a Grădinii Botanice dela Universitatea din Cluj în anul 1925.</i>
503	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XV, 1935, Appendix I. <i>Dare de seamă despre starea Muzeului Botanic și a Grădinii Botanice dela Universitatea din Cluj în anii 1927-1934.</i>
504	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XV, 1935, Appendix I. <i>Dare de seamă despre starea Muzeului Botanic și a Grădinii Botanice dela Universitatea din Cluj în anii 1927-1934.</i>
505	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XXV, 1945, Appendix III. <i>Dare de seamă despre activitatea Muzeului Botanic și a Grădinii Botanice dela Universitatea „Regele Ferdinand I” din Cluj în anii 1940-1945.</i>
506	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XXV, 1945, Appendix III. <i>Dare de seamă despre activitatea Muzeului Botanic și a Grădinii Botanice dela Universitatea „Regele Ferdinand I” din Cluj în anii 1940-1945.</i>
507	Borza Alexandru Extract	Buletinul de Informații al Grădinii botanice și al Muzeului botanic de la Universitatea din Cluj, vol. V (1925), No. 1-2. <i>Problema Muzeului Național al Ardealului.</i>
508	Borza Alexandru Extract	Revista Institutului Social Banat-Crișana, Vol. XI, 1943: 209-220. <i>Cetățile romane dintre Tibiscum și Sarmizegetusa.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
509	Borza Alexandru Extract	„Dacia”, anul IV (1942), No. 213-215, Timișoara, Tipografia Românească SA. <i>Descoperiri arheologice în Banat, din timpul Dacilor.</i>
510	Borza Alexandru, Ghiuță Mihail Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XVIII, (1938), No. 1-4. <i>Contribuționi la studiul și răspândirea Ceciddilor în România.</i>
511	Borza Alexandru, Ghiuță Mihail Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj la Timișoara, Vol. XXII, (1942). <i>Schedae ad Cecidothecam Romanicam.</i>
512	Borza Alexandru, Ghiuță Mihail Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj la Timișoara, Vol. XXIV, (1944). <i>Schedae ad Cecidothecam Romanicam.</i>
513	Borza Alexandru, Ghiuță Mihail Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XXV, (1945). <i>Schedae ad Cecidothecam Romanicam.</i>
514	Borza Alexandru, Ghiuță Mihail Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XVIII, (1938), No. 1-4. <i>Contribuționi la studiul și răspândirea Ceciddilor în România.</i>
515	Borza Alexandru Extract	Revista Institutului Social Banat-Crișana, Vol. XI (1943), Nr. XI-XI. <i>Cetatea Dacică de la Bobaița (Mehedinți). Note arheologice și botanice.</i>
516	Borza Alexandru Extract	Revista Institutului Social Banat-Crișana, Vol. XI (1943), Nr. XI-XI. <i>Cetatea Dacică de la Bobaița (Mehedinți). Note arheologice și botanice.</i>
517	Borza Alexandru Extract	Revista Institutului Social Banat-Crișana, Vol. XI (1943), Nr. XI-XI. <i>Cetatea Dacică de la Bobaița (Mehedinți). Note arheologice și botanice.</i>
518	Borza Alexandru Extract	„Dacia”, anul IV (1942), No. 213-215, Timișoara, Tipografia Românească SA. <i>Descoperiri arheologice în Banat, din timpul Dacilor.</i>
519	Borza Alexandru Extract	Publicațiile Institutului Social Banat-Crișana, 1944. <i>Nouii date relativ la cetățile romane dintre Tibiscum și Sarmizegetusa.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
520	Borza Alexandru Extract	Publicațiile Institutului Social Banat-Crișana, 1944. <i>Noui date relativ la cetățile romane dintre Tibiscum și Sarmizegetusa.</i>
521	Borza Alexandru, Erasmus Iulius Nyarady Extract	Proceedings of the Second Flora Europaea Symposium, Geneva, 1961. <i>Bibliographie botanique roumaine des plantes supérieures (taxonomique, floristique et géo-botanique) de 1945 à 1960.</i>
522	Borza Alexandru, Erasmus Iulius Nyarady Extract	Proceedings of the Second Flora Europaea Symposium, Geneva, 1961. <i>Bibliographie botanique roumaine des plantes supérieures (taxonomique, floristique et géo-botanique) de 1945 à 1960.</i>
523	Borza Alexandru, Erasmus Iulius Nyarady Extract	Proceedings of the Second Flora Europaea Symposium, Geneva, 1961. <i>Bibliographie botanique roumaine des plantes supérieures (taxonomique, floristique et géo-botanique) de 1945 à 1960.</i>
524	Borza Alexandru Extract	Proceedings of the Second Flora Europaea Symposium, Geneva, 1961. <i>Progress of flora researches in the Rumanian People's Republic, between 1945-1960.</i>
525	Borza Alexandru, Erasmus Iulius Nyarady Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XX, 1940, Appendix 1. <i>Index generalis ad centurias I-XXI „Florae Romaniae Exsiccatae” a Museo Botanico Universitatis Clusiensis.</i>
526	Borza Alexandru Extract	În preajma zilei de 1 decembrie 1918 la Alba Iulia.
527	Borza Alexandru Extract	Biblioteca Ateneului Român, Nr. 12, 1937. <i>Basarabia noastră – Conferință tinută la Ateneul Român în seara de 9 februarie 1936.</i>
528	Borza Alexandru Extract	Societatea de Mâine, Anul I, nr. 15-16: 324-334. <i>Câteva noțiuni de Fitosociologie. Pădurea-Stepa ieboasă. Lupta între aceste două formațiuni.</i>
529	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj la Timișoara, Vol. XXII, 1-4, 1942: 21-39. <i>O călătorie de studii și conferințe prin Croația, Elveția și Italia.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
530	Borza Alexandru, Borza Veturia Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XIX, 1-2, 1939: 66-77. <i>O excursiune de studii fitosociologice prin Corsica.</i>
531	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj la Timișoara, Vol. XXI, 1941: 34-47. <i>O călătorie de conferințe și studii prin Germania.</i>
532	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj la Timișoara, Vol. XXI, 1941: 34-47. <i>O călătorie de conferințe și studii prin Germania.</i>
533	Borza Alexandru Extract	Carpații, nr. 2, 1939, Cluj. <i>O excursiune prin Corsica.</i>
534	Borza Alexandru Extract	Contribuții Botanice, Universitatea „Babeș-Bolyai” din Cluj. Grădina Botanică, 1967. <i>Scrierile botanice ale Profesorului Dr. Borza Alexandru II.</i>
535	Borza Alexandru Extract	Contribuții Botanice, Universitatea „Babeș-Bolyai” din Cluj. Grădina Botanică, 1972. <i>Scrierile botanice ale Profesorului Dr. Borza Alexandru III.</i>
536	Borza Alexandru Extract	Revista Institutului Social Banat-Crișana, anul XI (1943: 149-172. <i>Corelația dintre flora României și poporul român. O sinteză etnobotanică.</i>
537	Borza Alexandru Extract	Institutul de Igineă și Sănătate Publică, București, 1970. <i>Despre denumirile românești de plante medicinale populare.</i>
538	Borza Alexandru Extract	Apulum – Buletinul Muzeului Regional din Alba Iulia, 1943-1945. <i>Cele dintâi publicații botanice străine cu numiri de plante „românești”.</i>
539	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj la Timișoara, Vol. XXIV, 1944. <i>Cele dintâi publicații botanice străine cu numiri de plante „românești”.</i>
540	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj la Timișoara, Vol. XXIV, 1944. <i>Cele dintâi publicații botanice străine cu numiri de plante „românești”.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
541	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj la Timișoara, Vol. XXIV, 1944: 110-118. <i>Date etnobotanice din Naidăș (J. Caraș)</i> .
542	Borza Alexandru Extract	Anuarul Muzeului Etnografic al Transilvaniei pe anii 1961-1964, Cluj, 1966. <i>Cercetări etnobotanice în Țara Oașului</i> .
543	Borza Alexandru Extract	Dacoromania, Vol. VIII. <i>Numiri populare de plante din Basarabia</i> .
544	Borza Alexandru Extract	Studii și Cercetări de Biologie, Cluj, Anul VIII, nr. 3-4, 1957. <i>Date floristice și etnobotanice din secolele XVI-XVIII privind România</i> .
545	Borza Alexandru Extract	Buletinul Muzeului Limbei Române – Articole mărunte: Primul dicționar de științe naturale românesc – „Vocabularium pertinens ad tria Regna Naturae” de Gh. Șincai.
546	Borza Alexandru Extract	Buletinul Muzeului Limbei Române – Articole mărunte: Primul dicționar de științe naturale românesc – „Vocabularium pertinens ad tria Regna Naturae” de Gh. Șincai.
547	Borza Alexandru Extract	Acta Muzei Regionalis Apulensis. Studii și Comunicări, III, Edit. Acad. RPR, 1961. <i>Aportul etnobotanic al lexicografiei vechi slavo-române și a altor lucrări din sec. XVIII</i> .
548	Borza Alexandru Extract	Cercetări de Lingvistică, Cluj, Anul III, 1958. <i>Numiri românești de plante în vocabulare și dicționare din secolele al XVII-lea – al XVIII-lea</i> .
549	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XXV, 1945: 133-142. <i>Ferdinand Pax – Schiță biografică (Cu un portret)</i> .
550	Borza Alexandru Extract	Ungarische Botanische Blätter, Jahrgang, 1915, Budapest. <i>Nachruf an József Barth</i> .
551	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XXV, 1945: 241-244. <i>Vieața și opera botanistului V.L. Komarov</i> .
552	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. III, no. 1-2: 1-13. <i>Bryologul Martin Péterfi. Schiță biografică (Cu un portret)</i> .

Continues.

Table 1 - Continuation.

No	Author/Name	Title
553	Borza Alexandru Extract	Buletinul Societății de Științe din Cluj, Tomul I, 1923: 597-603. <i>Le bryologue Martin Péterfi. Esquisse biographique.</i>
554	Borza Alexandru Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XIV, no. 3-4, 1934: 199-210. <i>Marcel Brândză. Viața și opera sa.</i>
555	Borza Alexandru Extract with dedication	Revista Institutului Social Banat-Crișana, Vol. X (1942): 649-672. <i>Sanctuarul Dacilor Kogaionon.</i>
556	Borza Alexandru Extract with dedication	Excerpta Botanica. Sectio B, Sociologica, 1959. <i>Verantwortlicher Herausgeber und Schriftleiter: R. Tuxen, Stolzenau/Weser.</i>
557	Borza Alexandru Extract with dedication	Proceedings of the Second Flora Europaea Symposium, Geneva, 1961. <i>Progress of flora researches in the Rumanian People's Republic, between 1945-1960.</i>
558	Borza Alexandru Extract with dedication	Acta Botanica Sinica, Vol. VIII, No. 1, 1959. <i>Botanical Problems in Roumania.</i>
559	Borza Alexandru Extract with dedication	În preajma zilei de 1 decembrie 1918 la Alba Iulia.
560	Borza Alexandru Extract with dedication	Revista „Societatea de mâine”, Vol. XIII (1936), No. 2: 27-28 și No.3: 57-61 din Martie. <i>Basarabia noastră – Conferință ținută la Ateneul Român în ziua de 9 februarie 1936.</i>
561	Borza Alexandru Extract with dedication	Studii și Cercetări de Biologie, Cluj, Anul VIII, nr. 3-4, 1957. <i>Date floristice și etnobotanice din secolele XVI-XVIII privind România.</i>
562	Borza Alexandru Extract with dedication	Cercetări de Lingvistică, Cluj, Anul III, 1958. <i>Numiri românești de plante în vocabulare și dicționare din sec. al XVII-lea–al XVIII-lea.</i>
563	Boșcaiu Nicolae Badge	International Mire Conservation Group in Japan, Aug. 25-Sep. 6, 1996.
564	Boșcaiu Nicolae Abstract	The 7th IMCG Field Symposium in Japan, 1996. <i>Phytogeographical importance of mires in the SE Carpathians and their protection.</i>
565	Boșcaiu Nicolae Article	Tribuna, 27 (1593) Anul XXXI, 2 iulie 1987. <i>Valori ale Școlii românești: Profesorul Borza Alexandru.</i>
566	Boșcaiu Nicolae Extract	Acta Musei Devensis – Sargetia, XI-XII, 1975-1976. <i>Semnificația documentară a florei și vegetației Hunedorene și perspectivele explorațării sale.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
567	Boșcaiu Nicolae Extract	Studii și comunicări de Ocrotirea Naturii, Suceava, 1973. <i>Conservarea capacității informaționale a ecosistemelor și a resurselor lor informative.</i>
568	Boșcaiu Nicolae Invitation	The 7th IMCG Field Symposium, Japan, 1996.
569	Botch Marina Calling card	Komarov Botanical Institute – Academy of Science of Russia.
570	Buia Al., Ghișa E. Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj, Vol. XXV, 1945, Appendix 1. <i>Scriserile botanice ale Profesorului Dr. Borza Alexandru.</i>
571	Buia Al., Ghișa E. Extract	Buletinul Grădinii Botanice și al Muzeului Botanic de la Universitatea din Cluj la Timișoara, Vol. XXV, 1945. <i>Scriserile botanice ale Profesorului Dr. Borza Alexandru.</i>
572	Bujorean G., Grigore St., Oprea R., Coste I., Oprea I. Extras	Lucrările Științifice ale Inst. Agronomic Timișoara, Seria Agronomie, Vol. XI, 1968. <i>Contribuții la studiul geobotanic al pajiștilor din zona Munțele Mic.</i>
573	Rarron C. Booklet	Flore du Congo du Rwanda et du Burundi. Spermatophytes. Ochnaceae. Genres Idertia, Rhabdophyllum et Campylospermum.
574	Card	For telephone in Japan.
575	Carmela Cortini Pedrotti Extract	Studi Trentini di Scienze Naturali. Acta Biologica, Vol. 56, Trento, 1980: 21-35. <i>La distribuzione di paludella squarrosa (Hedw.) Brid. In Italia.</i>
576	Chable Robert Extract	Bulletin de la Société Neuchateloise des Sciences Naturelles, Tome 92, 1969. <i>Contribution à une anatomie comparée du genre Arenaria L. II. Oxalate de calcium dans les racines.</i>
577	Claisses Renée, Géhu Jean -Marie Extract	Berichte der Internationalen Symposien der Internationalen Vereinigung für vegetationskunde Heraus gegeben von Reinhold Tuxen, 1977, J. Kramer, Vaduz. <i>Applications de la méthode phytosociologique à l'analyse des paysages urbains et ruraux.</i>
578	Čolić Dušan, Mišić Vojislav, Popović Milorad Extract	Recueil de travaux, Vol. 6, No. 5, Beograd, 1962. <i>Phytocenologic analysis of the high-mountain community of Silesian willow and mountain alder (Saliceto-Alnetum viridis ass. nova) in the Mount Stara Planina.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
579	Convention on Wetlands	The Ramsar Newsletter, Iran, 1971.
580	Cortini Pedrotti C., Orsomando E., Pedrotti F., Sanesi S. Extract	Atti dell’Instituto Botanico e laboratorio Crittogramico dell’Università di Pavia, Serie 6, Vol. IX, 1973. <i>La vegetazione e i suoli del Pian Grande di Castelluccio di Norcia (Appenino centrale).</i>
581	Csűrös I. Extract with dedication	Acta Bolyaiana, Vol. I, Cluj-Kolozsvar, 1947. <i>Contributions à l’étude du complex-mosaïque de l’Arrhenatheretum elatioris et Festucetum psudovinae dans la vallée du Somes (Szamos).</i>
582	Decision Romanian Academy	Aprobarea deplasării în Japonia a D-lui N. Boșcaiu, la lucrările Simpozionului Internațional privind conservarea turbăriilor.
583	Delsaut M., Godin J. Extract	Berichte der Internationalen Symposien der Internationalen vereinigung für vegetationskunde Herausgegeben von Reinhold Tüxen, Rinteln, 1976. <i>Mise en evidence de relations entre les complexes d’associations végétales et l’avifaune dans le marais audomarois (Nord de la France).</i>
584	Delzenne Chantal, Géhu Jean -Marie Extract	Documents phytosociologiques, Vol. II, Lille (1978). <i>Sur deux associations epiphytes du Parmelion caperatae des plaines et collines francaises.</i>
585	Dihoru Gh. Extract with dedication	Bot. Közlem. 57. kötet 3. füzet 1970. <i>Nehány Arum-Faj taxonomiai aspektusa.</i>
586	Dobrescu Const. Extract with dedication	Anal. Șt. Ale Univ. „Al. I. Cuza”, Iași, XVII, fasc. 2, 1971. <i>Contribuții la studiul pajiștilor xerofile din bazinul superior al Bârladului.</i>
587	Duckert-Henriod Marie-Marguerite Extract	Bulletin de la Société Neuchateloise des Sciences Naturelles, Tome 96, 1973. <i>Hierochloë odorata dans le Jura.</i>
588	Engel A., Nagy B., Nagy L.A., Engel C., Kremp G., Drew Ch. Extract	Science, Vol. 161, 1968: 1005-1008. <i>Alga-Like Forms in Overwacht Series, South Africa: Oldest Recognized Lifelike Forms on Earth.</i>
589	Engler A. Extract	Resultats scientifiques du Congrès International de Botanique, Vienne 1905. <i>Grundzuge der Entwicklung der Flora Europas seit der Tertiärzeit.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
590	Extract	Contribuții Botanice, Universitatea Babeș-Bolyai din Cluj. Grădina Botanică, 1967. <i>Scrierile botanice ale Profesorului Dr. Borza Alexandru II.</i>
591	Extract	Contribuții Botanice, Universitatea Babeș-Bolyai din Cluj. Grădina Botanică, 1967. <i>Scrierile botanice ale Profesorului Dr. Borza Alexandru II.</i>
592	Extract	Contribuții Botanice, Universitatea Babeș-Bolyai din Cluj. Grădina Botanică, 1972. <i>Scrierile botanice ale Profesorului Dr. Borza Alexandru III.</i>
593	Extract	Contribuții Botanice, Universitatea Babeș-Bolyai din Cluj. Grădina Botanică, 1967. <i>Scrierile botanice ale Profesorului Dr. Borza Alexandru II.</i>
594	Extract	Contribuții Botanice, Universitatea Babeș-Bolyai din Cluj. Grădina Botanică, 1967. <i>Scrierile botanice ale Profesorului Dr. Borza Alexandru II.</i>
595	Viorel Soran Extract	Natura – Revista Societății de Științe Biologice din RSR, 1969. <i>Hoemostazia și evoluția lumii vegetale.</i>
596	Extract	Vegetatio. Acta Botanica, Vol. XXII, 1971. <i>Vorläufige Liste von Mitarbeitern am Prodromus der Europäischen Pflanzengesellschaften.</i>
597	Fabarger Claude Extract	Bulletin de la Société Neuchateloise des Sciences Naturelles, Tome 99, 1976. <i>Un nouveau Cerastium de Turquie: Cerastium dominici spec. nov.</i>
598	Fabarger Claude Extract	Bulletin de la Société Neuchateloise des Sciences Naturelles, Tome 88, 1965. <i>Notes de caryologie alpine IV.</i>
599	Fabarger Claude Extract	Bulletin de la Société Neuchateloise des Sciences Naturelles, Tome 99, 1976. <i>Nouveau nombre chromosomique „de base” pour le genre Cerastium L. Et phénomènes endomitotiques chez Cerastium dominici Fabarger.</i>
600	Fabarger Claude Extract	Bulletin de la Société botanique suisses, tome 76, 1966. <i>Contribution à la cytotaxonomie du genre Petrorhagia (=Tunica).</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
601	Fabarger Claude Extract	Boissiera Genève, 14, 1969. <i>Le rôle d'un jardin botanique dans les recherches de cytotaxonomie.</i>
602	Fabarger Claude Extract	Bulletin de la Société botanique suisses, tome 74, 1964. <i>Recherches cytotaxonomiques sur quelques Erysimum.</i>
603	Fabarger Claude Extract	Anales del Instituto Botanico Antonio José Cavanilles del C.S.I.C., Madrid, Tomo XXXII, Vol. II, 1975. <i>Sur quelques Marguerites d'Espagne et de France (Etude cytotaxonomique).</i>
604	Final Information	Kushiro International Wetland Centre.
605	Folder	Sixième Excursion Phytogéographique Internationale. Roumanie, 1931.
606	Folder	Guide de la Sixième Excursion Phytogéographique Internationale. Roumanie, 1931.
607	Folder	Sixième Excursion Phytogéographique Internationale. Roumanie, 1931. Circulara nr. 2.
608	Folder	Sixième Excursion Phytogéographique Internationale. Roumanie, 1931. Circulara nr. 1.
609	Folder	Sixième Excursion Phytogéographique Internationale. Roumanie, 1931. Circulara nr. 1.
610	Folder	Akan National Park – Lakes Volcanoes and Forests.
611	Folder	The Environment Agency: Wetlands in Japan.
612	Folder	Hokkaido Development Bureau: Kushiro River Embankment – Earthquake disasters and Restoration.
613	Folder	Kushiro-Gawa hanasaka Jiisan Project.
614	Folder	Scottish Natural Heritage: Boglands – Scotland's Living landscapes.
615	Folder	Peatland Advisory Team.
616	Folder	Kushiro Shitsugen National Park Hokkaido Tsurumura Taito.
617	Folder	Akkeshi Town Office: Lake Akkeshi – Bekanbeushi Marsh, a Ramsar Site. Plentiful Living Things Tended by Abundant Marsh Water.
618	Folder	The Kushiro City Museum.

Continues.

Table 1 - Continuation.

No	Author/Name	Title
619	Folder	Kushiro Shitsugen National Park.
620	Folder	Kushiro Shitsugen National Park Ghid. Onnenai Trail nature Guide.
621	Folder	Kushiro Shitsugen National Park Ghid. Dragonflies of Kushiro Shitsugen.
622	Folder	Kushiro Shitsugen National Park Ghid. Siberian Salamander.
623	Folder	Kushiro Shitsugen National Park Ghid. The Tancho of Kushiro Shitsugen.
624	Folder	Onnenai Visitor Center.
625	Folder	Akan International Crane Center.
626	Folder (Japanese)	Akan International Crane Center.
627	Folder-Map	Hokkaido Development Bureau: Kushiro Development and Construction Department: Cross dike of the Kushiro River.
628	Folder-Map	Ushiro River.
629	Foucault (De) Bruno, Géhu Jean-Marie Extract	Documents phytosociologiques, Vol. III, Lille (1978). <i>La vegetation relictuelle des pelouses rases acidoclines du Nardo-Galion dans le Nord de la France.</i>
630	Fukarek Pavle Extract	Feddes Repertorium, Band 81, Heft 1-5, 1970, Berlin. <i>Bemerkungen zu einigen balkanischen und balkano-karpatischen Baum- und Straucharten.</i>
631	Futák Ján Extract	Mizející flóra a ochrana fylogenofondu v ČSSR, 1981, Praha. <i>Endemické rastliny Slovenska.</i>
632	Géhu J.M., Géhu J. Extract	Documents phytosociologiques, Vol. V, Lille (1980). <i>Sur l'associations a Polygonum achoreum et Polygonum aviculare des sites pietines du Quebec.</i>
633	Géhu J.M., Géhu-Franck J. Extract	Évolution des prés-salés nord-armoricains sous l'impact de la marée noire.
634	Géhu J.M., Géhu-Franck J. Extract	Documents phytosociologiques, Vol. V, Lille (1980). <i>Aperçu phytosociologique sur les falaises d'Hendaye et de St-Jean-de-Luz (Pays basque).</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
635	Géhu Jean -Marie, Géhu Jeannette Extract	Berichte der Internationalen Symposien der Internationalen Vereinigung für vegetationskunde Heraus gegeben von Reinhold Tuxen, 1978, J. Kramer, Vaduz. <i>Approche synphytosociologique des agrocenoses du Nord de la France.</i>
636	Géhu Jean -Marie, Foucault (De) Bruno, Chantal Van Haluwyn Extract	Sonderdruck aus Excerpta Botanica, sectio B, Band 19 (1979). Gustav Fischer verlag-Stuttgart-New York. <i>Bibliographia Phytosociologica: Gallia. Pars IV a.</i>
637	Géhu Jean -Marie, Foucault (De) Bruno, Chantal Van Haluwyn Extract	Sonderdruck aus Excerpta Botanica, sectio B, Band 19 (1979). Gustav Fischer verlag-Stuttgart-New York. <i>Bibliographia Phytosociologica: Gallia. Pars IV a.</i>
638	Géhu Jean -Marie, Géhu Jeannette Extract	Publications du CNEXO: Actes de Colloques nr. 9 – Les côtes atlantiques d’Europe, évolution, aménagement, protection. Brest, France, 1979: 269-276. <i>Synecologie d’un systeme dunaire en deflation. L’exemple des Dunes de la Slack (Département du Pas-de-Calais France).</i>
639	Géhu Jean -Marie, Foucault (De) Bruno Extract	Documents phytosociologiques, Vol. VI, Lille (1977). <i>Les pelouses a Tortula ruraliformis des dunes du Nord-ouest de la France.</i>
640	Géhu Jean -Marie, Foucault (De) Bruno Extract	Documents phytosociologiques, Vol. VI, Lille (1977). <i>Les pelouses therophytiques halophiles des falaises de la manche orientale (de la Seine maritime au Pas-de-Calais).</i>
641	Géhu Jean -Marie, Foucault (De) Bruno Extract	Documents phytosociologiques, Vol. VI, Lille (1977). <i>Les pelouses siliceuses a Therophytes de la zone littorale du Nord de la France (I).</i>
642	Géhu Jean -Marie, Bigot Marguerite Extract	Sonderdruck aus Excerpta Botanica, sectio B, Band 20 (1980). Gustav Fischer verlag-Stuttgart-New York. <i>Bibliographia Phytosociologica: Gallia. Pars V.</i>
643	Géhu-Franck Jeannette Extract	Documents phytosociologiques, Vol. VI, Lille (1977). <i>Caracteristiques edaphiques comparees des dunes a Tortula ruraliformis du Nord-Ouest de la France.</i>
644	Gerdol Renato Extract	Journal of Vegetation Science 1, 1990. <i>Vegetation patterns and nutrient status of two mixed mires in the southern Alps.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
645	Gervais Camille Extract	Bulletin de la Société Neuchateloise des Sciences Naturelles, Tome 91, 1968. <i>Notes de cytotaxonomie sur quelques Avena vivaces.</i>
646	Gervais Camille Extract	Bulletin de la Société botanique suisses, tome 78, 1968. <i>Sur un critère anatomique nouveau, utilisable dans la taxinomie des Avoines vivaces.</i>
647	Ghrințescu Ioan, Borza Alexandru Memoir	Memoriul directorilor institutelor de botanică din Cluj adresat autorităților universitare și Înaltului Minister al Instrucțiunii publice, arătând nevoia de a clădi un nou Institut Botanic.
648	Grebенщиков О.С. Extract	Institutul de Geografia, Academia de Științe a URSS, 1970, Moscova. <i>География растительности балканского полуострова (Geografia vegetației din Peninsula Balcanică).</i>
649	Herbert Bruns Booklet	Biologische Abhandlungen, 1969. <i>Lebensschutz oder Bioprotektion.</i>
650	Hunkeler Claudine, Fabarger Claude Extract	Bulletin de la Société Neuchateloise des Sciences Naturelles, Tome 90, 1967. <i>Contribution à la Cytotaxonomie du genre Pimpinella L.</i>
651	Izco Jesus, Géhu Jean -Marie Extract	Documents phytosociologiques, Vol. VI, Lille (1977). <i>Les ourlets nitrophiles annuels à Anthriscus caucalis du littoral Nord-Ouest de la France.</i>
652	Izco Jesus, Géhu Jean -Marie Extract	Documents phytosociologiques, Vol. VI, Lille (1977). <i>Un exemple de végétation macrohemiterophytique phytonitrophile: le Smyrnietum olusatri du littoral de La Manche Occidentale.</i>
653	Jakucs Pál Extract with dedication	Acta Botanica Croatica, Vol. XXVIII, 1969. <i>Die Sprosskolonien und ihre Bedeutung in der dynamischen Vegetationsentwicklung (Polycormonsukzession).</i>
654	Jurko Anton Extract	Preslia, Praha, 45:41-69, 1973. <i>Multilaterale Differenzierung als Gliederungsprinzip der Pflanzengesellschaften.</i>
655	Kapoor B.M., Löve Askell Extract	Caryologia, Vol. 23, n. 4, 1970. <i>Chromosomes of Rocky Mountain Ranunculus.</i>
656	Karacsonyi Carol Extract	Studii și comunicări IV, Satu Mare, 1980. <i>Cercetări asupra florei și vegetației terenurilor mlăștinoase din Câmpia Nirului și Câmpia Careiului.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
657	Kornaś Jan Extract	Taxonomy, Phytogeography and Evolution, Valentine, D.H. (ed.), London and New York, 1972: 37-59. <i>Corresponding taxa of Eurasia and North America.</i>
658	Kremp Gerhard Extract	Journal of the British Interplanetary Society. Vol. 21, 1968: 99-112. <i>Observations on Fossil-like Objects in the Orgueil Meteorite.</i>
659	Leppik E.E. Extract	Phytomorphology, Vol. 21, Nos. 2-3, 1971. <i>Paleontological evidence on the morphogenic development of flower types.</i>
660	Leute G. H. Xerox	„200 Jahre Wulfenia carinthiaca 1779-1979“ Gedanken über unsere Kärntner Landesblume.
661	Leute G.H. Extract	Carinthia II, Klagenfurt, 1972. <i>Der Kugelginster, Cytisanthus radiatus (L.) Lang, eine floristische Kostbarkeit am Weißensee.</i>
662	Leute G.H. Extract	Carinthia II, Klagenfurt, 1976. <i>Über ein neu entdecktes Vorkommen der Erbsen-Wicke (Vicia pisiformis L.) am Magdalensberg in Kärnten.</i>
663	Leute G.H. Extract	Carinthia II, Klagenfurt, 1976. <i>Zum Vorkommen einiger kritischer Weißorne (Crataegus L.) in Kärnten.</i>
664	Leute G.H. Extract	Carinthia II, Klagenfurt, 1978. <i>Vorläufige Mitteilung über zwei Sippen aus dem Campanula patula – Aggregat und ihre Verbreitung in Kärnten.</i>
665	Leute G.H. Extract	Carinthia II, Klagenfurt, 1978. <i>Ein weiterer Standort der Glanzbinse Holoschoenus romanus (L.) Fritsch subsp. holoschoenus (L.) Greuter in Kärnten.</i>
666	Leute G.H., Müller I. Extract	Carinthia II, Klagenfurt, 1979. <i>Potamogeton acutifolius Link und Lemna trisulca L., zwei verschollen geglaubte Vertreter der Kärntner wiederentdeckt.</i>
667	Leute G.H., Niklfeld H. Extract	Carinthia II, Klagenfurt, 1979. <i>Über ein bemerkenswertes Vorkommen der Gelben Taglilie (Hemerocallis lilio-asphodelus L.) in Kärnten.</i>
668	Leute G.H. Extract	Carinthia II, Klagenfurt, 1979. <i>Ein Brief von Franz Xaver Freiherr von Wulfen im Landesmuseum für Kärnten in Klagenfurt.</i>
669	Leute G.H. Extract	Carinthia II, Klagenfurt, 1980. <i>Das Schlammkraut, Limosella aquatica L. (Scrophulariaceae), ein interessanter Neubürger der Kärntner Flora.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
670	Leute G.H., Müller I. Extract	Carinthia II, Klagenfurt, 1982. <i>Das Knöterich-Laichkraut (Potamogeton polygonifolius Pourr.) neu für Kärntner und Österreich.</i>
671	Leute G.H. Extract	Carinthia II, Klagenfurt, 1983. <i>Robert Benz Freicherr von Albkron (1863-1921) und seine botanischen Sammlungen am Landesmuseum für Kärnten.</i>
672	Leute G.H., Mildner P. Extract	Carinthia II, Klagenfurt, 1983. <i>Notizen zur Ruderalfloren und Fauna der Klagenfurter Innenstadt.</i>
673	Leute G.H. Extract	Carinthia II, Klagenfurt, 1984. <i>Zum Gedenken an Alfred Neumann (1916-1973).</i>
674	Leute G.H. Extract	Carinthia II, Klagenfurt, 1984. <i>In memoriam OstR. Dr. Fritz Turnowsky.</i>
675	Leute G.H., Sembach W. Extract	Carinthia II, Klagenfurt, 1984. <i>Die Verbreitung der Quetschgurke (Thladiantha dubia Bunge, Cucurbitaceae) in Kärnten und deren Auftreten als Maisunkraut.</i>
676	Leute G.H. Extract	Carinthia II, Klagenfurt, 1972. <i>Der Kugelginster, Cytisanthus radiatus (L.) Lang, eine floristische Kostbarkeit am Weißensee.</i>
677	Leute G.H. Extract	Phyton (Austria), Vol. 16, 1974. <i>Der Aronstab (Arum maculatum L.) – neu für Kärnten.</i>
678	Leute G.H. Extract	Ann. Naturhistor. Mus. Wien, 81, 1978. <i>Ergebnisse einer botanischen Sammelreise durch das südliche Jugoslawien im Jahre 1969.</i>
679	Leute G.H., Pirker U., Prugger O., Rippel H., Wagner S. Extract	Carinthia II, Klagenfurt, 1975. <i>Nachträge zur Flora von Kärnten IV.</i>
680	Leute Von Gerfried, Maurer Willibald Extract	Carinthia II, Klagenfurt, 1977. <i>Zur Verbreitung einiger Brombeerarten (Rubus, Sectio Eufruticosi) in Kärnten.</i>
681	Leute Von Gerfried, Maurer Willibald Extract	Carinthia II, Klagenfurt, 1983. <i>Rubus juennensis Leute & Maurer, eine neue Brombeerart aus dem östlichen Kärnten.</i>
682	Lindsay Richard Calling card	Edinburg. Chairman of International Mire Conservation Group.
683	List of participants	Participants – The 7th IMCG Field Symposium in Japan, 1996.
684	Löfroth Michael Calling card	Swedish Environmental Protection Agency.

Continues.

Table 1 - Continuation.

No	Author/Name	Title
685	Löve Askell, Löve Doris, Kapoor Brij Extract	Arctic and Alpine Research, Vol. 3, No. 2, 1971. <i>Cytotaxonomy of a Century of Rocky Mountain Orophytes.</i>
686	Löve Doris, Löve Askell Extract	Ecology, Vol. 47, No. 5, Late Summer, 1966. <i>Nature preservation in Romania.</i>
687	Löve Doris Extract	Ecology, Vol. 51, No. 5, Late Summer, 1970. <i>The Soviet Arctic Coast.</i>
688	Löve Doris Extract	Ecology, Vol. 50, No. 6, Late Summer, 1969. <i>A magnificend world ecology.</i>
689	Löve Doris Extract	Ecology, Vol. 51, No. 4, Late Summer, 1970. <i>A comprehensive plant embryology.</i>
690	Löve Doris Extract	Ecology, Vol. 51, No. 4, Late Summer, 1970. <i>Perspectives in Phytochemistry.</i>
691	Löve Doris Extract	Ecology, Vol. 51, No. 4, Late Summer, 1970. <i>Plant Science.</i>
692	Löve Doris Extract	Taxon 20(1), 1971. <i>Jacques Rousseau – In memoriam.</i>
693	Löve Doris Extract	Ecology, Vol. 51, No. 3, Late Summer, 1970. <i>The Arctic Packice. The classical Flora of North America.</i>
694	Löve Doris Extract	Taxon 19 (2), 1970. <i>Emendations in the Icelandic Flora.</i>
695	Mériaux J.-L., Géhu J.-M. Extract	Reactions des groupements aquatiques et subaquatiques aux changements de l'environnement.
696	Meusel Hermann Extract	Arch. Naturschutz u. Landschaftsforsch, Berlin, 1968. <i>Geobotanische Beobachtungen in den Südost-Karpaten.</i>
697	Mititelu D., Cojocaru V. Extract with dedication	Ocrotirea Naturii, 14, nr. 1, 1970. <i>Flora și vegetația rezervațieio „Frumoasa” – Suceava.</i>
698	Morariu I., Ularu P., Negruș H., Danciu M. Extract	Comunicări de Botanică. Vol. XI, 1967. <i>Contribuții la cunoașterea vegetației din Poiana Brașov.</i>
699	Mucina L., Valachovič M., Jarolimek I. Extract	Abstracta Botanica 10: 227-233, 1986. <i>Ecological differentiation of alpine plant communities in a glacial circle in Bulgaria.</i>
700	Müller Cornelius Extract	Vegetatio. Acta Botanica, Vol. XVIII, 1969. <i>Allelopathy as a factor ecological process.</i>
701	Müller Cornelius Extract	Yeitschrift für Pflanzenkrankheiten und Pflanzenschutz, 1967. <i>Die Bedeutung der Allelopathie für die Zusammenensetzung der Vegetation.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
702	Notification	List Oral Presentation.
703	Pavan Mario Booklet	Deperimento e Moria delle foreste: una calamità ecologica provocata dall'Uomo.
704	Pawlowska Stanisława Extract	Fragmenta Floristica et Geobotanica, Ann. XII, Pars 4, Kraków, 1966. <i>De position systematica speciei Saxifraga wahlenbergii Ball (=S. perdurans Kit.).</i>
705	Pawlowski Bogumil Extract	Arch. Naturschutz u. Landschaftsforsch, Berlin, 1969. <i>Die Karpaten und die Sudeten cine vergleichende pflanzengeographische Studie.</i>
706	Pedrotti F., Sanesi G., Ballelli S., Cortini Pedrotti C., Orsomando E. Extract	Lavori della Società Italiana di Biogeografia. Nuova serie, Vol. IV, Siena, 1976. <i>Il Piano di Rascino (Rieti) – note fitogeografiche.</i>
707	Pedrotti Franco, Chemini Claudio Extract	Studi Trentini di Scienze Naturali. Acta Biologica, Vol. 58, Trento, 1981: 425-462. <i>La vegetazione del laghestel di Piné (Trento).</i>
708	Pedrotti Franco, Cortini Pedrotti Carmella Extract	Comun. Soc. Stud. Veget. Alp.orient. dinar. 14, Ljubljana 1978. <i>Notizie sulla diastruzione del Carici-Fraxinetum angustifoliae lungo la Costa Adriatica (Italia Centro-Meridionale).</i>
709	Pedrotti Franco Extract	Studi Trentini di Scienze Naturali. Vol. XLIV, N. 1, Trento, 1967: 3-13. <i>Proposte per l'organizzazione in riserva integrale della torbiera delle Viotte di Monte bondone (Trento).</i>
710	Pedrotti Franco Extract	Colloques phytosociologiques, Vol. VII, Lille, 1978. <i>La vegetation de la torbiere du Vedes (Trento).</i>
711	Pedrotti Franco Extract	Archivio Botanico e Biogeografico Italiano, Vol. XLVII (1971). <i>Carex buxbaumii, relitto glaciale: prima segnalazione per l'Italia peninsulare.</i>
712	Pedrotti Franco Extract	Studi Trentini di Scienze Naturali. Acta Biologica, Vol. 56, Trento, 1980: 37-43. <i>Hammarbya paludosa (L.) O. Kuntze, specie nuova per la flora italiana.</i>
713	Pedrotti Franco Extract	Studi Trentini di Scienze Naturali. Acta Biologica, Vol. 55, Trento, 1980: 3-9. <i>La scoperta della Scheuchzeria palustris L. nel Trentino.</i>
714	Pedrotti Franco Extract	Archivio Botanico e Biogeografico Italiano, Vol. XLIII (1967). <i>Giuseppe Dala Fior.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
715	Pedrotti Franco Extract	Atti del Seminario "Problemi scientifici e tecnici della conservazione del patrimonio vegetale" Firenze, 1979. <i>La conservazione della vegetazione negli ambienti umidi.</i>
716	Pedrotti Franco Booklet	Instituto di Botanica dell'Universita di Camerino: un relitto di bosco planiziare a <i>Quercus robur</i> e <i>Fraxinus angustifolia</i> lungo il fiume sinello in Abruzzo.
717	Pedrotti Franco Booklet	Instituto di Botanica dell'Universita di Camerino: Guida all'escursione della Società Botanica Italiana in Val d'Adige e nel Parco Nazionale dello Stelvio (27-30 giugno 1980).
718	Post Card	The Beautiful Scenery of East Hokkaido: Dance of cranes couple.
719	Post Card	The Beautiful Scenery of East Hokkaido: Ezo yellow lilies and the crane.
720	Publications Catalogue 1996/97	Wetlands International.
721	Review	Natur schutz arbeit in Sachsen. 33, Jahrgang, 1991.
722	Review	Natur schutz arbeit in Sachsen. 31, Jahrgang, 1989.
723	Review	Natur schutz arbeit in Sachsen. 30, Jahrgang, 1988.
724	Review	Les torbières au pays des plantes carnivores.
725	Review	The newsletter of Wetlands International, nr. 2, 1996.
726	Review	Global Mire and peatland Conservation: Proceedings of an International Workshop.
727	Review	Irish Peatland conservation plan 2000.
728	Review	National Institut for Environmental Studies: Mires of Japan – Ecosystems and Monitoring of Miyatoko, Akaiyachi and Kushiro Mires.
729	Review (xeros)	The newsletter of Wetlands International, nr. 1, 1996.
730	Review (xeros)	Le Courier de la Nature, nr. 157, 1996: Protection des zones humides.
731	Rivas-Martinez S., Géhu Jean -Marie Extract	Documents phytosociologiques, Vol. III, Lille (1978). <i>Observations syntaxonomiques sur quelques vegetations du valais Suisse.</i>

Continues.

Table 1 - Continuation.

No	Author/Name	Title
732	Rusan Romulus Article	Viața studențească, nr. 43, 11 decembrie 1968. <i>De rerum naturae (interviu cu profesorul Borza Alexandru).</i>
733	Soran V. Extract with dedication	Studii și comunicări de Ocrotirea Naturii, Suceava, 1973. <i>Genofondul și problema ocrotirii lui.</i>
734	Soran V. Extract with dedication	Natura – Revista Societății de Științe Biologice din RSR, 1970. <i>Orientări și realizări contemporane în problema originii vieții.</i>
735	Soran V. Extract with dedication	Progresile Științei, 5, nr. 6, 1969. <i>Viața și originea ei în lumina științei contemporane.</i>
736	Soran V. Extract with dedication	Progresile Științei, 6, nr. 7, 1970. <i>Biomatematika și biologia teoretică.</i>
737	Soran V., Rațiu O. Extract with dedication	Contribuții Botanice, Cluj-Napoca, 1973. <i>Alelopatia și rolul ei în mecanismul de asociere a plantelor.</i>
738	Šourková Michaela Extract	Preslia, 50, Praha, 1978. <i>Caryophyllaceae subfam. Dianhoideae – Begrenzung, Charakteristik und Gliederung.</i>
739	Sutter Ruben Extract	Acta Botanica Croatica, Zagreb, 1969. <i>Ein Beitrag zur Kenntnis der soziologischen Bindung Süd-Südostalpiner Relikttendemismen.</i>
740	Tanaka Chihoko Calling card	Volunteer Interpreter (English/japanese).
741	Täuber F. Extract	Berichte der Internationalen Symposien der Internationalen Vereinigung für Vegetationskunde, 1981. <i>Phytozönologische Untersuchung der extrakarpatischen Rotbuchenwälder der lippaer Hochebene (Rumänien).</i>
742	Tăcină Aurica Extract with dedication	Revue Roumaine de Biologie. Série de Biologie Végétale, Tom 24, nr. 1, 1979. <i>Recherches caryologiques sur l'Achillea schurii Schultz-Bip.</i>
743	Tüxen R. Extract	Ber. Naturhist. Ges. 114, Hannover, 1970. <i>Zur Syntaxonomie des europäischen Wirtschafts-Grünlandes.</i>
744	Tüxen R. Extract	Mitt. Fluor.-soz. Arbeitsgem., N.F. 17, Todemann Göttingen, 1974. <i>Die Haselünner Kuhweide. Die Pflanzengesellschaften einer mittelalterlichen Gemeindeweide.</i>
745	Wakatsuki Naoko Calling card	Consultants in the Environmental and Applied Earth Sciences, Tokio, Japan.
746	Warner Barry G. Phd, Calling card	Department of Geography Waterloo, Ontario, Canada.

Continues.

Table 1 - Continuation.

No	Author/Name	Title
747	Wattez Jean-Roger, Géhu Jean -Marie, Foucault (De) Bruno Extract	Documents phytosociologiques, Vol. VI, Lille (1977). <i>Les pelouses à annuelles des buttons de la Brenne.</i>
748	Wenger José Extract	Bulletin de la Société Neuchateloise des Sciences Naturelles, Tome 92, 1969. <i>Contribution à la Biosystématique de la Gesse du printemps: Lathyrus vernus (L.) Bernh.</i>