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Description of certain varieties of sea buckthorn (*Hippöphae rhamnoides* L.)

Homologated and patented by prof. Rati Ioan Viorel

INVITED SPEAKERS

THE EXAGGERATED GENERALIZATION REGARDING THE MUTUAL ADAPTATION OF FLOWERING PLANTS AND POLLINATING INSECTS

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The authors present data and examples of mutual adaptation between flowering plants and pollinating insects. The adaptation developed gradually, the flowers becoming nectariferous. After the discovery of nectaries (in 1717), many botanists have exaggerated the role of the selection factors in their intention, otherwise a good one, to support with as many arguments as possible the theory of evolution of the unsurpassed Darwin (1859). After a critical examination of the papers published on this subject between 1859 and 1879, the famous French botanist Gaston Bonnier emphasizes the insufficiency of the facts underlying the role of nectaries in the reproduction of angiosperms, after he investigated the relationship between nectaries, the shape of the flowers and insects; to this end he studied more than 800 plant species during 10 years. Following the performed study, the named author concludes that it is impossible to generalize the fact that all floral arrangements are calculated to attract insects by providing them with nectar and achieving cross-pollination; it cannot be clearly stated that there is a mutual adaptation among all the flowers and insects.

NEW TECHNOLOGIES FOR SUSTAINABLE FRUIT GROWING

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Nowadays, the Fruit Growing Industry faces new challenges regarding higher production costs but limited fruit selling prices, environmental footprint and increasing consumers concerns for fruit residues content. The paper presents some new approaches on orchard sustainable management from fruit tree planting to harvest. Detailed aspects related to new planting systems and tree canopies are exposed, taking in consideration new pruning principles to balance the tree growth and fruit production. Mechanical and hand fruit thinning is recommended to produce constant and high quality yield, while soil orchard management, irrigation and fertilization, are supporting that. Orchard protection against late frost, hail, rain and strong wind is largely discussed, as a priority for supporting a sustainable production. In order to reduce the fruit and environment pollution, alternative pests and diseases control methods are presented with special accent on biological measures. The harvest can be organized in order to reduce the man work costs and to preserve the fruit inner quality for immediate fresh consumption or storage.

BUSINESS CENTER FOR EXPORT BACAU SUPPORT FOR POTENTIAL EXPORTING SME's

COSTIN LIANU

"Spiru Haret" University of Bucharest

Starting from the needs of small and medium-sized firms and their difficult access to foreign markets, the Ministry of Business, Commerce and Entrepreneurship through the Swiss-Romanian Cooperation Program finances the project "Integrated Export Services for SMEs in Romania".

Through this project the Business Center for Export Bacau was set up, which operates within the Bacau Chamber of Commerce and Industry, a pilot center that focuses between August 2017 and November 2019 on the furniture and ecological agriculture industry, with the intention to address other areas in the future.

The main objective established by the funders is the implementation of an integrated program to support companies, resulting in increased exports of SMEs in Bacau County, NE Region and neighbouring counties of Bacau.

SME training and training programs for the best export performance are free and have the following themes:

- developing export strategies
- management of participation at international fairs/exhibitions and economic missions
- the establishment and management of export clusters
- the importance of promoting through own sectoral brands.

The training sessions will be attended by Swiss lecturers and specialists who, besides the presentations, will advise companies with potential for: improving product quality and certification, brand building, identifying export markets, setting the appropriate export strategy for each company and participating in fairs, exhibitions and economic missions.

Running the training programs follows:

- preparing companies to access new markets
- assisting managers to acquire new skills specific to export promotion
- improving competitiveness on the value chain
- increasing the degree of innovation
- improving product quality
- integration of SMEs into the export promotion program through strategies based on branding and clustering.

Following the training / training program, the project will fund the participation of qualified firms at fairs and international exhibitions, in order to promote their products and access new markets.

The program can be accessed by all SMEs active in the fields of bio-agriculture and furniture production, and in particular by:

- exported with limited success: occasional exports, which sell on a single target market or to a single distributor
- exporting low-value, minimally processed products that could have a higher added value
- potential exporters who do not export but have limited knowledge of markets and want to export
- small firms that could benefit from the clustering potential.

ACTUALITY OF GRIGORE ANTIPA'S PRINCIPLES AND PROBLEMS IN TOPIC OF THE DANUBE FLOODING AREAS IMPROVEMENTS

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Since 1907, Grigore Antipa published his principles regarding Danube waterside amelioration. In 1910 he published the Book „*Danube Flooding Regions. Its actual stage and means to make it worth*”. In 318 pages, Antipa printed a general description of Danube waterside areas, a special reference to different types of lands which are in the flooding Danube area with their actual production and advantageousness/profitableness; how to reevaluate the Danube flooding areas and what kind of politics must follow the State in topics of improvement of these regions. His principles were: - increasing production and advantageousness of each spot of land (today, fallows); - allocation of funds to capitalize/reevaluate the flooded and flooding lands by: draining works, embarking/daming up, strengthen of river shores, improvements of cultures, better managing pools and marshes for fishing; - preliminary feasibility study, to whom must cooperate hydrotechnicians, agronomists, economists, scientists; - those studies and projects are not very expensive, but to carry works into the field (drainages, irrigations, building dams and water gates, fitting up marshes, etc.) were estimated in 1907 to 30 million lei for Danube waterside between Brăila and Turnu Severin (Plot of lands from Dobrogea and Danube Delta supposed to be more expensive).

As solutions: 1 – Works to be granting to interested companies on their own charges, in condition that they will exploit (free of charge) a number of years those lands of a high quality and thus, redeem/liquidate to pay should be in a short time; 2 - Dividing into lots of 500 – 600 ha and granting them a certain number of years, with condition that leaseholders to ameliorate according to a project before

established, by a book of tasks. 3 - Foresight in State annual budget of an amount of money dedicated to these improvements. 4 – Creating of a fund to Saving House of Economy (CEC) – which should be continuously feeding from the improvement lands plus-value. Thus, in time all State's lands from the Danube flooding areas will be improved from their own income. 9 - Organization of trade-unions for hydroimprovements and projects for private properties in the Danube flooding areas. State should come to understanding with neighboring owners and reunited in trade-unions, on principles of Water Rights. 10 - Granting reimbursements to land owners, for digging channels of letting out or drain water.

As program, Grigore Antipa suggested; - to be respected his principles on the way of works; - a system based on latest scientific data and on the experience of other large rivers from the world; to put in value the natural and economical of this special area; - the program of work in all Danube region, without change the natural regime of river and not disturbing the balance established there in millenary; - a general Plan not to cease in front of interested people to build a huge and continuous dam along all Danube shore, with evil consequences.

Conclusions: 1 - For fish production, leaving unembanked large and permanent marshes to avoid clogging. 2 - It is necessary embanking flooding areas together with small and temporary marshes and **jepci**; valorification of land with agriculture, grazing and fishing. 3 - Keeping natural stage of balance in Danube Waterside. 4 - The area is dry, with alluvial deposits and cultivation of cereals should quickly exhausting the land. 5 - Taking advantage by water kind action and by brought mud of Danube, fertilizing this plain. With other systems, this wonderful gift of nature should run unused, as fast as possible to the Black Sea.

BIODIVERSITY OF ECUADOR – A STUDY CASE FOCUSED ON AMPHIBIANS

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Ecuador is a biodiversity hotspot that holds an incredibly high ecosystem and species diversity. The remarkably complex local geological, geomorphological, hydrological and climate conditions create a mosaic of distinct ecosystems types, divided in three major regions: Coastal, Andean and Oriental (Amazonia).

Amphibian species diversity is highest in the Neotropics, which hold almost half the number of known species. This high species diversity is almost entirely endemic, with 96% occurring only in the Neotropics. Our knowledge of this group is at best mediocre; nearly one-quarter of all known species described over the last decade. The amphibian fauna of Ecuador is the third most diverse in the world after Brazil and Colombia, and the first in terms of species density, with over 589 known species. At least 90 new species for science were described for Ecuador during the last decade only. Almost one third of the anuran species from Ecuador belong to the genus *Pristimantis*. The direct-developing frog genus *Pristimantis* is by far the most speciose among terrestrial vertebrates with more than 508 species within the genus. During the last decade 121 new species of *Pristimantis* were described, about 30% of which from Ecuador.

Our studies on amphibians were done in two contrasting protected areas: a cloud forest and a dry coastal forest, both located in the El Oro Province, SW Ecuador. Reserva Buenaventura protects remnants of cloud forest situated between 450-1400 m and was intensively studied during the last 15 years, with two checklists published in 2013 and 2015. The reserve is a hotspot of biodiversity

with five new species of amphibians and one of reptiles described during the last decade. This provided the baseline information required for estimating the completeness of the inventory during a three years period (2014-2016). The study showed that the species inventory is still incomplete, due to high endemism and localized distribution of species, but also highlighted the limited reliability of past reports, especially those not backed up by preserved specimens in collections. The second protected area studied, Arenillas Ecological Reserve, is a coastal remnant of the previously widespread dry forests. Amphibian species diversity is lower, with animals adapted to cope with harsh environmental conditions. The life-history of a fossorial frog (*Ceratophrys stolzmanni*) was studied, highlighting the amazing adaptations developed.

Apart from similarity in area, (with Romania only slightly smaller in size than Ecuador), species diversity represents only 3.3% for amphibians, 4.8% for reptiles, 23% for birds and 26% for mammals. A comparison of herpetological studies and research directions in Neotropical and temperate regions points to differences in priorities and approaches. While in temperate regions, with low species diversity, research is mostly hypothesis-driven, research in the Neotropics is still exploratory and descriptive, focused more on taxonomy and conservation.

AGENDA 2030: PROVOCARE ȘI OPORTUNITATE PENTRU COMUNITATEA PROFESIONALĂ ÎN ECOLOGIE ȘI SUSTENABILITATEA DEZVOLTĂRII

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Concluziile rapoartelor privind modalitățile și nivelul de îndeplinire ale obiectivelor promovate în documentele cadru privind "dezvoltarea sustenabilă" - Agenda 21 și "Obiectivele Mileniului / MDG" adoptate succesiv la: i) Conferința ONU pentru Mediu și Dezvoltare (UNCED, Rio 1992) și; ii) Summitul ONU / Johannesburg - 2002 au evidențiat, pe de o parte, o serie de contribuții la proiectarea și testarea unor variante ale cadrului conceptual și infrastructurii instituționale și operaționale, iar, pe de altă parte, serioase limite de ordin științific (fundamental și aplicativ) și operațional care ar explica ritmul lent, în raport cu modificările accelerate din structura, funcționarea și reziliența Sistemului Terestru suport al vieții, suprapunerile și eficiența foarte redusă din primele etape ale tranziției la modelul de dezvoltare sustenabilă / MDS".

În documentele Summit-ului Rio +20 / Rio -2012 sunt preluate și dezvoltate aceste concluzii pentru a argumenta adoptarea unor decizii politice esențiale care au vizat: i) completarea și consolidarea cadrului generic multi-dimensional (17 obiective de dezvoltare sustenabilă / ODS și 169 activități și praguri) printr-un proces participativ larg (2013/2015); ii) adoptarea la Adunarea Generală ONU / Septembrie 2015 și precizarea aplicabilității universale a acestuia în intervalul 2016/2030 cu denumirea generică - "Agenda 2030 pentru Dezvoltare Sustenabilă" și; iii) facilitarea abordării integrate, coerența și sinergia tranziției la nivel global, regional și național și finalizarea procesului de tranziție la MDS în orizontul de timp 2030.

Prezentarea propusă încearcă să răspundă, din perspectiva comunității științifice, la provocările majore generate de către deciziile politice recente privind accelerarea și eficientizarea tranziției globale la un nou ciclu de dezvoltare al cărui atractor ar trebui să fie MDS, rezultat în urma redefinirii variantelor Rio '92 și Johannesburg 2012, consolidării, testării și validării acestuia.

În acest sens subliniem importanța procesului de integrare multi și transdisciplinară, susținut și orientat de către progresul teoretic, conceptual și operațional accelerat în cazul științelor integrative emergente - Ecologia Sistemică și Știința Sustenabilității - pentru: i) identificarea **Mediului Terestru: Natural** (biotic și abiotic) și **Social** ca ierarhie spațio-temporală de sisteme **ecologice cuplate - naturale și sociale sau sisteme socio-ecologice**; ii) crearea cunoașterii științifice privind, pe de o parte, complexitatea și dinamica relațiilor dintre componentele biotice și abiotice ale **mediului natural** aplicând principiile și metodologia ecologiei biologice și ecosistemice și, pe de altă parte, complexitatea relațiilor și proceselor din și dintre sisteme socio-ecologice, aplicând principiile teoretice și metodologia ecologiei sistemice; iii) crearea cunoașterii transdisciplinare prin integrarea cunoștințelor științifice multidisciplinare cu expertiza și cunoștințele tradiționale ale publicului și cu expertiza politică și managerială; iv) clarificarea interpretării unor concepte cheie (ex. biodiversitate vs. capital natural; dezvoltare durabilă vs. sustenabilă; ecologie vs. mediu; sectorial vs. ecosistemic (holist); potențial adaptiv; dinamică ne-lineară vs. deschidere ontică; v) interpretarea conceptului de dezvoltare sustenabilă ca atribut al sistemelor socio-ecologice și nu în ultimul rând; vi) proiectarea și construcția rețelei de platforme suport - Știință - Politici - Societate / SPS care trebuie să asigure cercetarea fundamentală și aplicată a sistemelor socio-ecologice; crearea cunoștințelor fundamentale și co-dezvoltarea cunoștințelor transdisciplinare și, fundamentarea gestionării procesului de dezvoltare sustenabilă a acestora.

În contextul marcat, pe de o parte, de către obiectivele majore ale Agendei 2030 iar, pe de altă parte, de către setul de solicitări, adresate comunității academice, de a inova căile și mijloacele de răspuns în sprijinul îndeplinirii obiectivelor sustenabilității, identificăm oportunitatea pentru membrii și grupurile cu expertiză diferită din

componența comunității "experților în ecologie" de a reacționa urgent și eficace. În acest sens propunem:

- i) dezvoltarea, adaptarea și perfecționarea organizațională și funcțională a acestei comunități profesionale și,
- ii) implicarea în: a) activitatea de fundamantare, dezvoltare și derulare a programelor de cercetare și monitoring integrat, pe termen lung, a complexelor de sisteme ecologice cuplate naturale și sociale (Sist. Soc.-Ecol.), distribuite la scara sub-bazinelor hidrografice (Sist. Soc. Ecol. locale) și a bazinelor (districtelor) hidrografice (Sist. Soc. Ecol. regionale), și a planurilor de management adaptiv (conservare, restaurare, utilizare sustenabilă) ale componentelor biostructurii Capitalului Natural (CN) (populații / specii, comunități / biocenoze, ecosisteme) și a **funcțiilor și serviciilor** acestora (inclusiv resursele genetice); b) activitatea de inovare a învățământului universitar și post-universitar pentru formarea și perfecționarea specialiștilor în domeniul multi și transdisciplinar (nivel 2) al "ecologiei și sustenabilității"; c) activitatea de comunicare, informare și educație a publicului și; d) activitatea de proiectare, dezvoltare și utilizare a infrastructurii instituționale și operaționale suport.

În final subliniem rolul comunității profesionale în ecologie și sustenabilitate în dezvoltarea capacității de a crea, testa și conserva potențialul adaptativ în cadrul sistemelor socio-ecologice.

BIODIVERSITY OF AQUATIC ORGANISMS

Oral presentations

SUCCESSIONS OF DIVERSITY, QUANTITATIVE AND FUNCTIONAL PARAMETERS OF PHYTOPLANKTON OF AQUATIC ECOSYSTEMS OF REPUBLIC OF MOLDOVA

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In 2015-2016 the taxonomic, quantitative structure and functioning of the phytoplankton in the Nistru river, Prut river and Dubasari reservoir was evaluated. Phytoplankton of Nistru river was represented by 86 species and intraspecific taxa which refer to 4 taxonomic groups, while of Prut river – by 97 species and intraspecific taxons from 6 taxonomic groups. In Dubasari reservoir there were identified 68 species, divided into 5 taxonomic groups. Variations in phytoplankton number and biomass during the vegetation period were found to be within the range of 0.56-19.43 mln cel./l, 1.07-15.31 g/m³ in Nistru river and between 0.63 and 11.03 mln cel./l, 1.7-13.7 g/m³ in Prut river. In the Dubasari reservoir the phytoplankton number and biomass oscillated within the limits of 0.9-8.19 mln cel./l, 0.88-15.71 g/m³. Higher values of quantitative phytoplankton parameters were recorded during the spring and summer periods in all the investigated aquatic ecosystems. In most cases the phytoplankton biomass values referred to the trophic category "eutrophic" sometimes "polytrophic".

Organic substances destruction values exceeded primary production values in most cases, the A/R ratio being less than zero, both in river ecosystems and in Dubasari reservoir, with the exception of the confirmed value for Nistru river at Camenca st. in the autumn of 2016 when the primary production values exceeded about 2 times the values of the destruction of organic substances. Thus the values of the primary production varied within the limits of 0.49-41.47 gO₂/m⁻² in 24h in Nistru river, 0.19-0.44 gO₂/m⁻² in 24h in Prut River and in the

Dubasari reservoir between 0.74-7.7 gO₂/m⁻² in 24h. The values of the destruction of organic substances were within the limits of 1.08-57.12 gO₂/m⁻² in 24h in Nistru, 1,36-32,31 gO₂/m⁻² in 24h in the Prut River and 1,63-46,17 gO₂/m⁻² in 24h in the Dubasari reservoir. According to the A/R ratio the self-purge indices of Nistru river, Prut River and Dubasari reservoir are within the limits of quality classes II-V (good – very polluted).

There were attested well-pronounced seasonal successions of phytoplankton, expressed by the modification of the taxonomic structure and complexes of dominant species of the algal communities, variations in the intensity of the production-destruction processes, conditioned by the presence in the composition of the phytoplankton of the species with different production capacities under the conditions of the environmental factors variation. It has been established that species that are not able to compete, depending on their characteristic range of the determinant factors (temperature, light, water mass dynamics and nutrient concentration) during the vegetation period disappear from the composition of the phytoplankton. The ability of species to compete with other species of phytoplankton under conditions of anthropogenic pollution and eutrophication is conditioned by the intensity of nutrient use, their production capacities and their adaptations to the seasonal variations of the termic and water layers light regime, as well as the tolerance to the concentrations of the polluting substances.

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RED ALGAE FROM ROMANIAN BLACK SEA COAST AND POSSIBLE PRESENCE OF NEW SPECIES

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Phytobenthos includes all the algae that attach to solid substrate and marine phytobenthos is made up especially of pluricellular algae of the green algae category (*Enteromorpha*, *Ulva*, *Bryopsis*) but mostly of brown and red algae. Red algae represent an important component at Black Sea ecosystem, even though the number of species have decreased over time.

In this paper, a situation of red algae at our littoral, in the last years is presented. We consider that a particular attention should be paid to this group, because there is a dramatic decline regarding the number of Rhodophyta, this being explained by the fact that this group is the most sensitive to pollution, even though some genera of red algae (*Ceramium*) can also develop in eutrophic waters, sometimes covering the hard substratum up to 90%.

In particular after year 2000, researches highlighted some positive signs, in terms of the physico-chemical conditions of Black sea littoral waters, which has consequences for all biota. In this regard, it is possible to notice the recurrence of species not mentioned for a long time, and perhaps even the identification of some species not signaled at our seaside before. The present work shows two red algae species, one considered lost for many years and the other never signalled at our littoral, collected from various sites along the littoral, over the last years.

Unfortunately, no exact data about its location and biomass could be achieved, as the thalli, of both species were collected from the beach, teared away from the rocky bottom, so further investigations are absolutely necessary.

**THE BIOLOGY OF MUDSNAIL *ECROBIA MARITIMA*
(MILASCHEWITCH, 1916) (MOLLUSCA, GASTROPODA,
HYDROBIIDAE) AT THE ROMANIAN BLACK SEA COAST**

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The life cycle, growth, and annual production of *Ecrobia maritima* (Milaschewitsch, 1916) associated with the dwarf eelgrass *Zostera (Zosterella) notei* bed from the southern part of the Romanian Black Sea coast was investigated, forming part of a larger benthic survey. Quantitative random samples were taken at regular intervals over a period of 5 months using a corer, and collected snails of *E. maritima* were counted, measured and weighted. The average fresh weight of individuals was calculated from the following length-weight relationship $FW = 0.3449 \cdot L^{2.0494}$ ($n = 181$, $r = 0.9164$). *E. maritima* is a strictly annual species in the study area. Sexual maturity is attained at 6 months and a shell length of 2.5–3.0 mm. The average life span was estimated as approximately 12–14 months. Recruitment took place over a brief period in May and June, after which the breeding population died. Growth of the cohort C1 was slow during the cold season, probably due to the drop in the temperature. A period of rapid growth of the new generation C2 took place in June–July. Under unfavourable conditions (strong storms, low temperature, high pressure from predators) *E. maritima* was observed to burrow deeply into the sediment. Therefore, during the study period, the population of snails showed considerable variations of the above-ground density. The maximum above-ground density of snails was 4248 ind.·m⁻² and the maximum biomass was 12.49 g fresh wt·m⁻² in June 2015. Annual cohort production was estimated as 5.96 g fresh wt·m⁻²·a⁻¹. The obtained value for annual turnover ($P/\bar{B} = 1.86$) was comparable to the estimates for other hydrobiid species in similar habitats.

THE STUDY OF ZOOPLANKTON COMMUNITY DIVERSITY IN ZAGHEN RESTORED WETLAND

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The Zooplankton species richness found in Zaghen wetland area, located in the eastern part of Tulcea, were studied in four stations, during June to September 2017. The present investigation reveals 85 taxa of zooplankton which include rotifera, showing highest diversity of 56 taxa followed by that of copepoda with 15 taxa, cladocera with 14 taxa and Chironomidae larvae (Diptera).

This study was necessary to evaluate the ecological status of the Zaghen reservoir after restoring the functions as they are important in nutritive level and evaluating as well as ameliorating pollution status and thus used for determining the health of an aquatic ecosystem. Zaghen wetland aims to restore functions of wet ecosystems lost as a result of anthropogenic activities carried out in the 1970s and aimed at expanding Romania's agricultural area to the detriment of natural ecosystems. During the 2012 to 2015, a rehabilitation flood regime was carried out

This study was to implement the conservation of biological diversity, natural habitat, wild flora and fauna species in this wetland.

THE MONITORING OF THE FISH FAUNA IN THE UPPER DÂBOVIȚA RIVER BASIN 2015-2017

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The paper sums up the results of the study of fish fauna, carried out in the years 2015-2017, on an area of about 200 km², with an altitude level from 2200 to 940 m, in the upper basin of Dâmbovița river, in the Nature 2000 protected area ROSCI 0122 Făgăraș Mountains and Piatra Craiului National Park. Using the electrofishing method, in 7 sampling sites on the Dâmbovița River and the tributaries of Otic, Vlad and Tâmas were collected a number of 313 fish, ages 1 to 3 years: *Salmo trutta* L. 1758 - trout, Salmonidae, Ord. Salmoniformes, *Cottus gobio* L.1758 - bullhead, Cottidae, Ord. Scorpaeniformes, *Phoxinus phoxinus* L. 1758 – minnow, Cyprinidae, Ord. Cypriniformes. The paper contain data concerning the representation of the species from the perspective of the analytical and synthetic ecological indices, according to the sampling site facies analysis and the effect of the anthropic factors (the presence of the hydrotechnical constructions, the deforestation and the spruce monocultures). The ecological quality of the river was analyzed by calculating the biogenic capacity for trout (B), according to the Cristea-Vișoianu methodology and the application of the European Fish Index (EFI +). The material has been collected according to the current environmental legislation of Romania, following the principles of protection for the rare species and habitats.

NEW DATA ON THE DISTRIBUTION OF CARPATHIAN NEWT (*LISSOTRITON MONTANDONI*) IN ROMANIA

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The paper presents new data on the distribution of the Carpathian newt (*Lissotriton montandoni*) in Romania, and tries to elucidate why its distribution range stops at the Fagaras Mountains. One hypothesis is that the geological structure of mountains could be the reason for that. Ecological studies show that aquatic invertebrates fauna in small ponds and puddles differs significantly on acid rocks and on basic rocks. The stomach contents of the alpine newt (*Ichthyosaura alpestris*) differs from that of *Lissotriton montandoni* in the same pond? A multidisciplinary approach should resolve this problem.

EFFECTS OF EXPERIMENTALLY DECREASING WATER LEVEL TO *RANA DALMATINA* BONAPARTE, 1840 TADPOLES

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Amphibians are organisms with complex life cycles with their morphological plasticity significant influenced by the ecological factors. Tadpoles of several amphibians' species show flexibility during the development process by accelerating their metamorphosis as a respond to pond drying. In the present study, we investigated the plasticity in time of metamorphosis, as well as the effect on the body weight of *Rana dalmatina* tadpoles at the end of metamorphosis. We evaluated the response of the tadpoles to the simulated drying conditions by gradually reducing the water level in the experimental containers. There were used four water level treatments: constant high level, constant low level, slow decrease and fast decrease.

The results showed that *Rana dalmatina* tadpoles are able to speed up their metamorphosis process as an effect of drying habitats and this accelerated development causes a reduced body size. Statistical analysis points to a positive correlation between the duration of metamorphosis and the body mass at the end of this process. We noticed that the length of larval period and metamorphosis was influenced by water level decrease rhythm, but was not significantly affected by the water level. As in other studies on this subject, in tadpoles that experienced constant low water volume treatments, are remarkable the small dimensions at the end of their metamorphosis that was probably induced by the crowding effect and changes in water chemistry.

PRELIMINARY DATA ON WINTERING MONITORING OF BIRDS IN THE ROSPA0072 LUNCA SIRETULUI MIJLOCIU

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The present monitoring study of bird species was done inside the perimeter of Nature 2000 site ROSPA0072 Lunca Siretului Mijlociu as part of management plan. The present standard form of the site includes one list of 48 bird species that need special measures in order to prevent their decline of populations. Between these, 28 are breeding bird species in the area, but the site is very important during the migration and wintering time, when we can count more than 20,000 individuals of aquatic birds that use this perimeter like stopover and feeding territory.

Our field monitoring was done from 1 July 2016 to 30 June 2017, along 26 transects covering the whole territory of site. In January 2017, we included the Nature 2000 site in the national Wintering Census of Waterfowls, one long-term monitoring program developed by the Romanian Ornithological Society.

This winter was one very cold and strong, but from November 2016 to middle March 2017, we recorded 63 bird species, 16 from these being birds related to the water (aquatic species and two heron species), while 6 are raptors bird species and other 4 are owls species. The mallard (*Anas platyrhynchos*) was the dominant aquatic species, with near constant population during the winter (2100 – 2475 individuals). The wintering effectives of raptor birds on the site territory are quite impressive varying between 29 and 52 individuals per daily observation, with the common buzzard (*Buteo buteo*) as dominant species. The raven (*Corvus corax*) was one constant presence in the area, with great concentrations around abandoned carrion (sheep or dogs).

PERSISTENT ORGANIC POLLUTANTS (POPs) IN LOTIC ECOSYSTEMS – MUREȘ WATERSHED CASE STUDY

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International studies showed that the freshwater ecosystems are vulnerable to POPs. Consequently, according to the Conference of the Parties of the Stockholm Convention, it is necessary to have a mechanism for coherent data collection at regional and global scale on the concentration of these chemicals in the aquatic ecosystems and to evaluate the POP effects on ecological processes and of the medium and long term risk.

Our study aim was to assess the distribution and concentration of POPs in different compartments of the Mureș watershed lotic ecosystems. Samples of sediment, water and biota (benthic macroinvertebrates and fish tissue) were analysed in 16 sectors situated along the Mureș River and its tributaries, Arieș and Târnave.

Among the pollutants that were investigated in the reference zone, the following were identified: PCB, DDT, HCH, HCB, chlordan, mirex, BFR and PFAS. The most of the classes of POP and the highest concentrations were found in the fish tissues. The pollution with organochlorine pesticides is accentuated on Arieș downstream Câmpia Turzii and on Mures in areas downstream Târgu Mureș, downstream Luduș, downstream of the confluence with Arieș, at Alba Iulia, downstream Arad and in the Cenad–Șemlac region. Among the organochlorine pesticides, DDT has the widest distribution in the reference zone and the highest concentrations. Pollution with PCB is significant on Mureș downstream Luduș, at the confluence with Arieș and downstream thereof, downstream Alba Iulia, downstream of the

confluence with the Orăștiei River, at Mintia, downstream Arad and in the Cenad – Șemlac region.

This study was developed in the project SIDPOP financed by a grant from Iceland, Liechtenstein and Norway (EEA 2009 – 2014) in the frame of RO04 Program.

THE PHOTOLUMINESCENCE ANALYSES OF SOME CONSTITUENT PARTS OF CHUB FISH THAT HABITATES IN SIRET RIVER

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The goal of the study is to identify the accumulation of heavy metals in the constituent parts of the chub fishes that lives in polluted waters. The samples were fished in Siret River, downstream Galbeni Accumulation, Bacau Country. The photoluminescence analyses were applied to investigate fish parts of chub, such as: gills, brain and fin. The studied parts are composed from organic macromolecules. The impurities that are contained in chemical compounds from the samples have the origins in micro- and macro- organisms that serves as the food for fishes. The photoluminescence (PL) spectra were excited with the radiation of N₂-He laser with the photons energy of 3.67 eV and the lifetime of 10⁻⁸ s. The excited radiation interacts with organic and inorganic molecular electrons from the fish samples. The PL spectra of organic macromolecules contain the wide electronic bands (1 - 3 eV) with the dislocation energy of ~ 2 – 5 eV. The excited radiation is efficiently absorbed at the surface of the samples. Certainly in these regions of the samples are expected the presence of water-soluble impurities and other compounds of heavy metals. The PL spectra of fins consist of wide emission band that covers the spectral region from the line of resonance emission ($\lambda = 337.4$ nm) to ~ 600 nm. This band consists of at least six electronic sub-bands with the maximum at 400 nm. The intensity of the band increases 1.3 times for chub samples that length decreases with 4 mm (samples 8-317s and 8-314s). The PL spectra of the gills are wider then of the fins that were extracted from the same sample. The resonant PL limits the edge of the band

from the high energies and the edge of the band from the small energies tends to background PL at 700 nm (1.8 eV). The spectrum of brain (8-315) contains a structured band that lies from the resonant emission line till 660 nm. The composition of sub-bands that energies differ with ~ 0.1 eV is characteristic to electronic transitions in organic macromolecules. Only two sub-bands are common to spectra recoded from brain, fins and gills. The maximum of these bands are at 458 nm and 502 nm. It can be concluded that the studied component parts of chub fish are selective accumulators of organic and inorganic molecules. The complex structure of PL bands indicates the adsorption properties of the impurities from organic and inorganic compounds that can be found in the river water.

BIODIVERSITY OF AQUATIC ORGANISMS

Poster presentations

PRELIMINARY DATA ON THE DIVERSITY OF AQUATIC BEETLES IN ARONEANU LAKE (IASI COUNTY)

ION COJOCARU

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This paper presents preliminary qualitative and quantitative data on the aquatic coleopterans community taken from Lake Aroneanu (Iași) under the conditions of 2013. Lake Aroneanu is an artificial lake of meadow dam in the Moldavian Plain, formed in the valley of the Ciric River, upstream of the lake of the same name. The purpose of this paper is to deepen the knowledge of the diversity of aquatic coleopterans existing in the accumulations of the Ciric River. If of the three accumulations forming the Ciric Lake there were recorded 52 aquatic coleopterans taxa (Cojocaru, 2012), only three taxa were registered in Aroneanu Lake (Nicoară *et al.*, 2000; Nicoară & Cojocaru, 2000). The samples were taken monthly from May to August, from a single sampling station, and consist of 367 individuals of aquatic coleopterans, adults and larvae, of 37 determined taxa belonging to 9 families: Dytiscidae, Noteridae, Spercheidae, Scirtidae, Hydraenidae, Limnebiidae, Helophoridae, Hydrophilidae and Curculionidae. For each taxon, numerical abundance and relative abundance are given. The most abundant were the Dytiscidae (35%), Hydrophilidae (25%), Noteridae and Spercheidae (each 16%); the fewest were Hydraenidae (3%), Helophoridae (2%), Limnebiidae, Scirtidae and Curculionidae (each 1%). In terms of number of species, the most diverse were Hydrophilidae (14 taxons) and Dytiscidae (10 taxons). The dynamics of the numerical abundance for families with significant abundance: Dytiscidae, Noteridae, Hydrophilidae and Spercheidae show a sharp decline in these insects between May and August. In these families the larvae are dominant (73,40% in Dytiscidae, 64,40% in Hydrophilidae, and 96,66% in Spercheidae). The different sampling data for adults and larvae of Spercheidae, are explained by their different way of life, which influenced capture efficiency.

STRUCTURE OF BENTHIC MACROINVERTEBRATE (LARVAL ASSEMBLAGES) IN SEVEN SECTION (LOTIC ENVIRONMENTS) FROM TELEAJEN RIVER

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Aim: Long-term researches are needed to a correct evaluation of spatial and temporal changes of biodiversity (species richness, TDMs, ecosystems and local landscapes), their resilience and impact of risk gradients: climatic, hydromorphological, geomorphological and socio-economic. Due to, research area has been extended on the nested local, subregional and regional danubian socio-ecological systems and have been established as network of Long Term Socio-Ecological Research Sites (LTSER) (Vădineanu A., 2004). In this context, this empirical study, investigated the variability in structure of benthic macroinvertebrate (larval assemblages) of Teleajen River, to evaluate how this fauna reflects influence of longitudinal gradients.

Methods: To achieve this objective were selected seven sections (lotic environments) from Teleajen River; macroinvertebrates were collected systematically every month, with Surber sampler from October 2010 to September 2013, also an assessment of the main physical site characteristics was also carried out. Analyzes were performed of environmental variables (Principal Components Analysis-PCA) and taxonomic structural of communities (taxon richness, numerical densities, Cluster analysis, Multidimensional scaling MDS, Kruskal-Wallis test).

Results: 112649 individuals were sampled and identified the fallow taxa: Phylum Mollusca- Class Gasteropoda, Phylum Annelida- Class Oligochaeta, Phylum Arthropod- Class Malacostraca- Order Amphipod- Family Gammarida, Class Insecta –Order Ephemeroptera, Plecoptera, Trichoptera, and Dipteran- Family Chironomidae. EPT group (orders Ephemeroptera, Plecoptera and Trichoptera) exhibited grater densities and taxon richness in reference section (T1- Izvorul lui

lepure), in contrast Oligochaeta larvae and dipteran larvae, especially the chironomid were the most abundant benthic invertebrate taxa, ranging from 2148 ind./m² (Chironomidae, september 2012) and 2606 ind./m² (Oligochaeta, septembrie 2012, in sections suffering from lack of riparian forest. Cluster analysis on benthic macroinvertebrates (Bray-Curtis distance was used) classified sections in clusters with more then 30 % spatial similarity, results were validated by non-metric multidimensional scaling (nMDS) and non parametric test Kruskal-Wallis.

Conclusion: Among the benthic invertebrate groups low variability along time and longitudinal gradients, was best explained by environmental factors affecting distribution:flow variations, abundant periodic precipitations, anthropic control factors of domestic and industrial origin, which have led to removal of benthic invertebrate communities.

SOME BIOLOGICAL DATA ON STURGEONS IN DANUBE RIVER

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Some ecological aspects related to migration and reproduction of three sturgeon species: beluga (*Huso huso* Linnaeus, 1758), Russian sturgeon (*Acipenser güldenstaedti* Brand, 1833) and stellate sturgeon (*Acipenser stellatus*, Pallas, 1771) were studied for several years and compared with previously data on the Romanian Danube River and other areas. Results of former fishing campaigns were analyzed and compared in order to find out significant aspects of anadromous sturgeon migration in the Danube River.

Particular aspects of reproductive behavior and biometric data on average body length and weight as well as sex and fecundity on many classes of age and in different locations were put together in order to obtain a more focused point of view about the decreasing number of the these tree sturgeons species which migrates into the Danube River for reproduction.

THE INVENTORY OF COMMUNITY INTEREST FISH SPECIES FROM PROTECTED AREA ROSCI0329 OLTUL SUPERIOR

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Located approximately in the center of the country, the ROSCI0329 Oltul Superior spreads over an area of 1508 ha, which belong almost equal to the alpine biogeographical region and the continental biogeographical region. The maximum altitude reach 601 m and the minimum 459 m, the most representative habitats in this protected area being, of course, the rivers and lakes, occupying 42% of the total area of the site. The linear shape of this site, given by the river Olt, has a part where the water flows from north to south and another part where the water flows approximately in the south-north direction. From the point of view of fishing zone, ROSCI0329 is located in the chub (*Squalius cephalus*) zone followed by the rheophilic barb (*Barbus petenyi*) zone. Inventory activities of the ichthyofauna carried out in March, April, June and July 2015. The sampling of fish was made by electrofishing, a portable fishing device, type ELT62II, was used. Fishing stations were located close to neighboring localities. Thus, on the north-south direction of the river, the stations were located near localities Bixad, Micfalau, Malnas Bai, Malnas, Olteni, Bodoc, Zoltan, Ghidfalau, Sfantu Gheorghe, Chilieni, Coseni, Ilieni, Dabalii de Jos, Podul Olt and on south-north direction of the river near localities Dumbravita, Feldioara, Hagigh, Rotbav, Arini, Maierus, Apata, Aita Mare, Omerus, Miclosoara, Augustin, Racos. According with standard sheet of ROSCI0329 Oltul Superior were named 10 community interest fish species, these species being mentioned from the bibliographic data as being present to these areas (*Pelecus cultratus*, *Rhodeus sericeus amarus*, *Barbus meridionalis*, *Gobio uranoscopus*, *Gobio kessleri*, *Misgurnus fossilis*, *Cobitis taenia*,

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Sabanejewia aurata, *Cottus gobio*, *Aspius aspius*). But, in the fishing activities during the spring and summer of 2015 year, only 7 of the 10 community interest fish species were found along with other 14 fish species, these do not have a protection regime. The three community interest fish species that were not fished in ROSCI0329 Oltul Superior are *Cottus gobio*, *Pelecus cultratus*, *Aspius aspius*, the first species being characteristic for upstream, for trout zone and the following two species being characteristic for downstream, for carp zone.

STUDY OF FISH POPULATIONS IN THE MIDDLE COURSE OF SIRET RIVER, UPSTREAM BACAU-RACACIUNI IN 2012-2015

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The importance of the ichthyofauna for water quality assessment is well known, as well as the advantages of using the fish as bioindicator organisms.

This is the main reason for scientists to update the scientific data regarding the structure of the fish communities relative to the significant environmental changes in the last decades, mainly induced by the human activities.

The study was carried out in the middle course of Siret River, and on some of its tributaries during the years 2012 and 2015. The aim of the study was to assess the state of fish populations in the study area, and also to highlight significant changes in fish communities, based on the ecological analysis. The biological material was sampled by electrofishing from 15 sampling sites (10 in 2012 and 5 in 2015), it was determined and immediately released. The taxonomic analysis highlights the presence of 27 fish species (25 in 2012 and 22 in 2015) two of them being non-native: *Pseudorasbora parva*, and *Perccottus glenii*.

Since the study area overlaps the chub zone, the common fish species are: *Squalius cephalus*, *Alburnus alburnus*.

Some of the ecological indices were calculated, as well as biodiversity indices (Margalef, Menhinik, Shannon-Wiener), evenness (equitability), and fish stocks. The ecological analysis revealed some interesting aspects of fish communities structure and also of biodiversity.

The sampling site placed on Siret River, upstream Holt bridge has the highest species richness (4.694, and 1.437 respectively) according to Margalef and Menhinick indices, and also the highest equitability even if the number of species is only 8.

CONTRIBUTION ON THE BIOLOGY OF *SPRATTUS SPRATTUS* (LINEE, 1758) FROM THE CENTRAL ROMANIAN BLACK SEA COASTAL WATERS

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Sprattus sprattus (sprat) is a little fish widespread in Northeast Atlantic Ocean, northern Mediterranean and Black Sea. In the past it was the second important species in Romanian industrial fishing. After 1990, Black Sea sprat catches have been considerably reduced. Subsequently, the industrial collapse of the countries around Black Sea, the reduction of the eutrophication phenomena, and the reduction of *Mnemiopsis* population effective, allowed the regeneration of the sprout stocks which reached the peak of the '80s. However, the level of catches is constantly decreasing mainly because of the reduction of the number of trawlers, the increase in production costs and changes in hydro climatic conditions. The species remains, however, one of the most important from Black Sea ichthyofauna. That's why, knowing the peculiarities of its biology and their variation in correlation with changes of environmental factors is very important in appreciating its role in the trophic chains of the marine ecosystem and in the development of fishing forecasts.

Our study, accomplished in 2014-2015, wants to complete and update the old information about this species. We analyze de biometric composition by size class in sprat population from the middle zone of the Romanian coastal waters (Navodari-Constanta) and the length-weight relationship as well as the trophic spectrum of the species. The results obtained showed a predominance of the 9-12 cm length class and high values of the length-weight correlation and the weighting coefficient which indicate an efficient use of the trophic offer and a high degree of population health. Analyze of digestive tract contents shows that copepods represent a constant in the sprout diet. Polychaetes and other annelid, as well as cirripedia are added in the warm season in the sprat diet.

THE GENETIC DIVERSITY OF SOME SALMONIDS FROM UZ AND OITUZ RIVERS

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The brown trout (*Salmo trutta*, morpho *fario*, Linnaeus, 1758) is a member of *Salmonidae* fish family and has a wide distribution in Romanian mountain rivers. Various anthropogenic activities that might disrupt the species habitats were reported in various rivers. Frequently, the fish targeted for restocking activities come from aquaculture farms, whose fish stocks might not be composed of indigenous Danubian brown trout, but composed of other non-native lineages, such as Atlantic, Mediterranean or Adriatic lineages, since the import of biological material represents a common practice. Given this context, our study aims to analyse the genetic diversity of two Romanian brown trout populations from the Uz and Oituz Rivers (tributaries of Trotuş River) using mitochondrial (D-loop region) and nuclear markers (microsatellites).

The DNA was isolated by a standard extraction method from 82 biological samples represented by fin clips, followed by PCR amplification of the D-loop mitochondrial region and Sanger sequencing. The sequences were analysed with BioEdit and DnaSP software, and compared with several others from GenBank in order to establish the evolutionary lineage and construct a phylogenetic tree using Mega software. The molecular methods for the nuclear markers comprised of PCR amplification of nine microsatellite loci, followed by capillary electrophoresis for the nuclear DNA assay and bioinformatic analysis with GenAlex, Genetix and Structure software.

We identified 15 haplotypes for the population from Uz and 4 for the population from Oituz, with a haplotype diversity greater than 0.53 for both populations. The statistic results revealed no gene flow between the populations. The phylogenetic tree topology showed that the majority of the individuals chosen for this study were placed in the Danubian clade as the other Danubian sequences selected from GenBank. The microsatellite analysis revealed that the mean inbreeding coefficient F_{is} was 0.247 ± 0.109 and the fixation index F_{st} was 0.069 ± 0.021 . A more complex populational status was observed after Structure analysis, since the two populations are genetically composed of four separate subpopulations ($K = 4$).

This study proved that the two brown trout populations were genetically distinct, with a moderate genetic diversity, but a complex genetic structure from the point of view of nuclear markers.

THE DYNAMICS OF CYTOCHROME B AND MHC CLASS II GENES CORRELATION TO THE SPECIFIC LIFE ENVIRONMENT IN *CARASSIUS GIBELIO*

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The invasiveness presented in the history of *Carassius gibelio* species as well as the current economic and ecological importance are still making this species an important object of study. The gene flow and the genetic diversity of populations are directly correlated by this mobility degree. A geographical isolation of a population leaves their mark on the genetic fund and can dictate certain development directions of individuals in order to adapt them to the new environmental conditions.

Due to the presence of specific pathogens in different aquatic habitats and to the presence or absence of gene flow between populations, the responsible immunity genes for individuals may be modified, defining different haplotypes between populations from specific environments.

The aim of this study was to highlight the differences between different *Carassius gibelio* individuals sampled among the Danube basin, from various aquatic habitats.

Using a molecular approach, *Carassius gibelio* samples collected from the Bistrița River, a nearby lake, and also from the Danube basin have been analyzed. For this study one mitochondrial gene (cytochrome b) and one nuclear gene (MHC class II) have been sequenced.

All sequences were aligned based on the ClustalW method in MEGA 7 software. Phylogenetic trees were constructed using

SeaView 4, the optimum substitution model was identified using jModelTest 2.1.4. software and the visualization of the trees was performed in FigTree v.1.4. software. The mapping of MHC class II gene has showed precisely the differences between individuals sampled from different aquatic environments, as punctual mutations and block insertions of nucleotides. The phylogenetic tree obtained by analyzing the cytochrome b sequences of individuals from Danube basin and Bistrița River is showing a common ancestor, but also has revealed a specific clustering for the individuals sampled from the Bistrița River.

CONSIDERATIONS REGARDING THE BENTHOFAUNA, ICHTHYOFAUNA, AND RIPARIAN VEGETATION FROM SOME TRIBUTARIES OF THE SIRET RIVER, DOWNSTREAM OF BACĂU

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The paper will deal with some data obtained by researching the benthic biocoenosis and the fish populations living in the tributaries of the Siret River, downstream of Bacau city to the Răcăciuni village. The studied zone belongs to the basin of the middle sector of Siret, where the average slope of the plateau is of 0.5 m / km. In the paper will be presented the structure of the benthic invertebrates' populations, aspects of the riparian vegetation as refugee places and the composition of the fish populations encountered in the researched sites.

Sampling was done in autumn of 2016, along the middle Siret and in some tributaries, as Bahna, Valea Seacă, Valea Mare, Răcăciuni and Căprean. 13 sites were investigated.

The fish catchments were done by electronarcosis. Unfortunately, only in 7 areas were found fish and could be sampled.

Regarding the benthic quantitative samples, these were taken from the same sites which correspond with the fishing points from the respective tributaries. For the benthos it was used a surber stream bottom sampler with a surface of 365, 76 cm². Only in 9 researched sites, it could be taken samples of benthos, because either the basin was dry or there were no fauna in the samples.

The fish samples were conditioned and processed in laboratory, after specific techniques (identified and biometrical measured).

The benthos samples were processed after typical methods. Taxonomic identification under a Nikon binocular microscope has been done for large phylogenetic groups and in particular situations for some genera and species. Some statistic interpretation was done. Regarding the benthos, a list with identified taxa will be presented in the paper. Percent qualitative composition in studied sites will be analyzed and some synecological indices (as frequency, dominance and Dzuba indices) will reveal characteristic groups of the ecosystems.

The ichthyofauna from the studied sites comprises individuals belonging to 12 species.

Three of them - *Rhodeus sericeus amarus* (Bitterling), *Barbus meridionalis* (Mediterranean barbel) and *Sabanejewia balcanica* (Balcan spinned loach) have special conservation status on App. III of the Bern Convention. *Squalius cephalus* (chubb) and *B. meridionalis* are euconstant species for these ecosystems. *Gobio obtusirostris* and *Barbatula barbatula* recorded a constant presence in the samples. 6 fish species could be considered as accidental in the studied sites.

The results intend to make a correlation between the structure of ichthyofauna from the Siret tributaries and the benthic invertebrates' populations as possible food resources, at least for some of the fish species which are benthivorous and live in these ecosystems.

INTEGRATED MULTI-TROPHIC AQUACULTURE IN THE ROMANIAN POND ECOSYSTEM

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Nowadays, the Romanian aquaculture is still based on the semi-extensive culture of common carp along with the Chinese carps accounting for more than 75 percent of the total production (FAO,2017) in pond system.

The pond is a total life-support system for the aquatic organisms, from providing foods to dilution and neutralization of potentially toxic wastes. The system is controlled more by function of nature than by the action of man.

Integrated multi-trophic aquaculture (IMTA) is not a new concept, because Asian countries, which provide the most of the world’s aquaculture production, have been practicing it for centuries.

For a balanced ecosystem approach and to avoid harmful shifts in aquatic environmental processes, fed aquaculture has to be integrated with organic and inorganic extractive aquaculture. In this respect, to overcome aquatic ecosystem degradation through IMTA system, the conversion, not dilution is the solution to pollution, when the “waste” of one resource user becomes a resource for the other.

Our case study is part of an on-going European project, through the Cooperation in Fisheries, Aquaculture and Seafood Processing Program, entitled “Integrated Multitrophic Aquaculture for EFFiciency and Environmental ConservaTion” – IMTA Effect. The main objectives case-study are to test innovative approaches, to increase the efficiency of the production in Romanian fish farms by using IMTA as a mechanism to minimize the impact on the environment of the current technologies, based on an innovative

technical solution that involves pond dividing and nutrients transfer from one side to another. Till now, the results of this study have demonstrated that an IMTA cyprinids pond production system, where common carp is considered as main species, can be more sustainable, comparing with the traditional cyprinids pond production system.

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BIODIVERSITY OF TERRESTRIAL ORGANISMS

Oral presentations

ANATOMICAL ADAPTATIONS OF HALOPHYTES FROM DIFFERENT CLIMATES. AN INTEGRATIVE APPROACH

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Halophytes present a large range of anatomical features, many of them having a clear adaptive value related to their ecology and structural acquisitions gained during evolution. Halophytes (70 species) have been anatomically investigated in order to find consistent adaptations. Plant material has been collected from Romania (2004-2017), Poland (2011) and Spain (2010-2011). The aim of present study is to identify convergent anatomical strategies in halophytes vegetating in different climatic conditions and to discuss their ecological and functional significance. Romania has a temperate-continental climate, while Spain (Eastern coast) is under Mediterranean influence. Obtained results suggest that, despite different climatic conditions, there are no significant differences between anatomical strategies that allow plants to vegetate and survive in saline habitats. Succulence was found both in C₃ and C₄ xero-halophytes and hygro-halophytes. In xero-halophytes, succulence plays a water storage function, while in hygro-halophytes, it helps in providing the erect position in species with less developed mechanical tissues (*Salicornia*, *Suaeda*, *Sarcocornia* species). In all cases, succulence may also contribute to a dilution of concentrated salts from plant tissues. Salt secreting structures were evidenced, either as salt hairs (bladders) in *Atriplex*, *Chenopodium*, and *Halimione* species, either as salt glands, in *Limonium*, *Frankenia* and *Glaux* species. Kranz anatomy is a feature related to C₄ photosynthesis that has been found especially in *Chenopodiaceae* species. Bulliform cells were evidenced in halophytes vegetating in salt marshes subjected to seasonal droughts. Therefore, species from different climates display similar adaptations, because they must face similar environmental constraints: salinity and aridity.

NEED FOR STANDARDIZED RESEARCH METHODS IN BIODIVERSITY ASSESSMENT: CASE STUDY WITH ARTHROPODS IN LITTLE ISLAND OF BRAILA

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Data obtained in experimental field studies are used to generate estimates of the community composition, species richness and distribution within and across habitats and regions. Nevertheless, the experimental design have implication for the assessment of biological diversity and its main trends of changes.

The present paper examines the arthropods response to experimental design with respect to type of carrion-baited traps, position they were placed in the field as well as the bait tissue used in the study. Research was conducted in Harapu Island which is part of the Little Island of Brăila that is Natural Park, Natura 2000 site and RAMSAR site.

Our results indicate that experimental design used in arthropods assessment can directly impact the colonization patterns on carrion-baits. All the criteria considered could be responsible for differences recorded in densities, relative abundances and diversity of arthropods in carrion-baited traps. The complementarities of the research designs used in the attempt to correctly characterize the biological diversity and the structure of this type of communities was revealed.

The results strengthen the necessity to define the core principles and to standardise the methods applied in the long-term arthropod species assessment, which is instrumental to enable comparison within and across ecosystems, spatial and temporal scales.

**CARABIDS (CLS. INSECTA, ORD. COLEOPTERA) FROM
THE DANUBE DELTA BIOSPHERE RESERVE CAPTURED
WITH TRAPS OF LIGHT, INCANDESCENT, MERCURY AND
NEON LIGHT OF DIFFERENT COLORS DURING 2002-2003**

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The distinct diversity of the Danube Delta habitats provides, to a certain extent, a high specific diversity of carabine communities in these ecosystems. Although the catches were made using the light trap method, however, a number of 104 taxa were captured compared to only 61 and 69 registered by M.A. Ieniştea (1986 and 1974 respectively) and Şt. Black only 29 taxons (1968). The use of light trap methods appears to have a selective character in attracting only the macroproducts and micropters species of the Harpalinae, Stenolophinae, Trechinae, Scaritinae, etc. subfamilies. In the 545 samples with carabidae were captured 1875 ♂♂, 2916 ♀♀. In our researches we mostly surprised the exceptional diversity of the Danube Delta habitats, so samples from salty areas, such as Chituc Grind and Mila 26 (Maliuc), Enisala (Fishery Farm of INCPDD Tulcea) as well as habitats with lush vegetation from Mila 23 (Dunarea Veche) and the Litcov - Caraorman Canal. In all the sites where they were sampled, the taxa of the subfamily mentioned above prevailed.

It is worth noting that the Shannon-Wiener index ($H' - 4$), which was recorded in the samples captured at Mila 23, Dunarea Veche, where 51 species were captured in single night (31.07.2002) in traps with neon white light. The same category includes the communities of Enisala and Grindul Chituc.

GROUND BETLES ASSEMBLAGES (COLEOPTERA: CARABIDAE) OF OAK WOODPASTURES. A STUDY CASE FROM TRANSYLVANIA (ROMANIA)

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Wood-pastures are considered cultural systems consisting of a mosaic of social, economic and biodiversity components. Wood-pastures may support high diversities of invertebrates, particularly saproxylic insect assemblages. Ground beetle assemblages were investigated using pitfall traps. In this context, we investigated ground beetle communities from three habitats, within an oak wood-pasture from southern Transylvania (Crăciunel, Harghita County). Sampling was carried out two times per month, between May and October in 2015 and 2016, The traps were placed in a forest stand, near solitary trees and the ecotone between the first two habitats. Out of the three sampling types only the pitfalls were successful in capturing ground beetles. Overall, we identified 20 ground beetle species. In terms of abundance, the solitary trees habitat and ecotone were characterized by the high numerical dominance of *Calathus fuscipes* (Goeze, 1777). In contrast, in the forest stand three species were the most abundant, namely: *Calathus fuscipes*, *Carabus coriaceus* Linnaeus, 1758 and *C. convexus* Fabricius, 1775. Regarding the diversity, the forest stand recorded the highest species number (18), whereas the solitary trees habitats the lowest (7). This study provides valuable information on species distribution and ecology that will be discussed in detail in the poster presentation. Financial support was received through the project ‘Oak woods in rural landscapes of the Carpathian region: origin, dynamics and conservation values’, financed by the National Science Centre, Poland, following the decision DEC-2013/11/B/NZ9/00793.

ANT ASSEMBLAGES (HYMENOPTERA: FORMICIDAE) OF OAK WOOD-PASTURES. A STUDY CASE FROM TRANSYLVANIA (ROMANIA)

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Wood-pastures are cultural systems which consists of mosaic of social, economic and biodiversity components. Wood-pastures represent reservoirs of biodiversity for insects, particularly saproxylic insect assemblages. Within the insects occurring in such habitats, ants play a key role in woodland ecosystems as generalist predators. Ant assemblages were investigated using pitfall traps, Barrier traps and Moericke (yellow) pan traps. Sampling was carried out two times per month, between May and October in 2015 and 2016, in a site near Crăciunel, Harghita (Transylvania, Romania). We studied three types of oak habitats within the wood-pasture: forest stand, solitary trees and the ecotone between the first two habitats. We identified a total of 21 ant species. Most of the species are common for Romania. Yet, it is worth mentioning the presence of thermophilic species: *Aphaenogaster subterranea* (Latreille, 1798), *Dolichoderus quadripunctatus* (Linnaeus, 1771), *Temnothorax affinis* (Mayr, 1855) and *Temnothorax corticalis* (Schenck, 1852). The highest diversity was recorded in the forest stand. The three habitats shared an important proportion of the species, yet we recorded significant differences between the three habitats in terms of community composition. Oak associated habitats can sustain high diversity of ant species and thermophilic specialists thrive. Furthermore, it seems that forest specialists are in low abundance, whereas species such *Lasius brunneus* (Latreille, 1798), *Myrmica scabrinodis* Nylander, 1846, *Dolichoderus quadripunctatus*, *Camponotus ligniperdus* (Latreille, 1802), and *Formica fusca* Linnaeus, 1758, can be regarded as typical wood-pasture species. Financial support was received through the

project 'Oak woods in rural landscapes of the Carpathian region: origin, dynamics and conservation values', financed by the National Science Centre, Poland, following the decision DEC-2013/11/B/NZ9/00793.

EX SITU CONSERVATION OF *PHYLLOBATES VITTATUS* (COPE, 1893) – EXPERIMENTAL DATA

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The decline of amphibians as a major taxonomic group and the extinction of many species around the world (especially in the tropics), raises major concerns related to conservation. In many cases, the *ex situ* conservation is the only solution to save a species from extinction. Although present in large numbers in private collections and research institutions, *Phyllobates vittatus* continues to have a poor conservation status in natural habitats in the area of Golfo Dulce (Costa Rica), where the species is endemic. Beginning with the autumn of 2016 we conducted an experiment aimed at determining the parameters related to the reproductive effort and reproductive success of the species in captivity, in controlled environment and fed *ad libitum*.

Our data point out the relative capacity of this species to generate a large number of descendants, despite the fact that the species is one of those included in the group "Phytotelmata", with a reproductive strategy situated on the border of type "r" and type "k". Also, our results contradict the literature in terms of the duration of the breeding season, and argue in favor of the hypothesis that under ideal conditions, the species is able to reproduce throughout the year.

BLOTCHED SNAKE (*ELAPHE SAUROMATES* - PALLAS, 1814) AND ITS DETECTABILITY IN SPECIFIC HABITATS

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The detectability problem in the case of cryptic taxa with elusive behavior still does not find its rightful place among the studies concerning the biology and ecology of these species. In the case of rare taxa, insufficiently studied and understood, the lack of data on detectability can lead to erroneous estimations of population size and thus to errors in the assessment of the conservation status. If the case of *Elaphe sauromates*, its distribution and abundance in Romania was underrated mainly because of the lack of data regarding the typology of the specific habitats and periods of maximum detectability.

Between 2012 and 2017 we conducted research that aimed to identify specific habitats, to clarify the issues regarding species detectability and tried to identify viable populations of this species. Our data highlight periods of high and low detectability, and variances in the detectability of adults (with an emphasis on detectability segregated by gender) and juveniles. These data are trying to clarify the problem of habitat requirements for this species, an aspect still poorly known.

**THE SITUATION OF THE WHITE-TAILED EAGLE PAIRS
(*HALIAEETUS ALBICILLA* L.) IN THE DANUBE DELTA
BIOSPHERE RESERVE (ROMANIA)
BETWEEN 2016 AND 2017**

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The field investigations carried out in 2016-2017 revealed the presence of 60 White-tailed Eagle nests in Danube Delta Biosphere Reserve (D.D.B.R.). From the total, 35 were active nests used for breeding and 25 were alternative nests used for resting, feeding etc. In addition to these nests, 5 active territories have been identified based on adult pairs observed during the nesting period. Nests location for these 5 pairs have not been identified yet. Regarding the tree species preferred for nesting in D.D.B.R., the White-tailed Eagles have 39 nests built on *Salix alba*, 11 on *Populus alba*, 8 on *Populus x canadensis hybrid* and 2 on *Alnus glutinosa*. Beside the tree species, the height from the ground was measured/estimated for each nest. The height interval for the identified nests was of 4 to 23 m from the ground or water. Two thirds (70%) of the nests are located at heights less than 15 m and one third (30%) over 16 m height.

FAUNA OF SMALL MMAMALS (RODENTIA, INSECTIVORA) FROM RUBBISH DUMPS IN THE REPUBLIC OF MOLDOVA

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At present the process of degradation of natural ecosystems occur intensely throughout in the word. Rubbish dumps constitute one of the biggest ecological problems of Republic of Moldova because they pollute not only anthropized ecosystems, but also natural ones. This work is based on data collected since 2009 until 2017 within rubbish dumps from different ecosystems of Republic of Moldova. The studies were performed in several types of ecosystems: forest, forest belt, agrocenoses and ecotone between forest and agrocenosis in some districts of Northern, Central, Southern zones and Chisinau city.

During the study period 699 trap/night were processed and 141 individuals from 8 species were caught: *Myodes glareolus*, *Apodemus flavicollis*, *A. sylvaticus*, *A. agrarius*, *A. uralensis*, *Sorex araneus*, *S. minutus* and *Crocidura suaveolens*. Also the synanthropic species *Mus musculus* and *Rattus norvegicus* were registered visually. The highest trappability coefficient of small mammals near rubbish dumps was registered in the North with 36.8%, followed by Central zone with 29.5%, Chisinau city with 11.8% and Southern zone with 9.4%.

The ecosystem with the most abundant small mammal fauna near rubbish dump was the agrocenosis with 46.1%, followed by wood with 25.5%, shelter belt and ecotone forest-agrocenosis with 14.2% each.

The highest diversity of small mammal fauna near rubbish dumps was registered in agrocenoses with 7 species, Shannon index 0.845, in shelter belts 5 species, Shannon index 0.699, in forest ecosystems 4 species, Shannon index 0.602 and in ecotone forest-agrocenosis only 3 rodent species, Shannon index 0.477.

In all studied ecosystems with rubbish dumps the most abundant was *M. glareolus* with 30.5%, followed by *Apodemus* genus species (*A. agrarius* – 28.37%, *A. sylvaticus* – 17.73%, *A. flavicollis* – 17.02% and *A. uralensis* – 2.84%), while the shrew species had much lower abundance: *S. araneus* – 1.42%, *S. minutus* – 1.42% and *C. suaveolens* – 0.71%.

Small mammal species, especially the rodents find favorable conditions near rubbish dumps, especially due to abundant trophic resources.

The study was performed within the fundamental project 15.187.0211F.

DIVERSITY OF BAT FAUNA (MAMMALIA: CHIROPTERA) HORDINEȘTI STONE QUARRIES FROM THE NORTHERN ZONE OF THE REPUBLIC OF MOLDOVA

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Stone quarries near Hordinești are situated at 48^o09.899^o N, 27^o08.968 E at the altitude of 166 m and have several entrances, of which 4 abandoned and the rest are active. Some of the entries are protected. The studies were performed at the end of January, 2015 and in middle of June, 2017.

The quarries are machine-made, spacious, reaching 2-8 meters high and 5-7 meters wide. Temperature and humidity regime vary depending on the distance from the entrance: the temperature at 10 meters from the entrance was 6.8°C, the humidity of 62%; at 70 m air temperature was 10.2°C, humidity - 68%. A total of 3 km of underground passages were investigated. Bats were studied directly by visual observations, all observed individuals were identified. During cold period the hibernation places were recorded, in summer the reproduction activity was registered.

In winter period 265 individuals from 5 species (*Rhinolophus hipposideros*, *M. blythii*, *M. daubentonii*, *M. mystacinus*, *Plecotus austriacus*, *P. auritus*) in Hordinești quarries. Only two species formed groups: *M. blythii* was observed in groups of 2 to about 30 individuals and *M. daubentonii* was found in small groups of 2-4 individuals. Other species were found exclusively solitarily. The most numerous were *M. daubentoni* with 84.62%, followed by *M. blythii* (11.92%), while the rest of species were registered in low number (*Rh. hipposideros* – 0.77%, *P. austriacus* – 1.54%, *P. auritus* – 1.15%).

In several places in passages situated not far from the entrances, up to 50-70 m, large accumulation of guano were recorded. It was concluded that these are remains of activity from maternal colonies during reproduction period. This fact was confirmed in June 2017 when a large maternal colony of *M. blythii* was found. The colony consisted of about 400 females with juveniles of various ages – from 5 days old to 15 days old. The colony was divided in several groups; the largest one included about 200 females, two smaller of about 100 females and 5 small groups of several dozen females with juveniles. Also, *Rh. hipposideros*, *M. daubentoni*, *P. austriacus* were registered. Therefore, Hordinești stone quarries represent important hibernation and reproduction site for bats in the northern zone of Moldova.

The study was performed within the fundamental project 15.187.0211F.

BATS IN THE ANTHROPOGENIC ENVIRONMENT AND HUMAN INFLUENCE ON THEIR ADAPTATION

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In the last decades the territories of urban areas are permanently expanding. In such conditions the bats as one of most numerous groups of mammals have been affected by these changes, which are both positive and negative. The presence of a large number of insects surrounding human life serves as food source for bats, which gives certain advantages in the urban area. In the city of Chisinau the presence of artificial water reservoirs and parks create certain microecosystems where many species of bats find favorable conditions. In many cases bat species use attics, cellars, bell towers as perennial shelters for reproduction and hibernation, in some cases bats prefer to hide in cracks, ventilation holes, penetrate into apartments, houses etc. Often, this is negatively reflected both in man and in bats. For example, bats love to clog in the cracks, from the lead-out pipes of heating boilers, which, as practice has shown, contributes to their activity in the winter, due to the fact that they do not need to go into hibernation. Such cases worry people, but in addition, they have a detrimental effect on the physiological condition of animals, even to the impossibility of surviving until spring.

Bats were monitored in the urban area during the summer, using an ultrasound detector and signals from people who reported the presence of animals in their home. This allowed us to determine the synanthropic species of bats. In Chisinau, the following species were registered: Noctule bat - *Nyctalus noctula* is quite common in the city boundaries found in tree hollows, cracks in buildings, as well as in the winter in ventilations. Serotine bat - *Eptesicus serotinus* is also a very common form, detected both by an ultrasound detector and by numerous signals from people. In the urban area various kinds of

Pipistrelle bat were recorded: *Pipistrellus pipistrellus*, *P. kuhli*, *P. pygmaeus*, which feel great both in parks and in various old and new buildings. Within the city limits, both species of long-eared bats were found: *Plecotus auritus*, *P. austriacus* – mostly recorded in parks and tree plantations. Parti-colored bat (*Vespertilio murinus*) - another species that can be attributed to the synanthropic, because it was discovered exclusively in the urban area. In Chisinau about 4 species of *Myotis* were found: *M. daubentonii*, *M. dasycneme*, *M. bechsteinii*, *M. mystacinus*. These are frequent inhabitants of the zone with water basins.

In total 12 species of bats were recorded in Chisinau that are rather well adapted to the urban environment and represent a high diversity of bat fauna.

BROWN BEAR DEN-SITE SELECTION IN THE ROMANIAN CARPATHIANS

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The Romanian Carpathians provides one of the largest unfragmented areas suitable for large carnivores' conservation in Europe. The human access is restricted, particularly during the winter, due to low density of paved roads and low recreation opportunities (e.g., skiing infrastructure) resulting in a low disturbance of the brown bears (*Ursus arctos*) denning habitats. Yet, extensive logging is fragmenting the old-growth forests leading to loss of sensitive habitats even in protected areas. Scarce information is available on den-site selection for the Romanian population of brown bears, a gap that is transferred into an ecological meaningless forest management. We here trained a spatially explicit model to map den habitat at landscape scale, described the habitat structure around dens, and described the characteristics of 86 used cavities we measured in a 3-yr field study. The denning altitude ranged between 387 and 1326 m, average slope was 17.5% (± 8.6 sd). General aspect of the slope sheltering the dens was evenly distributed between SW (22% of the dens), E (20%), S (18%) and SE (15%) expositions. Rock cavities were dominant (68%) with length (average \pm sd over all dens) of 148.7 ± 50.7 cm, width of 108.5 ± 43.5 cm, and height of 114.0 ± 96.4 cm. At landscape scale, the generalized linear model with binomial function revealed that probability of den selection is mostly influenced by forest categories, with percent cover of mixed forests of beech-fir or beech-fir-spruce and percent cover of mature forest being the most influential

covariates. Topographic variables followed at model contribution, den selection being significantly higher with increasing slope and to a lesser extent with increasing altitude. Disturbance variables had lowest influence, den avoidance being slightly influenced by distance to transport network. These findings can inform future forest management in a bear-friendly approach by regulating the disturbances and loss of the denning “hotspots” thus, supporting the reproduction and survival of the Romanian brown bears.

INTEGRATING SIGN SURVEYS AND TELEMETRY DATA FOR ESTIMATING BROWN BEAR (*URSUS ARCTOS*) DENSITY IN THE ROMANIAN CARPATHIANS

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Accurate population size estimates are important information for sustainable wildlife management. The Romanian Carpathians harbor the largest brown bear (*Ursus arctos*) population in Europe, yet current management relies on estimates of density that lack statistical oversight and ignore uncertainty deriving from track surveys. In this study, we investigate an alternative approach to estimate brown bear density using sign surveys along transects within a novel integration of occupancy models and home range methods. We performed repeated surveys along 2-km segments of forest roads during three distinct seasons: spring 2011, fall-winter 2011, and spring 2012, within three game management units and a Natura 2000 site. We estimated bears abundances along transects using the number of unique tracks observed per survey occasion via N-mixture hierarchical models, which account for imperfect detection. To obtain brown bear densities, we combined these abundances with the effective sampling area of the transects, that is, estimated as a function of the median (\pm bootstrapped SE) of the core home range (5.58 ± 1.08 km²) based on telemetry data from 17 bears tracked for 1-month periods overlapping our surveys windows. Our analyses yielded average brown bear densities (and 95% confidence intervals) for the three seasons of: 11.5

(7.8–15.3), 11.3 (7.4–15.2), and 12.4 (8.6–16.3) individuals/100 km². Across game management units, mean densities ranged between 7.5 and 14.8 individuals/ 100 km². Our method incorporates multiple sources of uncertainty (e.g., effective sampling area, imperfect detection) to estimate brown bear density, but the inference fundamentally relies on unmarked individuals only. While useful as a temporary approach to monitor brown bears, we urge implementing DNA capture–recapture methods regionally to inform brown bear management and recommend increasing resources for GPS collars to improve estimates of effective sampling area.

BIODIVERSITY OF TERRESTRIAL ORGANISMS

Poster presentations

THYMUS ALTERNANS KLOKOV: NEW DATA REGARDING THE STRUCTURE OF VEGETATIVE ORGANS AND CHEMICAL COMPOSITION OF ESSENTIAL OILS

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Thymus alternans is a relatively new species for Romania, being first mentioned in Romanian flora in 2002. The species grows in mountain meadows at low altitudes (500-1100m). In this paper, the authors study the histo-anatomy of vegetative organs of *Thymus alternans* and the chemical variability of essential oils obtained from individuals of this species. For this purpose the vegetal material was collected in different phenophases (vegetative, anthesis and fruiting), during two consecutive years. The histo-anatomical investigations were conducted using transmission electron microscopy analyses. The separation and the identification of the components have been carried out using GC-MS (gas-chromatography coupled with mass-spectrometry). The histo-anatomical obtained data bring new information regarding *Thymus alternans*, a species which has been less investigated. Regarding the chemical composition, significant differences were recorded in the essential oils, according to the phenophase and the year of harvesting. From the available literature, we found very few information regarding the structure and chemical composition of essential oils of *Thymus alternans*, so our results complete the little existing literature.

RESEARCHES ON SAXICOLOUS BRYOPHYTES FROM THE NORTH – WESTERN AREA OF LEAOTA MOUNTAINS

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The geology and geomorphology of Leaota Massif from the Bucegi Mountains group is very diverse; in their north-western sector there is frequent shale and limestone scree which generates living environments with their own features for a variety of biocenotic components. Saxicolous bryophytes present a group of organisms with specific physiological and ecological adaptations, which make them thrive in this habitats.

Were collected saxicolous bryophytes from the north - western area of Leaota Mountains, within an extensive research project, between 2015–2017.

We identified 23 species that are taxonomically assigned to the two classes of bryophytes: Hepaticatae - 5 species from 3 families and Bryatae (Musci) - 18 species from 11 families.

Most of the identified bryophytes synusias were located in the cracks of different sizes of the rocks (limestone and shale). We also noticed populations of larger bryophytes that covered large areas of rocks or even entire stones.

The analysis of the species requirements towards the main ecological factors highlights the specific characteristics of the studied area and allows the an overview of the conections between the bryophytes and the particularities of the geological substrate.

PHYTOSOCIOLOGICAL STUDY OF *LIGULARIA SIBIRICA* (L.) CASS.

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Usually plant communities provide mechanisms that can adapt or mitigate those changes caused by environmental factors. Climatic oscillations during glacial periods have led to the migration of a large numbers of plant species, looking for some optimal conditions for survival. One of those species, represent the object of this study, the glacial relict *Ligularia sibirica* (L.) Cass.

The present paper aims to present the species of community importance, *Ligularia sibirica* (L.) Cass. in plant association from Zănoagei Gorges, Scropoasa, Seven Springs Waterfall, Apa Rosie Peat Bog, Harman Marsh and Brusturetului Gorges. The sporadic *Ligularia sibirica* species grows in Romania's habitats, such as eutrophic and oligotrophic marshes, meadows, wet soils or in hygrophilic communities on the riverbanks, in both bright spots and also in the shade of canopy trees. To achieve the aim of this paper was necessary to study the identified association in terms of biodiversity, taxonomy, bioforms, geo-elements and genetic structure analysis. Ellenberg indices analysis will complement this study as it can provide significant details regarding the structural evolution in time of the studied population from ecological point of view. Ellenberg indices analysis includes factors such as light, temperature, humidity, soil reaction and nitrogen content. The present paper also includes the degree of conservation and biodiversity offered by the studied areas for *Ligularia sibirica* (L.) Cass. species.

NOTES REGARDING SOME OF THE MOST INFAMOUS INVASIVE ALIEN PLANT SPECIES FROM BISTRITA RIVER BASIN, (NEAMT AND SUCEAVA COUNTIES, ROMANIA)

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Is well known that the uncontrolled spread of invasive alien plant species is among the most urgent nature conservation issues of his century. These invasive alien plant species are altering the native ecosystems, leading to habitat loss and to the replacement of native species (species diversity is dramatically affected). This leads to the loss of biodiversity, at least locally, because of the competition with the native plants and sometimes endangered plant species that are competing for resources (space, water, nutrients and light), suppressing the growth of native species.

These alien plant species are also affecting some economically important sectors as the rural agriculture (ex. this impact usually affect meadow and forest productivity etc.).

In the present time, there are more than 30 invasive alien species of plants also called adventive plants that are spreading in the middle basin of Bistrita river. According to our observations, the most aggressive ones which damage the natural environment are: *Acer negundo* L., *Ailanthus alissima* (Miller) Swingle, *Amaranthus retroflexus* L., *Amorpha fruticosa* L., *Ambrosia artemisiifolia* L., *Cirsium arvense* (L.) Scop, *Elodea canadensis* Michx., *Erigeron canadensis* L., *Galinsoga parviflora* Cav., *Impatiens glandulifera* Royle, *Impatiens noli-tangere* , *Iva xanthiifolia* Nutt., *Lactuca serriola* L., *Reynoutria japonica* Houtt. (= *Fallopia japonica*), *Robinia pseudoacacia* L., *Rumex alpinus* L. and *Xanthium strumarium* L. etc.

These invasive alien plant species are spreading out of control, especially in areas with the most anthropic disturbances. A

preliminary species list is under preparation. We will mention also for each invasive species the local distribution and the effect on habitat when possible. The material collected from this area of Bistrita river basin is deposited in the collection of the Natural Sciences Museum of Piatra Neamt.

GENETIC DIVERSITY OF *LAVANDULA* SPECIES BY RAPD MARKERS

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The *Lavandula* species are economically important plants in medicine, phytotherapy, aromatherapy, landscaping, cosmetics and food industries. Even if this species is important in such many areas and the cultures have started to extend all over the Europe, the genetic diversity studies and molecular characterisation of different species and varieties are almost absent.

The present investigation aimed to identify the intra- and interspecific genetic diversity of two *Lavandula* species: *Lavandula angustifolia* Mill., the varieties: Ellagance Pink, Ellagance Snow, Ellagance Purple, Vicenza Blue, Munstead, Grosso, Common English, and *Lavandula stoechas* L.

Total DNA purification was performed from dried leaves using the CTAB protocol. To identify the genetic similarity, RAPD (Random Amplification of Polymorphic DNA) was performed using 14 RAPD primers chosen according to the number of the amplified polymorphic sites.

The RAPD - PCR was performed in a 25 µl volume using the GoTaq Green Master Mix kit (Promega), followed by an amplicons separation in a 1,5% agarose gel electrophoresis. The gel images were transposed in binomial matrices followed by a FreeTree v.0.9 analysis based on the UPGMA method.

The dendrogram of genetic distances shows that the studied species are splitted in two groups: the first one is represented by the *L. stoechas* species and the second group consists of the varieties of *L.angustifolia*, divided in four clusters, all of which have a common origin.

A SYSTEMATIC CONSPECTUS OF THE INVERTEBRATE SPECIES IDENTIFIED IN THE SCREE AND LITHOSOL AREAS FROM THE NORTH-WESTERN SECTOR OF THE LEAOTA MOUNTAINS (SOUTHERN CARPATHIANS)

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The present work display the result of some eco-faunistic research that took place during the years 2014-2016 in the north-western area of Leaota Mountains, Southern Carpathians. The purpose of this research was to identify invertebrate species that populate the scree and also, the lithosol. This scree are known in speleology as *mesovoid shallow substratum (MSS)* or as *superficial subterranean environment (SSE)*, named also *shallow subterranean habitats (SSHs)*. The collection of invertebrates was done in nine ecological stationaries. For this purpose, we used Barber traps (for edafic invertebrates) and surveys installed at different depths: 0.5m; 0.75m; 1m (for the fauna from the scree). To this, was screened a large number of samples which contains more than 10,000 individuals and were processed data taking into account the different geological substrate (limestone and shale).

As a result of the research, 253 taxa (248 species plus another 5 taxa which were determined only at the gender level) were identified for the first time in the Leaota Massif, belonging to the following taxonomic groups: Araneae, Isopoda, Collembola, Coleoptera, Diplopoda, and Chilopoda.

Biodiversity of terrestrial organisms

The distribution of these species by taxonomic units is as follows: Arachnida Class: 26 species (Araneae order); Malacostraca Class: 7 species (Isopoda Order); Class Collembola: 77 species; Insect Class: 122 species (Coleoptera Order); Diplopoda Class: 14 species; Chilopoda Class: 7 species.

NEW, RARE AND ENDEMIC SPECIES FOR THE LEAOTA MOUNTAINS AND FOR ROMANIA'S FAUNA

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This paper presents the results of some faunistical research conducted during in the years 2014-2016 in the Leaota Mountains, the Southern Carpathians. Were identified 248 species of invertebrates by taxonomic units is as follows: Arachnida Class, Malacostraca Class (Isopoda Order), Collembola Class, Insect Class (Coleoptera Order), Diplopoda Class and Chilopoda Class. On this occasion, not only for Leaota, but also for Romania, unprecedented results were obtained three new species of invertebrates were identified for the first time in Romania.

Also, in the studied areas were reported another three rare species for Romania, which were only once or twice signaled in the previous researches.

There have been identified 8 endemic species for Romania and another 16 species of Carpathian endemites.

Also, as a novelty, we notice for the first time the presence of species *Nesticus balacescui* (Araneae) in the mesovoid shallow substratum (MSS) made of crystalline shists (shale).

It is for the first time that the troglophile species *Deuteraphorura cebennaria* (Gisin, 1956) is reported in the mesovoid shallow substratum.

The species mentioned aobove have been found in two kinds of habitats, scree and lithosol, with two different geological substrates, limestone and shale.

**NEW TRAPS AND FEROMONS FOR THE MONITORING AND CONTROL OF POPULATIONS OF PINE BARK BEETLES
PITYOKTEINES CURVIDENS (GERMAR, 1824)
(COLEOPTERA: SCOLYTIDAE)**

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Pityokteines curvidens, along with *P. vorontzowi* and *P. spinidens*, are the main bark beetles of the fir tree. In the beginning, they have a secondary character, but after they multiply, they become primary pests.

Heavy attacks lead to the drying of the trees. For this reason, detection and prevention of the numerical growth of the populations of these pests is a very important activity. The use of trap trees, that have been cut or broken by the wind or snow, and pheromone traps, are an effective way to control the populations of these beetles.

Trap trees should be tracked and peeled at the optimum time when the insects are in the larvae-snout stage, and with regard to pheromone races, attention should be directed to those that provide the greatest efficiency in trapping beetles.

To this end, a new type of triangle trap and a foreign pheromone (Curviwit) were tested during 2017, the effectiveness of which was compared with the type of wing trap and the Atracurv Romanian pheromone currently used in the protection of coniferous woods with fir in composition.

The studies revealed that the effectiveness of Triangle traps is 1.85 times higher than those of the Wing type. In terms of pheromone traps, there is a slight superiority of those produced in the country, at the Raluca Ripan Chemistry Institute in Cluj-Napoca, with 38%.

Monitoring the catches throughout the vegetation season, there was noted in the observation sheets that the flight started in the last decade of April, recorded an increase in May (Flight I) and then maintained a lower level during the summer in June, July and the first decade of August (Flight of sister generation and Flight II).

This has been greatly emphasized when using the triangular trap, very effective in the case of small beetles: *Pityokteines curvidens*, at fir, *Pityogenes chalcographus*, at pine spruce.

Triangle traps and the Atracurv pheromone show superior qualities and efficiency compared to the Wing trap and Curviwit pheromone, and can be used successfully in monitoring and controlling the populations of pine bark beetles (*Pityokteines curvidens*).

**DATA ON THE PRESENCE AND DISTRIBUTION OF INSECT
SPECIES LISTED IN THE HABITATS DIRECTIVE IN
NATURA 2000 SITES ROSCI 0128 AND ROSCI 0344**

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The Natura 2000 site ROSCI 0128 North East of Gorj is located in Southern Carpathians, occupying the southern part of the Parâng Mountains and west of the Căpăbânie Mountains. The Natura 2000 site ROSCI 0344 is located in the southern part of Căndești Piedmont, between the Valea Potopului Creek in the west and the Dâmbovița River to the east. The data were collected in the years 2013-2015, through observations in 118 areas on four species of insect species listed in the Habitats Directive.

COMPARATIVE ANALYSIS OF GROUND BETLES ASSEMBLAGES (COLEOPTERA: CARABIDAE) OF DECIDUOUS FOREST HABITATS. A CASE STUDY FROM SOUTHERN TRANSYLVANIA

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Ground beetles are known to be valuable bioindicators of sustainable forest management at both short and long-time scales, responding to human impact such as clear-cut logging and fire.

We investigated the ground beetle communities from three habitats within a deciduous forest. These habitats were: a forest stand, a 5-year forest site (resulted from clear-cutting and followed by natural succession) and the ecotone habitat between the first two sites. At each site three replicates of nine pitfalls were installed in a 3 x 3 matrix with a minimum of 10 meters between replicates and more than 15 m between habitats. Our study was carried out in July-August 2017 in southern Transylvania (Orlat, Sibiu County). Ground beetles were sampled using pitfall traps. At each site three replicates of three pitfalls were installed.

Overall, we identified 27 ground beetle species. Most of the species are common for the ground beetle fauna of Romania. In terms of species composition, the most abundant species overall was *Carabus glabratus* Paykull, 1790, recorded in all the three sites. The lowest abundance of individual was recorded in the forest stand, whereas the open site had the highest numerical abundance. Species richness increased from the forest stand to the open habitat.

Our preliminary results suggest that the open site may enhance widespread opportunistic species like the ones in the Harpalinae subfamily to colonize the forest.

ALIEN SEED BEETLES AND TRUE BUGS IN ROMANIA

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The alien species represents one of the most dangerous threats to biodiversity, being overcome only by the habitat destruction. So far, in Europe there have been detected over 1000 of allochthonous insect species, from which 42 are seed beetles and 22 are true bugs species. In Romania it is known to occur till now only 5 alien species of seed beetle and also 5 species of true bugs.

In our study we investigated the possible presence of some allochthonous insects in Romania, species that were already recorded from at least one neighbor country. For the seed beetles, we collected from different areas pods of different ornamental trees in order to obtain adults in the laboratory. For the true bugs species, we investigated the different microhabitats like under the bark of the trees, leaf clusters and certain host plants.

As a result of our study, we identified 4 new seed beetle species (*Megabruchidius dorsalis* (Fåhraeus, 1839), *Megabruchidius tonkineus* (Pic, 1914), *Bruchidius terrenus* (Sharp, 1886), and *Bruchidius siliquastris* Delobel, 2007) and 6 new heteroptera species (*Amphiareus obscuriceps* (Poppius, 1909), *Anthocoris butleri* Le Quesne 1954, *Arocatus longiceps* Stål 1872, *Belonochilus numenius* (Say, 1832), *Corythucha arcuata* (Say, 1832) and *Perillus bioculatus* (Fabricius, 1775)) for Romania, all of them allochthonous. Some species are widespread (*M. dorsalis*, *M. tonkineus*, *A. obscuriceps*) but most of them are occurring only in west and south Romania and two of them being recorded only in one location (*B. numenius* and *P. bioculatus*). The apparently restricted distribution is a consequence of

mild winters in the area which permits an easier colonization for the thermophilic species. Also, west and south Romania has a more intense trade and more developed traffic infrastructure which may facilitate the introduction of alien species.

**PRELIMINARY DATA ON DISTRIBUTION OF JERSEY
TIGER MOTH *EUPLAGIA QUADRIPUNCTARIA* (PODA,
1761) IN THE VANATORI NEAMT NATURE PARK**

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The Vanatori Neamt Nature Park it is a protected area situated in the north east of Romania. It is located both on the eastern slope of the Stânișoarei Mountains and in the Neamț Subcarpathians, in the area of localities: Agapia, Bălțatești, Crăcăoani, Târgu Neamț and Vanatori Neamt. It is also a Natura 2000 site (ROSCI0270 and ROSPA0107) with a stretch of over 30.000 ha. The protected area is covered mostly with deciduous forests (91V0 Dacian beech forests (*Symphyto-Fagion*) – 23000 ha). Data on the presence of *Euplagia quadripunctaria* and its favorable habitats where collected between July and August 2011 through transects established in 8 different parts of Vanatori Neamt Nature Park along forest roads, riverbanks, clearings. The species was found in 28 of 45 sample areas, with a particularly abundance along Nemțisorului Valley where the most specimens where observed.

THE NEED TO CONSERVE THE CRESTED AND COMMON NEWT [*TRITURUS CRISTATUS* (LAURENTI, 1768) AND *LISSOTRITON VULGARIS* (LINNAEUS, 1758)], FROM GÂDINȚI FOREST AREA, IN NEAMȚ COUNTY

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Triturus cristatus and *Lissotriton vulgaris* are the most common newts species in the forest of Gâdinti commune, situated in the S-E part of Neamț County, in the immediate vicinity of the Roman city. The forest covers 2,284 ha with several temporary and permanent ponds, which are mainly used by amphibians during reproduction period.

The amphibians was observed in the wild in the period march 2014 to july 2017 and the reproductive behavior of 20 individuals (5♂ and 5♀ of *Triturus cristatus* and 5♂ and 5♀ of *Lissotriton vulgaris*) was study in the laboratory.

Based on the observation made in the field the adult population size of the newt species decreased in this 3 years period mainly due to pollution with household waste, climate change, destruction of habitat, habitat modification and fragmentation. In the laboratory was observed the egg-laying, embryo development and larval evolution, to see if exist any modification in the reproductive behavior or in embryo development.

In conclusion, habitat destruction, pollution, and climate change lead to a rapid decline in the population of studied newts species due to their sensitivity, but the embryonic development was normal, studied in the lab conditions can provide invaluable data on the conditions of development of the embryo, larval and post-larval stages, all important to knowing and preserving this newts species.

THE IMPORTANCE OF CRYPTIC COLORATION OF THE JUVENILES OF *ELAPHE SAUROMATES* (PALLAS, 1814)

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The cryptic coloration in rare and elusive species with poorly known biology and ecology plays an important role as a source of errors in estimating the number of individuals in habitats where these species are present. This raises serious problems, especially for the juveniles of these species, whose identification is attempted, when their cryptic coloration and small size can become a major problem.

In our field studies on the blotched snake (*Elaphe sauromates*), conducted in the last five years, we encountered some problems and difficulties in identifying the juveniles of this species. In habitats where the taxon can be met, the number of juveniles was initially underestimated. The reason was the cryptic coloration of the juveniles which shows a striking resemblance to that of the nose-horned viper (*Vipera ammodytes*). Observations carried out on a total of 52 juvenile Blotched snakes, have revealed the presence of the pigmentation specific to *Vipera ammodytes*, a similar arrangement of spots and, in some cases, even the characteristic zigzag stripe of vipers.

**REASERCHES CONCERNING THE DISTRIBUTION OF THE
RED-FOOTED FALCON (*FALCO VESPERTINUS*, LINNAEUS,
1766) IN SOUTH DOBROGEA (CONSTANTA COUNTY)
IN 2017**

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One of the endangered species of birds of prey from Europe is the Red-footed Falcon (*Falco vespertinus*). It is protected by European and Romanian laws (LR IUCN cat. 2012 – Near threatened, Directive 2009/147/CE, OUG 57/2007, Law 407/2006). Because the most important populations of this bird is situated in Ukraine, Hungary and România (excepting Russia) we think that is important to have an idea about the size of the population of this bird in our study area (South Dobrogea). That is important especially for the measures of protection of the species.

In 2017 we made several field observations in Constanța County (South Dobrogea – Romania), searching for this species. From May to October we made 24 observations in the area. The main transects covered were: Constanța – Vama Veche, Constanța – Negru Vodă, Constanța – Ostrov, Constanța – Cernavodă, Constanța – Hârșova, Constanța – Mihai Viteazu, Constanța – Cheia, Constanța – Vadu. We manage to find only five locations with nests. They were found near the localities Sibioara - 2 nests, Vadu I – 6 nests, Vadu II – 1 nest, Mihail Kogălniceanu – 2 nests and Saraiu – 3 nests. At Saraiu, Mihail Kogălniceanu and Sibioara the nests were found inside of the rook (*Corvus frugilegus*) colonies, in the black locust (*Robinia pseudoacacia*) trees. At Vadu I, in a small black locust plantation, we found a colony formed only by Red-footed Falcons.

New data on nesting sites for Red-footed Falcon require further research to assess the real distribution of the population of this bird in South Dobrogea (Constanța County).

PRELIMINARY OBSERVATIONS REGARDING THE BAT FAUNA OF THE SNAGOV LAKE AREA

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In June 2015 and September 2017 we conducted two days of preliminaries field studies on bat fauna of the Snagov lake area. The field study was conducted through ultrasonic microphone records on fixed stations. Based on the records in the 25 selected observation points 14 species were identified. Of the 25 fixed stations, 9 were represented by aquatic habitats, 6 were represented by thick forest, 9 were represented by forest clearings one station is represented by human settlements (village).

CHARACTERIZATION OF SOME MULTIPLE MYELOMA CASES FROM REGIONAL INSTITUTE OF ONCOLOGY, IASI, ROMANIA

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Multiple myeloma (MM) is a neoplasia caused by the uncontrolled proliferation of a plasmocyte clone. It includes a spectrum of pathologies such as gammopathy of unknown source (MGUS), smoldering multiple myeloma (SMM), malignant disease of multiple myeloma (MM) and its more aggressive form, plasma cell leukemia with circulating plasmocytes in the sanguine torrent. This study evaluated cytogenetic abnormalities in patients with MM (n = 22) by karyotyping, between January and August 20 and the correlation with malignant plasma cell phenotype evaluated by flux cytometry (FC).

The karyotype analysis shows that 12 patients out of 22 cases evaluated, had a normal karyotype (54.54%)-group N, 6 had genetic abnormalities (27.27%) - group A, and 4 cases were unreadable (18.18 %) as a result of lack of metaphases or low cell counts. In group A 33% had a hypodiploid karyotype and 66% had a hyperdiploid karyotype. The rate of bone marrow infiltration of atypical plasmocytes in patients with cytogenetic abnormalities (lot A) was 29.35%, compared to 17.57% in the normal cytogenetic group (lot N). 33% (n = 2/6) of patients A had normal plasma cells identified by FC in the medullary aspiration sample compared to 41% of N patients (n = 5/12). In conclusion, a more complete description of cloning plasmocytes in patients with MM could help clinicians to select treatment strategies with optimal long-term benefit for these patients.

GROUP FITNESS¹ AND EVOLUTION BY NATURAL SELECTION

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Darwin hypothesized that natural selection may act not only on individual organisms, but also on “families” or “communities”. One of the interpretations for Darwin’s hypothesis states that natural selection may act at multiple levels of biological organization, i.e., in this case, at higher levels than the individual organism, namely the “family” or the “community” level. This particular interpretation of Darwin’s words raises the question: when Darwin states that a given modification in structure of a sterile worker is “advantageous to the community” – and is consequently maintained and even spreads –, what does this advantage to the community mean? Does it mean that the given community produces more communities or does it mean that the given community grows larger than other communities whose sterile workers lack the given modification of structure? The contemporary multi-level selection theory seems to have accepted that both of these potential advantages to the community might be seen as sources for potential definitions of a group’s fitness.

The term “group fitness¹” implies that it is appropriate to define the fitness of a group of biological entities based on the number of offspring individuals it produces. On the other hand, the notion of “group fitness²” implies that one group is fitter than another one if it produces more offspring groups, not more offspring individuals. In this study the notion of group fitness¹ is contested, by arguing that it is problematic and, more importantly, unnecessary. This hypothesis is problematic because of its incompatibility with the most influential framework for understanding evolution by natural selection, namely

the “variation in fitness of heritable traits” framework associated with the name of Richard Lewontin.

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MORPHOMETRIC VARIABILITY OF THE MOLAR TOOTH M₂ IN THE SKELETAL SERIES BELONGING TO THE 17TH CENTURY NECROPOLIS OF IASI (IASI COUNTY, ROMANIA)

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M₂ tooth is particularly important for paleoanthropological research. The molar tooth M₂ is generally well preserved *in situ* compared to other molar teeth (M₁ wears out early and therefore its form becomes with flattened cusps and unclear pattern, and M₃ does not appear constantly). This particularly molar, M₂, is used in the study of health and diet providing information on dental wear based on food.

The 17th century necropolis of Iași was discovered in 2008, in the rescue archaeological excavations from the Palas Mall complex. 60 individual and collective burial tombs were excavated, from which 111 skeletons were recovered (80 males and 31 females). Dating skeletons was made based on the archaeological inventory.

In the present study, 250 M₂ teeth from 77 skeletons were analyzed. For each tooth, the following dimensions were taken: cusps height, mesio-distal and bucco-lingual crown diameters. The occlusal surface was photographed by a Carl Zeiss Stemi 2000-C stereo microscope with a Canon Power Shot G9 attached. Digitized micrographs were taken using scanning electronic microscope (SEM) Tescan Vega II SBH.

Morphometric variability was analyzed depending on various factors such as: sex, age, laterality and position in the skull.

The molar teeth M₂ morphometrically analyzed will be the subject of a further study concerning the dental microwear as a marker of the paleodiet.

**BIOTEHNOLOGIES FOR ENVIROMENTAL
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Oral presentations

IS THE GOLD TOXIC FOR VERTEBRATE BRAIN? THE EFFECT OF GOLD ADMINISTRATION ON BEHAVIOUR OF ZEBRAFISH MODEL AND OXIDATIVE STRESS

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Gold plays an important role in the human society. It was one of the first metals shaped by human's hands to coins and jewelry. As a material it has different application due its properties and low reactivity. Today is very fancy to use gold in cosmetic treatments, food even to swallow it in solutions as a cure or a tonic. More and more studies were agreed that it is not safe for the human health. The zebrafish model can bring valuable proofs about the toxicity produced by acute intoxication with gold. The aim of this study was to prove the acute toxicity of gold on zebrafish behavior and oxidative stress. In this this experiment gold was absorbed from environment by gills and skin. This simulated the gold absorption by human skin. The gold solution used fir this experiment was from a standard certified solution 1 g L⁻¹ from Sigma-Aldrich. From this they were prepared 4 concentrations of testing for the experimental groups: 1 mg L⁻¹, 2 mg L⁻¹, 4 mg L⁻¹ and 8 mg L⁻¹. Each testing group had 10 specimens (5 males and 5 females). In the control group had same size. The exposure time was for 30 hours. During this time they were applied two tests in a T maze: performance test and social test. The behavioural measurements were done with the software EthoVision XT 11.5 from NOLDUS, Holland-USA couplet to multipurpose cross maze system and infrared camera.

The behavioural measurements were conducted at 2h, 6h, 12h, 24h and 30h after administration of gold and for the control group. The performance test measured the capacity of the subject of

exploration and swimming performance variables (speed, total distance, minimum acceleration, maximum acceleration, moving, not moving, clockwise rotation). The social test measured the capacity of interaction with another fish from its testing aquarium with more than 8 variables. At the end of the exposure all specimen were frozen for biochemical analyses and oxidative stress measurements.

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THE USE OF MODERN BIOTECHNOLOGIES IN THE PRACTICAL VALUATION OF RESEARCH OF BIOLOGICAL ACTIVE SUBSTANCES

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Modern biotechnologies constitute a fundamental and applicative value acquisition of contemporary science with implications for plant and animal enhancement in the production of biologically active substances. Medicinal herbs, with their biologically active substances, are the essential weapons of natural medicine and are of great interest in physiology, molecular biology, patho-biochemistry, nutrition, pharmacognosis. In recent years, the industry of biologically active substances has seen tremendous growth. Today, it is appreciated that phytotherapy uses 20,000 species of medicinal herbs, which more preferable prophylaxis and treatment serve about 300 plants. In popular medicine, over 200 herbal medicinal plants are used, which lower the level of sugar in the blood. Anti-diabetic effects exert the plants that contain amino acids, B-group vitamins, microelements, and enhanced bioactive substance yields, allowing them to be used in medical practice.

For the first time in the "Human and Animal Ecophysiology" Laboratory, MSU, experimental scientific investigations have been carried out on the influence of bioactive substances on the insulin function in the endocrine pancreas, thyroid hormones, blood counts that show the increase or decrease in body mass. Phytotherapy is an effective solution for the prevention and early treatment of diabetes due to its multilateral effects, such as: immunological, antiviral, anti-

inflammatory, regenerative and cicatrizing, as well as antitoxic, anti-irritant. The results of the investigations show that due to the chemical composition rich in bioactive substances, the extracts from medicinal plants (ginger, bay leaves and cinnamon) show a hypoglycemic effect and can be included in the list of natural preparations used in the treatment of glucidic metabolic disorders. The sanogenic effects of this extract can be successfully used in sanocreatology to maintain and strengthen health, thus maintaining the vital potential of the body within the limits of homeostasis.

SUSTAINABLE MANAGEMENT OF SOIL BY GREEN TECHNOLOGIES

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In the investigations carried out pilot land were selected and was evaluated the entire complex of factors that determine the contemporary evolution of the soils and was elaborated the integral concept regarding the anthropogenic pedogenesis.

Based on the complex assessment of soils according to the physical (grain composition) and chemical (content of humus) particularities of the soils, were developed models of technologies adapted to ecopedological conditions.

Under laboratory and field conditions, physical and chemical soil quality indices have been studied on the analyzed land. Based on the results obtained, was analyzed the impact of the spring works on soil pedogenetic indicators.

It has been established that ecological remediation technologies imply the naturalization of agro ecosystems and the process of pedogenesis and include: the adaptation of agro ecosystems to concrete land conditions; reducing external pressures on soils by minimizing work, reducing the flow of substances from the outside with fertilization, including organic matter; balancing the balance of substances by biological agrocenosis based on compatibility, favoring and succession of crops over time.

On the basis of the assessment of the accumulation laws of heavy metals, it was proposed to develop a methodological - applicative framework for the identification of areas (land) with tense balance sheet of heavy metals and to promote organizational, agro-technical, pedoameliorative and special measures to optimize the balance of heavy metals and land reparcelling.

In accordance with the specified principles, anthropic soils have been divided into certain groups with the identification of priorities within the integrated remediation process.

IN VITRO EVALUATION OF NANOPARTICLES TOXICITY BY FLOW CYTOMETRIC ANALYSIS USING THE UNICELLULAR ALGA CHLORELLA

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In order to select flow cytometry analysis methods that can later serve ecotoxicological bioassays by taking *Chlorella fusca* microalga cell model, we intend to investigate the effects induced by nanoparticles resulting from nanoparticles, nanoparticles (NPs) whose toxicity and impact on the environment are still incompletely known and in some cases even ignored.

Nanomaterials are by far the most significant market opportunity in the foreseeable future. Under the toxic action of two types of nanoparticles (porphyrinic (P1) and ferromagnetic (P2)) at different concentrations and different incubation times (24h, 48h and 6 days) it can be seen that the calcein MFIs are dependent on the concentration of nanoparticles, with a decrease in estradiol activity at high concentrations. This decrease is much higher under the influence of ferromagnetic nanoparticles in sample P2 against the same concentrations of porphyrin nanoparticles, which proves that the method is sensitive, allowing a good discrimination of the toxicity of the samples.

The determination of metabolic activity based on the activity level of Calcein-AM (cell viability test) using a *Chlorella* culture as a cell model represents an important possibility to determine the toxicity of some pollutants due to sensitivity and the possibility of quantifying the results, including the study of the toxicity of nanoparticles before their application in various areas of economic life.

The method proves to be correlable with other flow cytometry tests and can be the basis for a flow cytometric bioassay easy to apply in ecotoxicity studies.

**BIOTEHNOLOGIES FOR ENVIROMENTAL
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Poster presentations

EVALUATION OF CYTOTOXICITY AND GENOTOXICITY OF COLD PLASMA ON IN VITRO CELL MODELS

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A major problem in current cancer therapies is the uncertainty of their major efficacy and the recurrence of cancer due to the drug resistance achievement. So, nowadays, there is a necessity to identify new therapies and combined strategies to combat the disease.

The aim of this study was to evaluate the impact of dielectric barrier discharge (DBD) plasma on normal and tumor cell cultures, in order to identify immediate and late effects on cell viability and apoptotic genes expression.

The biological material used in this study consisted of neoplastic HeLa cell cultures and normal Vero cells. Cell cultures, both neoplastic and normal, were exposed to DBD-type cold plasma for 10 minutes at a voltage of 15 kV.

In order to identify the impact of cold plasma on cells, were performed MTT viability tests, flow cytometry analysis, double-stained fluorescence microscopy (EtBR and AO) analysis, and RT-qPCR analysis of the TP53, Bcl2 and CDKN1A / p21 genes.

Following these analyzes, it has been observed that cold plasma has a selective effect, as evidenced by the more pronounced cytotoxic impact on neoplastic cell cultures compared to the normal ones. The higher frequency of preapoptotic and apoptotic cells in

neoplastic cell cultures compared to normal cell cultures, states the proapoptotic impact of cold plasma and supports evidence of the selective character of DBD plasma.

Analysis of the expression levels of the various genes involved in the apoptotic pathway (p53, p21, bcl2) suggest an independent p53 pathway for the induction of cell apoptosis, possibly following an alternative (mitochondrial) way.

RESEARCH ON THE INFLUENCE OF SODIUM BENZOATE ON WHEAT GERMINATION AND CELL DIVISION

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The research aimed at highlighting the influence of treatment with three solutions of sodium benzoate (E211) on processes of wheat germination and cell division (*Triticum aestivum*). For testing, we used 25 wheat seeds / test samples, including for control, and three concentrations of sodium benzoate (E211): 0.3 mM, 0.9 mM, 3 mM. The seeds were treated with the three concentrations at different times: 12 and 24 hours, respectively.

For each test sample, there were calculated the percentage of germinated seeds, the mitotic index (MI), the frequency of the cells in mitotic division phases, as well as the types and percentages of cells exhibiting chromosomal aberrations.

The study revealed that all E211-treated variants recorded cells in all phases of the mitotic division. All the treated variants had a mitotic index lower than the control sample. Of the experimental variants, the one treated for 12 hours with 3 mM sodium benzoate solution recorded the highest MI. The smallest IM was recorded in the sample treated for 24 hours with 0.3 mM sodium benzoate solution.

There was identified a fairly wide spectrum of chromosomal aberrations, identified primarily in the cells of the anaphase division, there being recorded A-T with bridges, retarded chromosomes, expelled chromosomes and fragments. A high number of identified cells contained micronuclei.

MODELING AND OPTIMIZATION OF GROWTH PARAMETERS FOR BAKERY YEAST (*SACCHAROMYCES CEREVISIAE*) BY USING EXPERIMENTAL DESIGN PROCEDURE

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Research on yeasts over recent years is of great interest, due to their potential in studying fundamental aspects of genetics, biotechnology, cell biology and development of applicative fields of productive interest. One of the most notable and well-known species of yeast in health and wellness is known as *Saccharomyces cerevisiae*, which is also known by its more common names, brewer's yeast or baker's yeast. Bakery yeast is a cell biomass of the species *Saccharomyces cerevisiae*, biomass made of living cells capable of producing fermentation of dough sugars with the formation of ethyl alcohol and carbon dioxide. The cultivation of *Saccharomyces cerevisiae* yeast in order to obtain biomass for the bakery industry is a complex of physico-chemical, biochemical, thermo-energetic and microbiological processes. This paper presents the application of kⁿ experiment design procedure for simulation and optimization of growth parameters for baker's yeast, *Saccharomyces cerevisiae*. There were performed 27 experiments according to the experimental design procedure. The input variables were: the amount of carbohydrates (X_1), temperature (X_2) and medium pH (X_3) and the output variable was the autolysed cells (Y). The optimal conditions for growth parameters of *Saccharomyces cerevisiae* were obtained for an amount of carbohydrates of 46.8 g/L, a temperature of 30°C and a pH of 5.7.

IN VITRO ANTIBACTERIAL ACTIVITY OF PELARGONIUM EXTRACTS

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Some herbs are often used in prophylaxis and therapeutics of many diseases. They are viable alternatives to synthetic drugs, cheaper and easy to use, free from side effects and capable to improve the human health.

In this study the antibacterial effects of pelargonium extracts (the aqueous and alcoholic extracts from *Pelargonium zonale* (L.)) were tested against four bacterial strains: *Chryseomonas luteola*, *Agrobacterium tumefaciens*, *Staphylococcus aureus* ATCC 25923 (a reference bacterial strain) and a lactic acid bacteria from university laboratory collection, marked as BL 55.

The disc diffusion method was used and the antimicrobial effects were estimated by measuring the diameter of inhibition growth zone. As a positive control we used a standard antibiotic disc (Streptomycin 10µg, Bioanalyse) and as negative control we used the solvent.

The most obvious effect was established for the lactic acid bacteria and the staphylococcal strain and the most effective extracts were the alcoholic extracts.

PRELIMINARY RESULTS REGARDING «IN VITRO» INHIBITORY EFFECT AGAINST BACTERIA OF SOME PHYTOGENICS

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After EU-wide ban on the use of antibiotics as growth promoters in animal feed in 2006, natural alternatives are needed to be found in feeding sustainable livestock production. In the last years, research activities has been accomplished to evaluate the potential of plant extracts and essential oils as favourable substitutes to in-feed antibiotics in livestock production. Essential oils represent a concentrated form of plant extracts (phytogenics), containing mainly the active compounds of the plants. However, their application on industrial scale is limited, largely due to the lack of full understanding of the action modes. In aquaculture, some authors (Citarasu T., 2010; Chakraborty S.B.& Hancz C., 2011, Yang C. et al., 2015) reported that phytogenics can be used for increasing the stress resistance and preventing the infectious diseases by modulating the nonspecific immune system of fish as prophylactic measures, but as treatment, too.

In our paper, a case study was conducted regarding *in vitro* effect of 21 commercial plant extracts obtained by steam distillation and tested against two bacterial strains, commonly found in aquatic environment, respectively *Aeromonas hydrophila* (ATCC 7966) and *Enterobacter cloacae* (ATCC 1304). The goal was to qualitatively detect the type of bacterial reaction around these essential oils and our results showed the specific bacterial actions. From those 21 essential oils tested, 5 have shown a common inhibitory activity on both bacteria, 14 have shown inhibitory activity on *Enterobacter*

cloacae and 9 on *Aeromonas hydrophila*. This stage of assessment under laboratory conditions was necessary in order to guide us how different phytobiotic extracts can interact with spontaneous fish microflora.

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RESEARCHES CONCERNING THE OPTIMIZATION OF GROWTH PARAMETERS OF SOME PROBIOTIC BACTERIA IN LABORATORY CONDITIONS

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Probiotics have their origins since 1903 when Metchnikoff in his studies noticed the beneficial effects of yogurt consumption. The "probiotic" term was first used in 1965 by Lilly and Stillwell, then by Parker in 1974 to define "organisms or substances that contribute to the microbial balance of the intestine." The researchers found that probiotics contain microorganisms belonging to genes: *Streptococcus*, *Lactobacillus*, *Bacillus*, *Aspergillus*, *Saccharomyces*, *Enterococcus*, *Pediococcus*, enzymes (lactoperoxidase, gluconase, nonspecific enzymes) and rumen extracts.

In this study, commercial probiotic bacteria known as "Linex" were used as samples. Cultural characteristics of these probiotic bacteria have been isolated and studied. For their analysis we used a wide range of equipment and consumables from the Department of Biology, Ecology and Environmental Protection - the laboratory of microbiology, phytopathology and plant physiology.

It has been found that solid culture medium (nutritional gelose) favored the growth and development of bifidobacteria better than the liquid nutrient medium (nutrient broth). Thus, the number of bifidobacteria resulting was of $789 \cdot 10^6$ cells/ml on solid media and $506 \cdot 10^6$ cells/ml in liquid nutrient medium from direct counting with Thoma chamber and $23,8 \cdot 10^3$ UFC/ml on solid media and $23 \cdot 10^3$ UFC/ml in liquid nutrient medium from colony forming unit technique.

“IN VITRO” MULTIPLICATION OF *SALVIA OFFICINALIS* L.

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The cultivation of *Salvia officinalis* L. through unconventional techniques offers many advantages arising from opportunities to improve, conserve and perpetuate a plant with pharmaceutical value. The major phytochemicals in flowers, leaves, and stem of *Salvia officinalis* L. include alkaloids, carbohydrate, fatty acids, glycosidic derivatives (cardiac glycosides, flavonoid glycosides, saponins), phenolic compounds (coumarins, flavonoids, tannins), poly acetylenes, steroids, terpenes/terpenoids, with a wide range of pharmacological activities, including anticancer, anti-inflammatory, antioxidant, antimicrobial, antimutagenic effects. The studies are based on vegetative multiplication of *Salvia officinalis* L.. Plant regeneration has been achieved from meristem cultures, followed by rapid shoot multiplication, rooting and finally establishment of plantlets in soil. The cultures were established on MS medium, supplemented with benzylaminopurine, as cytokinins, in various concentrations (1 mg/l , 0.5 mg/l, 0.1 mg/l) or in combination with an auxin (2,4 diclorphenoxiacetic acid): 2, 4 D (0,5 mg/l, 0,25 mg/l, 0,05 mg/l). The samples were kept in growth chamber at 24 ±2°C under a 16 h light and 8 h dark photoperiod. The evaluation of explants reactivity was the number of developed shoots encountered on initial explant. Benzylaminopurine (BAP), in a concentration of 1 mg/l, or in combination with 2,4 diclorphenoxiacetic acid (2,4-D 0.5 mg/ l) stimulate the shoots multiplication. The regeneration of whole plants was obtained in two steps: the shoots were excised and transferred to fresh medium and then rooting of these shoots was achieved on the same medium without growth regulators. The whole plant reconstruction protocol lasted for 10-12 weeks.

ELECTROMAGNETIC RADIATION INFLUENCE ON SOME PHYSIOLOGICAL AND CYTOGENETIC PARAMETERS IN ALLIUM CEPA L.

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Microwave action on living organisms it's interesting for biologist and not only, due to microwave influence on the DNA activity, especially on the conformational aspects of the genome. The aim of our study has been focused on the impact of microwaves on cellular and genome dynamics in *Allium cepa L.* root meristems. Our investigations establish the stimulatory effects of microwave treatments on mitosis, but also detect alteration at chromosomal level.

CARITOTIPIC CHARACTERIZATION OF *ECHINACEA ANGUSTIFOLIA* D.C. PLANTS MAINTAINED IN THE GENE BANK FROM S.C.D.L. BACAU

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The research presented in this paper focused on the cariotypic characterization of *Echinacea angustifolia* D.C. existing in the collection from S.C.D.L. Bacau. Genetic characterization is important for species identification and hybrid population analysis. Genetic determinations include chromosomal counting and karyotype determination, mitotic indexing, and mitotic anomaly analysis.

The biological material used in the present cytogenetic study is represented by the radicular meristems of the plantlets resulting from the germination of the seeds of *Echinacea angustifolia* D.C.

The preparation of biological material for cytogenetic studies was carried out according to the data presented by the literature. Thus, two working methods were used to determine the best coloring method, namely the Schiff Reagent staining method and Carr's Reagent staining method. Measurement of chromosomes was made by correlating the measurements made using the microscope micrometer and the measurements made in Adobe Fotoshop 5.

The results obtained showed that the chromosome sizes varied between 4.12 and 5.83 μm . Four pairs of chromosomes with centromers in the median area and two pairs with centromers in the sub-median area were identified. Of the remaining five pairs of chromosomes, four have centromers in the sub-terminal area, and the tenth pair has the centromer in the terminal region.

THE INFLUENCE OF THE NUTRITION SPACE ON THE HERB AND SEED YIELDS AT MOLDAVIAN SENNA (*Cassia angustifolia* Vahl.), IN A.R.D.S. SECUIENI PEDOCLIMATIC CONDITIONS

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Cassia angustifolia Vahl. (senna) is a heat-loving species, the seed germination begins at 8 °C and at over 15 °C the emergence occurs in 7-9 days. It also has high requirements to moisture in the phase of germination, when in order to germinate the seeds absorb water up to 150-200% of their weight, requirements that are maintained throughout the entire growing season.

In the conditions of 2015 – 2016 agricultural year, due to the observations made, it was found that the fresh herba, dry herba and seed yields were positively influenced by the distance between the rows (average factor A), but also by the distance between plants per row (average factor B). The obtained data have showed that the highest average yields of fresh herba (7520 kg/ha), dry herba (2800 kg/ha) and seeds (2500 kg/ha) were obtained at the a1xb1 interaction sown at 25 cm between rows and in continuous row (control variant). In the experience with the nutrition space, it was found that, the plants harvested for herba had a vegetation period of 111 days requiring 1918,8 °C and 327,4 mm of rainfall, and the plants harvested for seed developed in 158 days, the sum of accumulated temperatures being of 3430,6 °C and of rainfall of 363,8 mm.

THE PRESERVATION OF SEVERAL SPECIES OF *ERICACEAE* IN THE NEMIRA MOUNTAINS

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The blueberry (*Vaccinium myrtillus*) is a shrub belonging to the *Ericaceae* family with multiple therapeutical effects due to its high level of antioxidants in its berries and leaves. The leaves may be harvested for medicinal purposes starting with the end of June until September, and the berries – from July until September.

The blueberry fruits contain antibacterial and antiseptic substances. According to some recent scientific studies, they comprise a vegetal substitute for insulin, therefore they are recommended as an additional therapy in the treatment of diabetis. The calcium, potassium, sodium, and magnesium salts, the vitamins such as A, C, B₁, and B₂, and the proteins within its berries are a stimulant that enhances the body strength and the immune system.

It is spread in the subalpine region of the Nemira mountains at high altitudes (more than 1500 metres), covering the entire ridge. The blueberry grows next to some other species of *Ericaceae*, as well as of juniperus (*Juniperus communis*); they are key species in order to identify the commune interest habitat 4060 - “Alpine and boreal shrubs”. The preservation status is favourable within all the regions in which the blueberry was found. The current study displays a series of regulations that are extremely important to decrease the impact on the related habitat.

VALORISATION OF PEPPERMINT (*MENTHA PIPERITA*) FOR OBTAINING TONIC BEVERAGES

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Peppermint (*Mentha piperita*) represents an important medicinal and aromatic plant, with uses in pharmaceutical, flavor, cosmetics and food industries. The volatile profile of peppermint essential oils is mainly constituted by carvone (22-73 %) and limonene (8-31 %), with smaller quantities of 1,8-cineole (4-7%), menthone (1-5 %), isomenthone, menthol, eucalyptol. The non-volatile part of the plant contains phenol compounds (rosmarinic acid, salvianolic acid, lithospermic acid, chlorogenic acid, caffeic acid etc.) flavones and flavanone glycosides such as: routine, luteolin, hesperidin and eriocitrin.

Knowing the many medicinal uses of peppermint we aim in this study to capitalize the potential of peppermint by producing some tonic beverages.

Different methods of obtaining mint-based alcoholic beverages have been considered by maceration and warm extraction. The samples prepared were organoleptically analyzed by a multi-sensory approach (aroma, taste, color, clarity, smell) and by spectral methods.

Preliminary results showed perceptible differences between the samples obtained by the different methods of preparation. Since all the ingredients have been carefully selected and no additives have been used, we consider that the beverages obtained in this study may represent an ecological alternative to the already existing offer on the market.

INSIGHT IN THE GONAD DEVELOPMENT OF BEST BELUGA STURGEON HYBRID INDIVIDUALS THROUGH HISTOLOGY AND IMMUNOHISTOCHEMISTRY

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The Best Beluga is a sturgeon hybrid (♀ bester (♀ *Huso huso* × ♂ *Acipenser ruthenus*) × ♂ *Huso huso*) that can be found in Romanian aquaculture. Because of its availability it has been studied from a developmental point of view through histology. In this study we investigate the presence of the DMRT1 and CYP17-I proteins through immunohistochemistry in order to shed light on the gonad development of 21 months old individuals.

The individuals were weighed and total length was recorded, afterwards they were sacrificed and the gonads were fixed in paraformaldehyde. After embedding the samples in paraffin they were cut into 5 μm sections that were stained with haematoxylin and eosin. For immunohistochemistry the sections were deparaffinised and processed using the Novolink Max Polymer Detection System (Leica) using the anti-DMRT1 and anti-CYP17-I primary antibodies.

The sex of the individuals was identified at sampling by observing the lamellae on the female gonads and the relatively smooth male gonads and confirmed through histology. No intersex individuals were observed. The presence of the DMRT1 and CYP17-I proteins was detected in gonads of the Best Beluga individuals.

LEAD ADSORPTION FROM AQUEOUS SOLUTIONS ONTO CHEMICALLY MODIFIED NANOMATERIALS

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The retention of toxic heavy metals from wastewaters is an attractive subject in the field of environmental remediation. The adsorption is a very effective and economical process for heavy metal ions removal from wastewaters. Lead presented in the wastewater of many industrial processes, such as the production of dyes, paint coatings, glass and batteries, is potentially toxic to humans and to aquatic environment too. The exposure of humans to lead produces severe acute poisoning when is placed in the digestive tract, edema, learning disabilities for children, damage to organs (liver, kidneys and heart) and immune system disorders.

Due to its high montmorillonite content, to its high natural availability and low cost, Romanian bentonite, is a good candidate for the development of nanomaterials used in environmental remediation. The effects of synthesis parameters on textural, structural and morphological properties have been investigated. The modified clays were characterized by: nitrogen adsorption technique, X-ray diffraction (XRD) and scanning electron microscopy (SEM). The determination of Pb(II) ions concentration was realized by atomic absorption spectrophotometry. The nanomaterial with the best properties was tested on Pb(II) adsorption from aqueous solution. The parameters varied in the adsorption studies of lead ions onto the most advanced nanomaterial were: contact time between the adsorbent and the aqueous solution of Pb(II), pH of aqueous solution, adsorbent dose, Pb(II) ions concentration of initial solution.

ECOLOGICALLY MINERALIZED ORGANIC FERTILIZER USING BY-PRODUCTS FROM WOOD AND DAIRY INDUSTRIES

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The modern concept of sustainable development has led to an increased interest in environmental issues, in protecting environmental factors: water, air, soil. The basic principle is to minimize generation of industrial waste for preserving the quality of the environment.

Biodegradables by-products from wood industry represent about 60 % of the total amount of biodegradable waste at national level, so a recovery system is required.

On the other hand, whey is the main by-product of the dairy industry and it represents a product of major interest. In the literature, positives results were obtained by incorporation of dry whey in the compost mixture.

Our research investigated the possibility of direct valorization of by-products from wood and dairy industries, by obtaining an ecologically mineralized organic fertilizer used for agricultural soil fertilization.

Studies have been carried out considering the sawdust, bark and whey ratio and it influence on fermentation. The nitrogen variation in the fermentation anaerobic process was pursuing. It has been found that the fermentation time, the bark and the whey proportion represent important parameters in the obtaining process of mineralized organic fertilizer.

AMMONIA ADSORPTION KINETICS ON AL-PILLARED CLAY PARTICLES USING CO-AXIAL MAGNETIC FIELD AS PROCESS INTENSIFICATION

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This study was focus on ammonia adsorption kinetics from a gaseous air-ammonia mixture on Al-pillared clay particles in fluidized bed with pseudo-homogenous structure obtained by applying a co-axial magnetic field. The particles were formed by successions of Al-pillared particles with adsorbent properties and steel particles with Fe>98.5 % forming a multilayered structure. The alternant layers of Fe particles with support role for the Al-pillared clay particles ensure gas uniform distribution over adsorption column. The intensification process that combines the fluidization technique with the action of magnetic field ensures a maximum contact surface of the gas-adsorbent particles. The kinetics in fluidized bed using co-axial magnetic field showed an adsorption capacity of ammonia on multilayer beds of 0.81 mmol/g and reached saturation in ammonia in 671 seconds.

A GREEN CHEMICAL APPROACH OF CORN STARCH MODIFICATION FOR INNOVATIVE SOLUTIONS IN SOIL REMEDIATION

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The aim of research is to achieve chemical modifications of corn starch (*Zea mays* Poaceae). Therefore, the study is focused on its chemical modifications, in order to increase its aqueous solubility and to ameliorate its adsorption properties for one hydrophobic pollutant, belonging to Polycyclic Aromatic Hydrocarbons (PAHs), benzo[a]pyrene (BaP), as a model, a pollutant usually existing in contaminated soil and described as being almost insoluble in water ($3 \mu\text{g}\cdot\text{L}^{-1}$), allowing its retention in polysaccharide-based materials. Starch chemical modifications are realized by alkylation reactions using ether (propylene oxide) or ester (succinic anhydride) alkyl agents.

Starches obtained are characterized by ¹H NMR technique in order to verify the alkylation procedure. Water solubility of the obtained product was determined and its capacity to adsorb the considered model pollutant was studied. According to the registered results, starch modification with succinic anhydride conducts to an aqueous solubility of $34.00 \text{ g}\cdot\text{L}^{-1}$, significantly increased in comparison with the solubility of native corn starch which is insoluble in water at room temperature. With this modified starch, promising results for BaP aqueous solubilisation were obtained. This type of starch modification enhanced the apparent starch aqueous solubility.

The results revealed that the product can be successfully employed to develop environmental friendly methods for PAHs removal.

UTILIZATION OF BIOMATERIALS - CLAY TYPE SMECTITE

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Biomaterials are defined as "any substance or combination of a substance of natural or synthetic origin that can be used for a defined time period as a whole or as part of a system that treats, hurries, or replaces a tissue, organ, or function of the human body". Among the many existing biomaterials in the present work we refer to the clays. The term clay originates from the Greek term (clayey) and is a petrographic term attributed to any deposit that is made up of more than 60% clayey minerals and non-carbonate lucite fraction. The rocks are some of the most widespread biomaterials on the surface of the earth, with a small grain <0.002 mm, and composed of a complex of clay minerals: kaolinite, illit, montmorillonite, etc. A classification of these biomaterials is difficult to achieve because they are a mixture of minerals with fine particles, different chemical compositions, different structures, etc. Vaccari has, however, achieved a broad classification of these types of natural materials depending on the loading of the layers, namely: cationic clays and anionic clays. Considering this classification, Konta proposed another one and here appears the group of smectite (bentonite) - highly expanded trilamellar phyllosilicates (eg: montmorillonite, beidelite, nontronite, saponite). Bentonite originates from an acidic rock (a rhododit), and formed from the Paleozoic to the Quaternary, inheriting from the primary material some physicochemical properties, plus the properties resulting from the sedimentary and hydrothermal petrogenesis. In România, smectite clays appear in nature in large quantities in Countys: Maramureș, Hunedoara, Alba, Timiș, Caraș - Severin. Smectite clays used in industry, commercial or chemical products, can be divided into three types: Ca-Mg smectites, Na smectites and Fuller's (acid earths).

Uses of smectite clay minerals in large volumes: foundry sand binder, pet adsorbent, oil well drilling, pelletizing (iron ore, animal feed), waterproofing, water impedance, pesticide carrier, oil and grease adsorbent, filtering, clarifying, decolorizing and in small volumes: medical, cosmetic, pharmaceutical, paint, gypsum products, building (bricks, roofing tile, sewer pipe), radioactive waste disposal, catalysts, fertilizers, lubricants, pottery ceramics, water purification among other miscellaneous. The use of these biomaterials is as old as humanity.

LAYERED DOUBLE HYDROXIDES, NANOMATERIALS USED FOR ENVIRONMENTAL PROTECTION

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The scientific literature has dealt with the study of various assemblies of procedures and abilities to remove pollutants from wastewater, such as the use of nanofiltration, advanced oxidation processes and adsorption on various types of clay impregnated with agents surfactants and others. For all that, between all these processes, the adsorption has been preferred because of the high quality of the treated effluent, especially for a very well designed sorption processes a very well designed sorption processes. The layered double hydroxides (LDHs) amongst the various adsorbents, are promising waste scavengers, particularly for pollutants molecules. Adsorption of pollutant by LDHs is a facile method for cleaning up effluents and wastewater before discharging them into the environment. The adsorption process was found to be influenced by the contact time, the initial pollutant concentration, the pH, and also by the temperature. All recent scientific studies showed that the use of LDHs for the retention of organic anions has shown very good results because the nanomaterials have a layered structure and present various properties such as: specific surface area, pore diameter, thermal stability, mechanical properties that can be significantly improved by their processing and used as nanofilters. Layered double hydroxides, also renowned as anionic clays, are nanomaterials of large interest due to their and large specific surface area, but also and their very good adsorption ability. On the strength of to the very good

properties of materials, we study an application of synthesized LDHs in our laboratory for the retention of persistent organic pollutants on LDH matrices.

Layered double hydroxides clays are used as unconventional materials in several areas, especially in environmental protection, if their structure is modified, because they are good adsorbents for carbon dioxide and others environmental pollutants.

TOXICOLOGICAL EFFECTS ON MODEL ORGANISMS CAUSED BY ADMINISTRATIONS OF INSECTICIDES DELTAMETHRIN AND IMIDACLOPRID

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Deltamethrin and imidacloprid are two insecticides that are highly used for pest control in agriculture. Deltamethrin is a type II pyrethroid known for its neurotoxicity on insects and imidacloprid was considered to be more safety than it.

There are numerous studies that reveal the negative effects of insecticides on other organisms than insects, like fish, birds, mammals. In the case of fish, the exposure to deltamethrin leads to hyperactivity, loss of motor coordination, increased mucus secretion in the gills but also an increase in cortisol and prolactin levels. The enzyme activity of the antioxidant system suffers disturbances and high level of malondialdehyde which is a result of lipid peroxidation and oxidative stress. Reducing swimming speed, rapid gill and opercular movements, abnormal swimming and decreased fertility are just some of the effects observed on zebrafish model. It was observed on rodents a reduction in social interaction, locomotor frequency and an increase in cortisol and lipid peroxidation.

The rate of viability and hatching of fish eggs was reduced after imidacloprid administration. For example, in zebrafish, the combination of imidacloprid with other pesticides produced to the occurrence of synergistic effects, and in case of single administration, reduced the locomotor activity and oxidative stress have been observed. After the exposure of chick embryos at imidacloprid was observed a series of growth development abnormalities such: deformities of head and legs, weight lost and retardation growth. In

case of rodents, chronic exposure of imidacloprid produced lower testosterone levels and sperm in males; in females, it caused hormonal imbalance. In both cases, the presence of oxidative stress was observed by decreasing the activity of antioxidant enzymes and increasing the lipid peroxidation process and malondialdehyde activity. There were reported two cases of suicide with imidacloprid at humans and the principal effects observed was: fever, drowsiness, productive cough, disorientation, dizziness, gastroesophageal erosions, hemorrhagic gastritis, microhematuria, leukocytosis, glycosuria and hyperglycemia.

It is important to study the toxicity of these two insecticides because there is not enough data about their long term effects on humans and other liferforms.

ECOLOGY AND SUSTAINABLE DEVELOPMENT

Oral presentations

WETLANDS ECOSYSTEM SERVICES AND BENEFITS ALONG THE DANUBE FLOODPLAIN

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Wetlands provide vital ecosystem services to the socio-economic system at different scales (e.g. water quality control, wastewater treatment, groundwater recharge). Such ecosystems are essential for local sustainable development, especially in the floodplain area of the large rivers. The wetlands loss and degradation translated into increased flood risk, lower water quality with consequences for human health and welfare. The purpose of this study is to identify the benefits and ecosystem services provided by Greaca agricultural polder, a former flooding area, according to different scenarios. This area (Gostinu-Prundu-Greaca) is among the 53 polders constituted by 1200 km embankment of the Danube floodplain. According to Corine Land Cover (2006), 13 land use categories have been identified in Greaca agricultural polder. Agrosystems cover approx.90% of the area (arable land and rice fields). One hundred years ago, before the embankment, the area was mostly covered by aquatic ecosystems, natural meadows, forests and wetlands. Approximately 275 km² of land was naturally flooded for more than 6 to 7 months per year. The Greaca polder system has been examined in two states, reference and actual situation, taking into consideration ecological integrity and ecosystem services provided, respectively production, regulation and cultural services. This allowed to emphasize that for actual state all ecosystem services (production, regulation and cultural services) and ecological integrity decreased compared with the reference situation. The most important decreases occur for the regulation services (31%) and for the cultural services (35%), and the smallest for the production

services (87%). In this case the fish, reed, reedmace and animal production have been replaced by the agricultural production. The study contributes to the proper assessment of the wetlands benefits provided to the society and supports the decision-making process for implementation of ecological restoration program in the Danube floodplain.

PARTICULARITIES REGARDING THE COMPLEX SETTING OUT OF THE SIRET HYDROGRAPHIC AREA

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Concern for the proper administration of water and hydrographic setting out represents a major objective for the entire society and for all institutions and economic agents who carry responsibilities for a sustainable development of water or who use water in their production processes.

The major objectives, preoccupations and priorities of water managers are:

- Integral quality-quantity water management;
- A rational use, harness, preservation and provision of surface and underground water resources;
- The protection of water resources and a permanent monitoring of water sources;
- The prevention of damaging effects of waters and a coordination of the defence measures against floods; the exploitation and maintenance of water courses and of connected water management works;
- Providing the necessary protection debits for underwater and adjacent terrestrial ecosystems;
- The complex setting out of hydrographic basins.

These objectives and priorities are applied on the entire surface of the Siret Hydrographic Basin, the most spread basin on the territory of Romania (42.890sqm), out of which 28.116sqm fall under the management of Siret River Basinal Administration, Bacau.

In this paper we outline some particularities of the complex management of water within the Siret hydrographic basin, managed by the Siret River Basinal Administration.

DETERMINATION OF UNDERGROUND WATER QUALITY, THE MAIN SOURCE OF DRINKING WATER, IN A VILLAGE AREA, NORTH-EASTERN ROMANIA, BASED ON “*IN SITU*” PHYSICAL-CHEMICAL ANALYSIS

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The aim of this study is analysing and water quality assessment in the wells in a village area, north-western Romania. A total of 80 wells, representing the main source of water for the local population, were assessed. The TDS (total dissolved solids) was used as the main water quality indicator. This parameter is normalized by US-EPA (American Environmental Protection Agency) as a scale of normal values for waters in different geographic regions. Total dissolved solids (TDS) are naturally present in water, but also due to the anthropogenic activities such as mining, pollution, agriculture and waste water treatment. They represent the total of mineral salts and organic molecules, which in moderate concentrations are required for organisms but in high concentrations become contaminants, such as heavy metals and organic pollutants. US legislation provides periodic measurement and monitoring of this parameter in water for inorganic salts, organic matter and other substances dissolved. The concentration and composition of TDS in natural waters varies depending on the geological substrate, atmospheric precipitation and water balance (evaporation-precipitation). Waters with a TDS concentration of more than 1000 mg·L⁻¹ (equivalent to 1000 ppm) are considered to be "unpleasant" or unhealthy (Weber-Scanell & Duffy, 2007).

In addition to this parameter, we also analyzed: DO (dissolved oxygen), oxygen saturation, salinity, conductivity, oxidation-reduction reaction and pH. Measurements of the same parameters for the current water in the Municipality of Iasi and Botosani and for various bottled sparkling and still waters brands were made.

Since at national level the TDS is not standardized, American values were used for comparison

(<http://water.epa.gov/drink/contaminants/secondarystandards.cfm>).

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STUDY OF HYDROBIOCENOSE FUNCTIONING TOWARDS DETERMINATION OF THE SUPPORT CAPACITY OF AQUATIC ECOSYSTEMS AND ECOTOXICANT BIOLOGICAL MIGRATION

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The study of hydrobiocenose functioning, in order to determine the support capacity of aquatic ecosystems, consists of carrying out the complex investigations, in frame of which the regularities of relationships between abiotic and biotic factors at different trophic levels and their influence on the reproduction capacity of dominant species of hydrobionts are established, risks of environmental factors are assessed, water quality and migration processes of ecotoxicants are appreciated, functional and quantitative role of hydrobionts in biogeochemical migration is defined. A range of investigations are devoted to the monitoring and identification of peculiarities of microelement migration in the “water-suspensions-silts-hydrobionts” system in dependence of a range of factors, disclosure of regularities and levels of microelement accumulation in aquatic plants and animals, and determination of their functional role in biogenic migration of chemical elements. The metals form a group of chemical elements with a distinctive role in the functioning of aquatic ecosystems, their action on alive systems being similar to that of catalysts in biochemical reactions. In the same time, some metals are included in the EPA Priority Pollutant List (2014) and many of them are listed among the most stable ecotoxicants.

For the first time there were determined the quantitative parameters of the contribution of main factors to the dynamics of metal migration in aquatic ecosystems, established the regularities of their accumulation in aquatic plants and animals. All this, taken together with the disclosure of metal influence on production-destruction

processes, and on fish development at different ontogenetic phases grounded the concept of assessment of the buffer capacity of the main aquatic ecosystems of Moldova and namely the Dniester and Prut rivers.

Both the biological monitoring of metals and the appreciation of hydrobiont resistance to their compounds significantly contribute to the resolving of theoretical problems on hydrofauna evolution, mechanisms of bioproduction processes, flow of chemical elements in trophic chains. The applied aspects are linked to the protection of gene pool of aquatic fauna and flora, elaboration of recommendations on the restoration and sustainable use of aquatic resources, appreciation of water and fish product quality.

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ASSESSMENT OF WATER POLLUTION GENOTOXIC EFFECT IN *CARASSIUS GIBELIO*

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Fishes are aquatic organisms exposed to a large variety of pollutants in different concentrations. Some fish species are well-known as bioindicators of water pollution.

The aim of this study is to provide new information on water pollution genotoxicity in the gills cells nuclei of *Carassius gibelio*. 10 specimens were captured from the Danube, near Tulcea and used for micronucleus and total DNA fragmentation tests. For each specimen 3 microscopic slides were prepared using the squash method and the orcein staining, followed by photonic microscope analysis on the immersion lens. Micronucleus quantification was performed by visualizing 3 microscopic fields for each slide. The total DNA was isolated by phenol : chlorophorm : isoamyl alcohol (PCI) protocol and analysed in a 1,5% agarose gel electrophoresis, with a 10µl sample volume. The data was statistically analysed and showed that besides the nuclear fragmentation aspects (due to the squash technique), a significant frequency of micronucleus which denotes the xenobiotics presence in the water, that have induced the genotoxic effect, also proved by the DNA fragmentation assessed by agarose gel electrophoresis.

THE DANUBE DELTA FISHERIES: REVIEW OF EVOLUTION AND ACTUAL STATUS

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Fishing and fisheries in Danube delta is a traditional activity and mean for food and income for local communities from century. In the last century, majors hydro-morphological changes conducted to loosing of large fish habitats: i) 500,000 ha in Lower Danube floodplane and 100,000 ha in Danube delta. Channelization and pollution with nutrients conducted to water quality degradation (eutrophication). Boom of ichthyophagous bird populations (e.g. pelicans has increased from 5,000 to 17,000 birds in last 17 years) adds more pressures on fish biomass (estimated fish biomass need for bird food is 11,183 t). Overfishing and weak regulation enforcement and frequent changing in fishery management threats sustainability of fisheries. These multi-pressure factors determined major changes on delta fisheries in last half of century: i) collapse of catch over 10 times from 20,000 t to 2,000 t, ii) changing in fish communities from clear water to turbid eutrophic water species; iii) unbalancing in predators – prey ratio in favour of prey species. Sturgeons, carp, crucian carp and tench stocks has collapsed, pike, pike-perch and catfish declined, while gibel carp stock has been blooming. Pontic shad stock shows large catch cyclical variations.

Concluding, Danube delta fishery, in new environmental and management conditions has declined, and nowadays stocks transits towards a new resilience status. Lack of fishing effort monitoring and poor quality of data catch hampers stock estimation, base of quota management. To increase sustainability of delta fisheries, more administrative and research efforts are necessary.

MANAGEMENT OF NATURA 2000 SITES IN THE CONTEXT OF PRIVATE PROPRIETY: THE CASE OF ROSCI0326 MUSCELELE ARGEȘULUI

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The Natura 2000 network in Romania was established as condition for the Romanian adherence to the European Union in 2007. ROSCI0326 Muscelele Argeșului was designated by the Order of the Minister of Environment no. 2387/2011, for the protection of six habitats (two types of meadow and four types of forest) and three insect species: *Morimus funereus*, *Lucanus cervus* and *Cerambyx cerdo*, which we investigated as part of our study. The roughly 10.000 ha area is administrated by three forest districts (6200 ha) and includes a consistent area of privately administrated forests (almost 3700 ha).

Although a privately owned forested area might indicate improper management and profit driven administration, our field investigation indicated that the three insect species develop consistent population in the Muscelele Argeșului Natura 200 site: over 100.000 individuals for *Lucanus cervus*, around 40.000 individuals for *Morimus funereus*, and around 1000 individuals for *Cerambyx cerdo*, the distribution of the three species being related with the distribution of the forest species and not with the type of forest administration (public or private). Proper forest management indications (threes cut at over 1 m from the ground, dead threes left inside the forest, as well as large branches from the exploited logs) are present throughout the site, providing suitable conditions for the three species we investigated

Even more, three other species of community interest were identified during our surveys: *Pholidoptera transsylvanica*, *Rosalia alpina* and *Osmoderma barnabita*, the first two with significant

populations inside the Natura 2000 site, proving that, in this particular case, both private and public administration of forested areas can work properly if a correct approach is used.

WOLF IN THE EASTERN CARPATHIANS: POPULATION ESTIMATES, DIET AND PREY BASE. RESULTS OF THE WOLFLIFE PROJECT

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Wolf (*Canis lupus*) plays an important role in ensuring the right functioning of ecosystems and are fundamental for the conservation of biodiversity and resiliency of ecosystems. Its important role in the ecosystem has been widely recognized, but its elusive behaviour, the characteristic usage of large territories, the variety of habitat types and the wide spectrum of food sources hampers the efforts to obtain reliable information on the ecology of the species.

The Romanian wolf population is one of the largest in Europe and wolves have, historically, been widespread in the Romanian ecosystems. Nevertheless, wolf ecology has been poorly studied and, consequently, basic information on population size, pack size and distribution, wolf diet and wolf-prey interaction are still deficient.

Since July 2014, Wolf Life project - LIFE13 NAT/RO/000205 has been implemented in the Eastern Romanian Carpathians. Within the project, we used an integrated sampling design based on several non-invasive survey methods (snow-tracking, transects, camera trapping, genetic analysis) to assess wolf pack structure, density, and distribution. In addition, wolf diet and the available prey base were estimated based on the analysis of faeces samples, and pellet group count, respectively.

In this talk we will discuss the results obtained in three years of survey activity, and argue on the importance of a comprehensive view on the status of a wolf population as an important tool for efficient management decisions.

PEDOFUNCTIONAL AND PEDOGEOGRAPHIC PRINCIPLES OF THE FUNDAMENTATION AND IMPLEMENTATION OF ADAPTIVE AMELIORATIVE LANDSCAPE TECHNOLOGIES AT EXTREME CLIMATE CONDITIONS

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Under the current climate change in the Carpathian-Danubian-Pontic space, there is a significant increase in temperature and moisture reduction. This trend will be amplified by accelerated processes of defumification and physical degradation. The predicted situation will affect the soil biota, as a result of evolution of the regional pedogenesis process. Already at this stage the evolution of the hydrological regime of chernozems is developing under the action of two contrary to the opposite processes (aridization of agrogen layer and new-hydromorphic of the underlying) in a general trend of desertification. This implies the necessity to develop and implement technologies capable of minimizing the impacts of climate change and degradation processes. This objective corresponds to adaptive ameliorative landscape technologies. Their elaboration supposes taking into account all components of agrolandscape and involves four hierarchical levels.

1. Regional adaptive ameliorative landscape technologies elaborated on the basis of taking into account the natural conditions and agro-productive conditions at the pedogeographic level.
2. Hypothetical adaptive ameliorative landscape technologies elaborated taking into account the mean values of environmental components which form pedogeographic district.

3. Environment adaptive ameliorative landscape technologies elaborated with consideration and the functioning of soils at the level of ecological micro-district.
4. Adaptive ameliorative landscape technologies based on taking into account the dynamics of soil-plant relationships within the annual cycle

ENVIRONMENT AND HEALTH OF POPULATION IN THE REPUBLIC OF MOLDOVA

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The human body is influenced by a multitude of interdependent factors of natural and socio economic origin that determine their health. In the socio-political and economic context of the Republic of Moldova, the issue of population health occupies a prime place in the governance system, because health is not only one of the fundamental human rights but also a treasure of the state, an indispensable condition for social progress.

In the Republic of Moldova, the health of the population has a constant tendency to worsen. This state of affairs takes place against the backdrop of risk factors such as lifestyle, unsanitary behavior, environmental quality. The environmental risk may be in the form of stressors generated by human activity and may have adverse effects on the environment as well as degradation or loss of sustainability.

The action of the pollutant environment on the human body is very varied and complex: from simple inconveniences in human activity, discomfort, to chronic disruption of health, and even death. In this context, it is important to address the issue of health determinants that act synergistically.

Behavioral factors with the strongest impact on health are highlighted: smoking, alcohol use, drug abuse, diet failure, physical inactivity. In the Republic of Moldova, the number of smokers accounts for 27% of the population, ranking 4th among the top European countries with a

large number of smokers. Smoking accounts for 90% of cases of lung cancer, 75% of cases of chronic bronchitis and 25% of heart disease.

Another polluting factor for the health of the population is polluted air. The quality of air in the country is endangered by both internal and external pollution factors. The investigations have established that the territory of the country is subject to pollution with sulfur oxides, soot, lead.

According to World Health Organization data, 70% of the urban population of the globe breathes polluted air and only 10% - air that is within the permissible acceptable range. This is why the cardiac, respiratory, dermatological, hearing organs intensify. In the process of operating the vehicles engines, large amounts of oxygen are consumed, without which life on Earth is endangered.

THE QUALITY OF POTABLE WATER AND ITS INFLUENCE ON THE MORBIDITY OF AUTOHTONE POPULATION

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In the wisdom of the people water is called the source of life. There are relationships between the mineral substances in the water and their content in the human body. The excess of these substances in the water consumed by the population affects their health. Currently, the Drinking Waters of the Republic of Moldova are the Dniester River, which covers about 54% of the total water, the Prut River - 16%, other surface water sources - 7% and underground water sources - 23% . Water supply also takes place from about 5000 drilling wells, from 132 thousand wells with groundwater feed and, to a lesser extent, from atmospheric deposits. The available water potential is about 1100 m³ / inhabitant per year, which places the Republic of Moldova among the countries with relatively poor water resources. In addition, the waters of the Nistru and Prut rivers are biologically contaminated and require purification. In the fountains studied by us from Hîncești district, a very high content of ammonium salts was found. Thus, it has been established that there is a direct link between the content of ammonium salts and the highest mortality rate due to breast cancer, namely in this locality. The water used for drinking purposes in the Republic of Moldova is a factor that determines up to 15-20% of cases of acute diarrhea and type A hepatitis predominantly in rural areas, 20-25% of somatic diseases, and in the case of dental fluorosis - 100%. Data from the National Public Health Center show that 60% of the

rural population is fed with water from the wells, but 85 per cent of them contain excess nitrates or other chemicals harmful to health. It is argued that the main source of pollution is the organic rubbish from the households of the people who grow their animals in the yard. The best quality water for sanitary-microbiological status for use for drinking purposes is treated, filtered or boiled water, in which no pathogenic bacteria are present. Nitrates are a major problem, their concentration in drinking water above the admissible limits being quite frequent. Harmful are nitrites that result from nitrates in the body, but also abiotic in galvanized reservoirs and pipes, where nitrates are reduced to nitrite generating secondary nitrate toxicity. A key indicator of safe drinking water is the content of micro-organisms. In some cases their admissible number was exceeded 70 times. This means that dysentery, salmonella, and other dangerous bacteria and viruses could be in the water. The use of drinking water for high pollutants causes many diseases, including chronic hepatitis and liver cirrhosis. In order to improve the situation created in Moldova, the Government undertook a series of measures to improve the quality of drinking water used by the population.

THE ENVIRONMENTAL AND BIOLOGICAL AGE OF THE POPULATION

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Human and nature relations are a prior condition for the sustainable development of any country, including the Republic of Moldova. Economic reforms, the worsening of many social issues have contributed to creating environmental impact problems. The environmental issues, in their turn, have an impact on the biological age and on the aging of the population, including: the toxic waste spreading and the lack of infrastructure for collection, processing; the illicit deforestation, green plantations on construction land; water pollution; the degradation of biological diversity, etc.

According to environmental expert A. Isac, more than 50% of the car parks of the capital are obsolete, a fact which affects the air quality and which leads to various respiratory diseases. According to some estimates, the level of the air pollution in the Republic is 93%, and in Chisinau - 96%. The main sources of pollution of the atmosphere are industrial enterprises and the means of transport. Laboratory researches carried out by experts of the Ministry of the Environment showed an increased content of toxic dust and ozone in the atmosphere.

The study involved 105 young people aged between 21 and 36 years. The biological age that represents the chronological one, which normally contains constant biological aspects of the subject examined, was determined within fairly high ranges from 23.94 to 52.31. At the same time, the degree of aging was determined, and 40% of young people were concerned with a high degree of aging of 6.64 ± 5.97 uc, which attests to the state of health as satisfactory. A psychoemotional strain was determined, by the frequency of cardiac contractions, the clind tension index and orthostatism (77.5 ± 2.7

and 97.8 ± 2.6 , respectively, 265.32 ± 43.76), and 446.45 ± 75.06 unc), which attests to the demand for higher regulatory systems, responsible for adaptation and the increase in the "cost" of effort to maintain homeostasis. For the other individuals, even if there is a low degree of aging (-5.43 AD), it is necessary to review some aspects of the way of life.

Thus, the biological age within the optimum values of the chronological age of population implies economic and social security, harmonious interpersonal and social relations, a safe and healthy environment of work and living, the adequate quality of drinking water, air and soil , a sufficient and rational food, all of which are complemented by a healthy lifestyle and access to quality health services.

VIVARIUM- THE BOND BETWEEN US AND THE NATURE

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The exhibition "Bird's world-Sound and colour" was realized by experts from Vivarium saubunit of Museum Complex of Natural Sciences" Ion Borcea "in Botosani.

The exhibition aimed to harness the cultural heritage by exposing collection of exotic birds live in Vivarium. The exhibition was displayed midsize and small parrots, parakeets, finches: paddy, canaries, zebras Australian, seagulls Japanese.

DIVERSIFICATION OF APPLE ASSORTMENT FOR FRESH FEEDING BY PROMOTING OF VALUABLE VARIETIES OF SUMMER, AUTUMN, AUTUMN-WINTER

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The apple is considered to be the king of fruits being one of the most appreciated fruits. It is a valuable food for all ages and a drug for a wide range of affections. Romania is an important European apples grower, by producing of 500-550 thousand tons in the last years. Thus Romania becomes the 7th in the European Union and the 26th in the world.

The biological material was collected from a germoplasm culture of the Fructex Bacau Society. The collected fruits were subjected to several biometric observations, biochemical and organoleptic determinations by organizing several tastings, thus being classified into four groups of consumption: apples summer, apples summer-autumn, apples autumn and apples winter.

A total of 56 varieties resulted by studying the variety of apple hybrids: 12 apples summer varieties, 11 apples summer-autumn varieties, 23 varieties and apple hybrids for apples autumn and 9 apples winter varieties. As a result of biometric measurements, we had very small fruit with an average weight of 46 g (in the case of Hybrid 16), but also very large fruit that weighed up to 850g (in the case of Hilda apple variety).

ECOLOGY AND SUSTAINABLE DEVELOPMENT

Poster presentations

CONTRIBUTIONS TO KNOWLEDGE OF THE MEDICINAL VASCULAR FLORA IN THE PROTECTED AREA “SĂRĂTURILE DIN VALEA ILENEI” (IASI COUNTY)

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“Sărăturile din valea Ilenei” (Iasi County) is declared a natural reservation of botanical interest and a site of community importance. In this protected area, there are rare halophytes in Romania's flora and species of community interest. This paper contributes to a better understanding of the cormophytes with medicinal potential from “Sărăturile din valea Ilenei” (Iasi County). Through regular field trips and laboratory observations, these cormophytes species were identified in the studied area. Based on the specialized bibliography, the species with medicinal potential were selected and a characterization was made from an ecological point of view, as well as from the bioform, from the floral element and the flowering period and the therapeutic action. There were identified 182 species of cormophytes, belonging to 120 groups and 34 botanical families. From the identified species of cormophytes, 1/3 have medicinal potential, being used in classical and traditional medicine for the relief of digestive, respiratory, excretory disorders, etc.. Most species belong to the Asteraceae, Rosaceae and Lamiaceae families. The identified species are a source of bioactive compounds (organic acids, phenolic compounds, volatile oils, glycosides, mineral salts, vitamins, etc.) that have various therapeutic actions (antiseptics, astringents, anti-spasms, antioxidants, diuretics, etc.). Most of the species with medicinal potential blossom during summer. The growth and development of the identified species and their perpetuation in the site can be affected by certain natural (climatic conditions specific to the recent years) and anthropogenic pressures such as overgrazing and excessive exploitation of the vegetative organs of medicinal plants.

NICKEL EFFECTS ON MORPHOLOGICAL AND BIOCHEMICAL CHARACTERISTICS OF FERNS

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The aim of this study was to evaluate the morphological and biochemical changes induced by nickel in the gametophyte and sporophyte of 3 species of ferns: *Athyrium filix-femina* (L.) Roth, *Dryopteris filix-mas* L. Schott and *Dryopteris affinis* (Lowe) Fraser-Jenk. The spores of the 3 species were collected from samples in the Vâlsan Valley and uniformly distributed in Petri boxes full with sterilized forest soil with different concentrations of Ni. We obtained the following variants: Control = 0 g Ni²⁺, V₁=0.1 g Ni²⁺, V₂=0.2 g Ni²⁺, V₃=0.5 g Ni²⁺, V₄=1 g Ni²⁺. During 4 months the variants were kept in the growing room and periodically watered with distilled water. In this period we made observations on the development of the gametophyte and sporophyte; after that we determinate the content of photosintethic pigments with the spectrophotometer and total polyphenols with Folin-Ciocalteu reactive method. Ni effect on pigments content varied upon species. At *Dryopteris filix-mas* there were no significant differences between the chlorophyll content from control and V₁ but for the other variants we observed a downward trend for both chlorophyll (a and b) and carotenoid. Chlorophyll b is more sensitive to Ni than chlorophyll a in *Dryopteris affinis* and *Athyrium filix-femina*. In *Athyrium filix-femina* at the first variant with Ni were obtained the smallest values for pigments content: chlorophyll a 0.102 mg g⁻¹ fw, chlorophyll b 0.061 mg g⁻¹ fw, carotenoid 0.067 mg g⁻¹ fw and the highest for total polyphenols 83.12 gallic acid equivalents (%). Generally, the polyphenols content tended to increase at the variants with Ni compared to the control confirming their protective role against the heavy metals stress.

**CONTRIBUTIONS TO THE STUDY OF SALT TOLERANT
PLANT SPECIES FROM TWO DEGRADED PREHISTORIC
SALT EXPLOITATION SITES,
SITUATED NEAR BALTATESTI
(NEAMT COUNTY, NORTHEASTERN ROMANIA)**

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The aim of our preliminary study is to identify the plant species tolerant to salinity and to observe/quantify the ecosystem state, from two closely related areas with few salt-springs situated near Baltatesti locality, Neamt County. The salted lands around the springs are colonized by a great diversity of plant species, but a large number of this species are common weeds that are tolerant to salinity, invasive species are present in some cases also, but not the typical species of halophytes.

We have been able to identify 102 species of vascular plants that are colonizing the few salted lands near Baltatesti, we mention a few species that are the most tolerant to salinity (according to our observations): *Achillea setacea* Waldst. et Kit., *Agrimonia eupatoria* L., *Atriplex* sp. (*A. prostrata*), *Bupleurum tenuissimum* L., *Calamagrostis* sp., *Capsella bursa-pastris* (L.), *Centaurea* sp., *Cichorium intybus* L., *Cirsium arvense* (L.) Scop., *Clinopodium vulgare* L., *Crataegus monogyna* Jacq., *Daucus carota* L., *Elymus caninus* L., *Eryngium campestre* L., *Euphorbia cyparissias* L., *Fillipendula vulgaris* Moench, *Fragaria viridis* (Duchesne) Weston, *Gallium verum* L., *Gentiana cillata* L., *Geum* sp., *Juncus* sp., *Juniperus communis* L., *Lactuca saligna* L., *Leontodon autumnalis* L., *Ligustrum vulgare* L., *Melilotus officinalis* (L.) Lam., *Origanum vulgare* L., *Plantago* spp., *Phragmites australis* (Cav.) Steud., *Polygonum aviculare* L., *Rhamnus frangula* L.,

Rosa sp., *Teucrium chamaedrys* L., *Veronica spicata* L., *Xanthium strumarium* L. etc.

Regarding the habitat and ecosystem state, we observed the severe process of land degradation, soil and habitat degradation linked to an earlier deforestation, due to salt exploitation, pollution, overgrazing, that has lead to aridization etc. This factors that degraded the soil and the natural vegetation are recognized as major threats to the biodiversity and in this case the halophytes diversity.

We give details regarding the process of ruderalisation, habitat fragmentation and overall ecosystem degradation. The decline of this saline habitat is presented and illustrated.

SOME ASPECTS OF THE INFLUENCE OF FOSETYL-ALUMINIUM ON GAMETOPHYTE DIFFERENTIATION IN THE FERN *ATHYRIUM FILIX-FEMINA*

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The aim of this paper is to present the changes observed in gametophyte differentiation in the fern *Athyrium filix-femina* under the action of a fungicide containing fosetyl-aluminium. The biologic material consisted of spores collected from plants found in the Vâlsan Valley. The following experimental variants of culture media were prepared to cultivate the spores: Control (Knop solution), V1 (0.002% fungicide in Knop solution), V2 (0.002% fungicide in Knop solution), and V3 (0.2% fungicide in Knop solution). The spores were cultivated in 100 ml of solution, in culture vessels that were placed in the EKO POL KK growth chamber at 25°C during the day and 15°C during the night with a photoperiod of 16 hours of light and 8 hours of darkness. Microscopic observations on gametophyte differentiation were conducted periodically, after 9, 16, 34 and 64 days from the cultivation of spores. The V1 and V2 variants showed a slower gametophyte differentiation than that in the Control variant. No spore germination or gametophyte differentiation was observed in the V3 variant. Thus, at the end of the experiment, the most affected was the V3 variant, with ungerminated spores, followed by the V2 variant, which was at the stage of elongated lamellate prothalli with short rhizoids or necrotic prothallial cells and filaments, while in the C variant, the gametophyte was at the stage of elongated prothalli with antheridia and cordiform prothalli. The least affected variant was V1, where the gametophyte exposed to the lower concentration of fungicide reached the end of the experiment at a stage close to that in the Control variant.

STUDY OF BIOLOGICAL FUNGICIDES IN THE CONTROL OF THE EARLY BLIGHT AT TOMATO

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The best efficacy in control of early blight at tomato in the germination phase of the seeds was the variant treated with bordelae - 0.5%, the percentage of healthy plants after 7 days infection with *Alternaria* sp. being 90%. However, a strong retardant effect was observed on both the stem and the embryonic root, with a smaller growth rate of 54% for the root and 47.31% for the strain. In variant 1 the efficacy was 85%, the increase of the root and the strain being smaller compared to the uninfected variant, with 8.5% and 11.5%, respectively. Variant 4 demonstrated that although 0.5% nettle macerate treatment is not a fungicide, 50% of tomato plants have been stimulated to develop tolerance and vegetation following infection with *Alternaria* sp. In this case, there was also a reduction of the root and embryonic stem growth by 19.3 and 37.6%, respectively. The variant treated with Funres - 0.25% and Blocks - 0.25% did not survive infection with *Alternaria* sp in the germination phase.

In open field variant 5, treated with bordelae - 0.5% had the best efficacy - 84.5%, followed by variant 1, with an efficiency of 71.8%. The variants treated with nettle macerate and Blocks had a lower efficacy of 54.3% and 53.3%, respectively. The variant treated with Funres showed a lack of efficacy in control of tomato early blight. Percentage of healthy plants varied depending on the fungicides being 96% in variant 5 treated with bordelamine - 0.5%, 92% in variant 1

treated with 0.25% Condor (based on *Trichoderma atroviride* and *Glomus spp*) and 88% in variants treated with 0.5% nettle macerate and Blocks – 0,25%.

PHYTOTOXIC EFFECTS OF SOME COMMERCIAL FUNGICIDES ON ECONOMIC VALUABLE PLANT

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Phytotoxicity on crop plants is the result of the action of several factors, most often associated with a significant decrease in their productivity. Usually, the phytotoxic effects of the pesticides are the result of the improper use, the most common mistake being failure to correctly calculate dilutions and application rates and their residual accumulation in soils.

The main purpose of this research was to determine the effects of the high concentrations of a commercial fungicide on the phenotypic and genotypic characteristics of an important economical crop plant, *Phaseolus vulgaris*.

Bean seeds were germinated on filtered paper soaked in solutions with different concentrations of CabrioTop (BASF SE Germania) fungicide. The concentrations varied between 1X (the manufacturer's recommended dose) and 20X. The germination index (IG) was computed and, after germination, the morphological changes of the seedlings (i.e. the length and branching of the radicular system, epicotyl and hypocotyl length) were recorded over a 30 days period. Cytogenetic analyses were performed on the radicular meristematic tips of the plantlets.

The IG values 0 and 23.08% for 1X (2×10^{-4} g/ml) and 1.25X (2.5×10^{-4} g/ml) concentrations have indicated a strong phytotoxic effect of the fungicide. Higher concentrations (between 2×10^{-3} g/ml and 3×10^{-3} g/ml) seemed to have bio-stimulative effects, the most noticeable ones being recorded for the seeds treated with 15X and 20X fungicide solution, the computed IG varying between 407.69% and 661,54%. At macroscopic level, the bean plants regenerated from

seed germinated in concentrations exceeding 10X presented numerous changes, like long, thin and friable main stem, disintegration areas and/or spots on leaf surface. In the root cells, fungicide crystals were observed. The cytogenetic analysis showed for the plantlets grown on high fungicide concentrations: low rates of cell divisions (~2-3%), nuclei with abnormal shapes and sizes (macronuclei, pyknotic or lenticular nuclei), total or partial destruction of the chromatin and tendency of chromosome stickiness.

It is not known why the elevated doses of CabrioTop determined unexpectedly higher IG's, this aspect needing further investigation.

ENVIRONMENTAL PROBLEMS OVERVIEW IN SUGAR-BEET BY-PRODUCTS CONVERSION IN FODDER YEAST

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The excessive industrialization along with the inefficient production processes, reduced durability of goods and a certain consumption profile of the last years have given rise to imbalances difficult to control, as a consequence of the irrational exploitation of natural resources, confronting us at the same time with a huge volume of different types of wastes. These wastes represent a substantial loss of resources, viewed both in the form of materials and energy.

Therefore, all the various sectors of industrial production have devoted increasing attention to ecological-environmental problems by: evaluating the streams of the traditional production process; identifying the processes leading to environmental problems; researching solutions for the reutilization of by-products or waste products as secondary raw materials; decreasing or eliminating processes known as not being eco-compatible; optimizing the utilization of energy and water; controlling gaseous emissions and solid/liquid wastes; studying environment friendly technological alternatives.

The sector of beet sugar production has confronted itself also with the anterior mentioned problems. One way to solve at least the issue of spent beet sugar pulp is to use it as a viable substrate for valuable bio-products production. This advanced valorisation will increase the plant economic efficiency and will significantly diminish the negative impact on the environment of the solids, aqueous and gaseous wastes resulted especially from the stocking platform.

DIVERSITY OF GROUND BEETLES (COLEOPTERA: CARABIDAE) IN VINEYARD HABITATS FROM DOBROGEA

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Ground beetles (Coleoptera: Carabidae) are one of the most common insect group in all terrestrial habitats. A diversified food regime allows them to develop important populations even in types of habitats strongly affected by human intervention. Although there are some of the most affected types of agro-ecosystems, vineyard habitats had a particular ground beetle fauna. The carabid species mentioned from such habitats had a large variety of food habits and in some cases could develop large population. During 2016 and 2017, we carried out a research study in several vineyards from eastern part of Dobrogea (Murfatlar area). The study revealed correlations between vegetation cover, type of soil management and the Carabid fauna. Ground beetles were collected using the pitfall traps method, and the number of species identified was relatively high, exceeding 40 taxons. In terms of food habits, ground beetles were classified into four main types: predators, phytophagous species, species with mixed trophic regime predominantly with predator habits and species with mixed trophic regime predominantly with phytophagous regime. The phytophagous species (23 species from *Harpalus*, *Acinopus*, *Ophonus*, *Zabrus* genera) dominated the samples. The second group was the predator species (7) belonging to genera as *Anchomenus*, *Licinus*, *Microlestes*, *Spodrus*, *Syntomus*, *Trechus*. 11 species had mixed trophic regime: 6 of them were mixed-phytophagous species (belonging to genera as *Amara*, *Paraophonus*, *Poecillus*) and 5 were mixed-predators species (from *Brachinus*, *Calathus*, *Laemostenus* and *Pterostichus* genera).

The data was obtained within the research project UEFISCDI PN3-P3-61/12.17.2015, Nr. 21/2015 "Management concept for Central European vineyard ecosystems: Promoting Ecosystem Services in Grapes - PromESSinG" under European and international cooperation program - Horizon 2020, BiodivERsA / FACCE-JPI, part of the ERA-NET scheme of the European Union (FP7).

CHEMICAL CONTAMINATION WITH PHENOLS OF FISHES AND AMPHIBIANS IN THE AQUATIC ECOSYSTEMS

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Contamination of the natural environment, due to natural factors but also human action, has been the subject of numerous studies. Chemical contaminants are found everywhere in nature but especially in aquatic ecosystems with direct impact on fish and amphibians. Fish and amphibians are organisms that populate aquatic ecosystems, being involved in aquatic trophic chains both by eating food and by providing food for predators. In recent years, scientists have reported the global decline of some fish and amphibian species. The purpose of the paper is to present specialized researches on the action of phenols on fish and amphibian species.

DETERMINATION OF WATER QUALITY BY MACROINVERTEBRATES IN THE ROMANIAN SECTOR OF THE DANUBE RIVER

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The purpose of this paper is to estimate the effects of water quality on composition and biodiversity of macroinvertebrates. The water quality by benthic invertebrates and biodiversity of macroinvertebrates communities were established in the Romanian Danube River sector (2 sampling points: Bala Branch and Epurașu Island). Biodiversity environment relationships are becoming better understood in the context of species richness and species composition, whereas other aspects of biodiversity. Benthic invertebrates are important components of stream ecosystems, and are often used as indicator species for the assessment of river ecology.

The biological indicators of water pollution are saprobes, organisms that have adapted to live in polluted waters. Thus, the level of water pollution can be determined by the presence and quantity of saprobes. Through biodiversity indices, such as: H'S – Shannon-Weiner index, EH – Shannon equitability, 1-D – Simpson index, E1-D – Simpson equitability.

Water quality is assessed using the saprob system methodology using the Pantle-Buck method (1955) to determine the saprobic index. After the qualitative processing the quality of the samples there were identified seven taxa (species represented 11), namely: Oligochaeta, Gastropods, Bivalves, Ostracods, Amphipoda, Tricoptera, Diptera.

DETREMINATION OF TOTAL ORGANIC CARBON AND TOTAL NITROGEN FROM SOIL SEDIMENTS FORM HORIA LAKE, TULCEA

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Carbon and Nitrogen have an important role in maintaining trophic levels in lake ecosystems and can be used as pollution indices, soil quality and productivity indicators.

In this context, the aim of this research was to determine the total organic carbon (TOC), total nitrogen (TN) and the carbon - nitrogen ratio from the sediment samples collected from lake Horia, Tulcea county, Romania.

The lake is located in the area of Horia, being limited to the north, west and south by the agricultural field, and the eastern limit is represented by the intercounty road 222 A. The surface of the lake is 230 ha, and the depth varies between 0.5 - 1 m in summer time in the foot rope zone; the maximum depth is 3,962 m in the dam area. The incline of the ground permits the accumulation of the waters from the versants adjacent to the lake, with suspension contributions, fertilizers and herbicides used for the adjacent corn crop.

The samples were collected in the autumn season, from six stations of the lake and the sediment C and N contents were measured using Primacs^{SLC} and Primacs^{SNC} Analyzer, from the laboratory of Romanian Center for Modelling Recirculating Aquaculture Systems, University Dunărea de Jos, Galați. The higher values of TOC and TN were registered at station 3 (TOC = 2.53 ± 0.18%; TN= 0.67 ± 0.02%).

The C/N ratio registered values between (3 - 9) indicating a source of protein rich, lignin poor organic matter sourced from phytoplankton (lake sourced algae).

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RESEARCH ON THE ENVIRONMENTAL QUALITY IN THE TÂRGULUI RIVER

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Târgul River springs from the central area of the lezer Păpușa Massif having as important tributaries the Bătrâna River and the Cuca River. From the confluence of Bătrâna and Cuca, near the Voina hut, the river bears the name Târgului. It receives on the right side the River Râușor, and in the confluence area was built the Hidroenergetic dam known as the dam at Râușor. The river Târgului unites with Bratia, near Țițești, and with the River Doamnei in Maracineni and together flows into Argeș. The River Târgului River has the most developed system in the river basin of Argeș; exceeds by more than 1,000 km² the pool area of the River Doamnei at the confluence, so it could be considered as a defense of Argeș. It has its spring under Păpușa Peak (2391 m) at 2050 m altitude, consisting of a series of alpine torrents. The last important tributary of the River Târgului on the left is Argeșelul. The work was prepared on the basis of the bibliographic material on this theme, the materials provided by the Argeș - Vedea Water Basin Administration and the own researches carried out on the field during March - December 2016. The researches carried out aimed to establish the ecological quality status of the River Târgului at the monitoring points. In order to achieve the proposed goal, the following objectives were considered: identification of the structure of planktonic and benthic biocenoses in the monitoring points; establishment of saprobity indices for each species identified and framing the monitoring sections into the appropriate saprobity class; establishment of the ecological status of the River Târgului based on the biological analyzes.

EFFECTS OF ENDOCRINE DISRUPTORS IN LARVAE OF AFRICAN CLAWED FROG (*Xenopus laevis*)

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The endocrine disruptors (EDC) can be found in different environmental compartments, including the aquatic environment. These compounds can act adversely on the organisms which are living in that environments. The main objective of this work was to evaluate the effects of the thyroid-acting pharmaceutical 6-propylthiouracil (PTU) and the suspected EDC triclosan on *Xenopus laevis* larvae at biochemical level. These larvae were exposed at different concentrations of PTU and triclosan. For PTU test we used the concentrations 1.00 mg/L, 3.00 mg/L, 10.00 mg/L, 30.00 mg/L, 100.00 mg/L and for triclosan test 0.25 mg/L, 0.44 mg/L, 0.79 mg/L, 1.40 mg/L, 2.50 mg/L. The larvae were exposed also in a medium with T3 and T3+T4 in order to compare the effects of this thyroid hormones with the suspected endocrine disruptors PTU and triclosan. The biomarkers performed were acetylcholinesterase (AChE), catalase (CAT), glutathione-S-transferase (GST), and lactate dehydrogenase (LDH) activity for PTU bioassay and the same biomarkers with lipid peroxidation (LPO) in the triclosan bioassay. This assay presents that PTU induced some alterations on larvae while triclosan had more harmful effects on larvae inducing the oxidative stress and damage on lipids.

RISK ASSESSMENT OF POPULATION EXPOSURE TO HEAVY METALS THROUGH THEIR BIOACCUMULATION IN MEDICINAL PLANTS FROM THE SPONTANEOUS FLORA

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The medicinal plants may pose a health risk if these are harvested from polluted areas. Taking into account the potential bioaccumulation of heavy metal in medicinal plants frequently used in traditional medicine it is necessary to assess their contamination with heavy metals, to avoid the risk of using contaminated plants in different therapies.

The aims of this research were to analyze the concentrations and distributions of heavy metals in the studied area, to evaluate the bioaccumulation in the medicinal plants from the spontaneous flora, and to assess the potential risks of carcinogenic and non-carcinogenic toxicity caused by heavy metals.

The study area was the inhabited area of Iasi and its surroundings, from where soil samples were collected and heavy metals content was determined. The results were presented on the maps. From analyzed area were harvested 11 plants and analyzed for determined Cr, Cu, Ni, Pb and Zn content in dry plant and aqueous extract. For this study 11 plants with different therapeutic effects were selected: *Folium Menthae*, *Flores Chamomillae*, *Flores Millefolii*, *Herba Cichorii*, *Folium Urticae*, *Folium Taraxaci*, *Herba Chelidonii*, *Folium Plantaginis*, *Flores Primulae*, *Herba bursae pastoris* and *Herba Hyperici*.

The investigation of heavy-metal ion levels in studied medicinal plants revealed that: all studied plants has a great ability to accumulate and transfer Cr, Cu, Ni, Pb and Zn; the potentially toxic metals (Pb, Cd,) are present in investigated parts of plants and in the aqueous extracts (Cr in concentrations between 12.70- 26.16 $\mu\text{g L}^{-1}$, Pb in concentration between 18.60-29.28 $\mu\text{g L}^{-1}$).

The study showed that all the analyzed plants are able to bioaccumulate heavy metals (including carcinogenic metals), which suggests that their ingestion can be a pathway for the heavy metals in the environment to pass into the human body. The use of these plants in different therapies can represent a health risk.

**PRELIMINARY RESULTS REGARDING THE
BIOACCUMULATION OF COPPER AND ZINC IN STELLATE
STURGEON (*ACIPENSER STELLATUS* Pallas, 1771)
LIVER AND GILLS**

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Although water pollution by heavy metals in the Danube is considered to be very high, there are no specific data available on its impact on sturgeons. Due to the high lipid content of their body, long lives, long juvenile stage and benthivorous diet, sturgeons are at a high potential risk for accumulating metals in their tissues.

The aim of this study was to study the bioaccumulation of copper and zinc in *Acipenser stellatus* liver and gills. *Acipenser stellatus* juveniles were exposed for 7 and 14 days to 10% and 25% of LC₅₀ of copper and zinc, previously determined as 0.547 mg/l and 34.22 mg/l respectively. Also the experiment tried to evaluate the accumulation of both metals in a metal-metal interaction experiment, with 10% and 25% LC₅₀ of each metal. We observed an increase of accumulation with increasing concentration and time.

In liver, we observed significant accumulation ($p < 0.5$) of copper after 7 and 14 days compared to control, for the two concentrations, while zinc had no significant accumulation ($p > 0.5$). Regarding the accumulation of both metals in the mixture experiments, there were significant accumulations of copper and zinc ($p < 0.5$) only for the highest concentration.

Gills copper concentration increased significantly ($p < 0.5$) as compared to control levels, after 7 and 14 days for the both concentrations, while zinc had a significant accumulation only after 7

days. In the metal mixture experiments, there were significant accumulations of the two metals for all the concentrations ($p < 0.5$).

Even though the hardness of the test water was very high (340 mg/l CaCO_3), which offers a clear protection against the toxicity of copper and zinc, stellate sturgeon remains a sensitive species regarding metal accumulation.

**MONITORING THE EFFECTS OF ECOLOGICAL
RECONSTRUCTION WORKS IN THE CARASUHAT
AGRICULTURAL POLDER OF MAHMUDIA COMMUNITY,
THE DANUBE DELTA BIOSPHERE RESERVE**

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Through its monitoring and evaluation of the effects of ecological reconstruction work on the Carasuhat - Mahmudia agricultural site, our project makes a major contribution to ensuring efficient management and preservation of the integrity of the Danube Delta Biosphere Reserve, Tulcea County, in accordance with European Directives and with national legislation. The ecosystem formed within this perimeter is unique and specific due to its natural, geological, morphohydrographic, climatic and biogeographical components. The fluvial delta, by its size and the direct action of the Danube waters, has a varied present morpodynamics. The Danube arms represent the main dynamic force, which through the flow of water through the liquid and solid flow, with all the seasonal variations, creates a cycle of filling and emptying the indoor lake complexes.

The overall objective of the project was to improve and enhance the ecological conditions of some species and habitats of Community Importance typical for the swampy areas of the Danube Delta Biosphere Reserve. The ecological reconstruction in the Carasuhat area (924 ha) increased the natural potential and biodiversity of the area. The proposed investment resulted in a return to an ecological state close to the original one (up to 1980), prior to the embankment and exploitation of this area in agricultural purposes. The

project sought to know the beneficial consequences of the ecological reconstruction works carried out at the Carasuhat agricultural polder. Through ecological reconstruction activities, the habitats and species of conservative interest characteristic of the area will be developed and diversified. Particular attention has been accorded for improvement of the local conditions of the habitats 3130, 3150, 3160, rich in rare plant species and plant communities with conservation value.

The valuable elements of local biodiversity were selected and monitorized prior to the start of the ecological reconstruction works, during these works and after the completion of these activities in the aim to detect and improve the ecologically optimal conditions of the species / habitats mentioned in the Standard Form of the Natura 2000 site ROSCI0065 Danube Delta. A Detailed Biodiversity Monitoring Plan within the project area has been developed, with protocols, methodologies and monitoring files for the species of plants and habitats of conservative interest.

CHARACTERIZATION OF MONTMORILLONITE CLAY USED FOR ENVIRONMENTAL REMEDIATION

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Deterioration in soil, surface and ground water qualities due to existence of pollutants promotes the research, targeting environmental remediation in two ways: to develop environmentally safe technologies and to remove the pollutants by economical and efficient techniques. Adsorption, as a simple and relatively economical method, is a widely used technique in the removal of pollutants. The adsorbents used may vary due to the change of adsorption conditions depending on the type of pollutants too. The development of crystallography and mineralogy in the 18th and early 19th Centuries was of great importance in increasing the knowledge of the raw mineral materials used in environmental remediation.

However, the development of chemistry in the early 20th century, which enabled numerous minerals to be obtained through synthesis, had a negative effect upon the use of raw minerals for environmental protection, due to the use of synthetic mineral.

This paper proposes the characterization of raw material based on clay, with adequate qualities for environmental remediation. The Na-bentonite clays were characterized using the following methods: Brunauer–Emmett–Teller (BET) method, X-ray diffraction (XRD) and EDAX-SEM (energy-dispersive X-ray) spectroscopy.

HUMAN INFLUENCE ON THE CLIMATE SYSTEM

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Climate either from the earth as a whole or in one country or location is often described as the weather recorded over a long period of time. It is defined in terms of long-term averages and other weather statistics, including frequencies of extreme events. The climate is far from static. As the weather changes daily, the climate changes, over a period of several years, decades, and millennia and longer, corresponding to the geological history of the earth. These changes, caused by internal and external factors for the climate system, are naturally intrinsic to the climate itself. But not all climate change is caused by natural processes. People also exercised influence. By building cities and changing land use patterns, people have changed the climate on a local scale. Through a series of industrial-era activities in the mid-19th century, such as the accelerated use of fossil fuels and land deforestation that changes, people have also contributed to the greenhouse effect. This increased greenhouse effect leads to an increase in atmospheric concentrations of greenhouse gases, such as carbon dioxide and methane, and is generally considered responsible for the observed increase in global average temperatures.

ASPECTS REGARDIN NOISE POLUTION DUE TO ROAD TRAFFIC IN DISTRICT OF BACĂU

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Noise pollution, through it's presence in all compartments of modern life, represent an important component of environmental polution. Determined by different noises (Terrestrial transportation, aerial, construction sites, industrial or household equipment etc.), noise pollution represents for the population one of the important factors that perturb the quality of life.

Different epidemiological studies have proven that exposing humans to noises above 65 dB induce psychic modifications manifested mostly through fatigue and attention disorder, they accentuate behavior deficiencies (aggressivity, anxiety), they can generate insomnia, they can negatively influence cardio-vascular and digestive deficiencies. Noise can act as a stress generally perturbing homeostasis through the „Stress syndrome”.

Studies regarding noise pollution due to road traffic have been performed between 12.09.2017 and 18.09.2017, by recording the average value of the noise levels produced by road traffic in the intersection Calea Mărășești – Str. Spiru Haret – Str. Erou Ciprian Pinteia, followed by analysis if the recorded values are in accordance with the european normatives (roads, highways – 65dB, maximum allowed value L_{zsn} 2017). The noise level determination was performed during the day in the hourly intervals of 07:30 –08:30, 12:30 – 13:30, 16:30 – 17:30 și 19:30 – 20:30, for all eight measuring points established at distances relatively equal to the center of the intersection subjected to our study. For measuring the noise levels the Sound Level Meter TESTO 816 has been used.

In the measuring point McDonalds we have found that throughout the entire surveillance period (12.09 – 18.09.2017) of noise levels, in the hourly interval 16:30 – 17:30, the recorded values are above the allowed limits (> 65 dB). The highest recorded value was found on 13.09.2017 in the hourly interval of 07:30 - 08:30, 75dB.

In the measuring point Maison du Vin, in the hourly interval of 07:30 – 08:30 on 12.09.2017, the noise value recorded was 79 dB. Values under 65 dB were recorded on Saturday (16.09.2017) in the hourly interval of 19:30 – 20:30 and Sunday (17.09.2017) in between 07:30 and 08:30.

The highest noise values were recorded at the measuring point Profi, where values in the interval 12:30 – 13:30 during work days, were as high as 85 dB (14.09.2017).

Taking into consideration the topographic aspect of the measuring points and the importance of road arteries for urban traffic it is considered that the measuring points Spital (Hospital) and Panselilor, even though the noise values in some time intervals are over the allowed limits, they are a lot smaller in comparison with the recordings from other points. The measuring points where noise values higher than 65 dB were found throughout the entire period of the experiment (including Saturday and Sunday) and in all time intervals were Bulevard, Luca and Optic Plus.

According to the realised study, in the period 12.09 – 18.09.2017, we concluded that in the intersection Calea Mărășești – Str. Spiru Haret – Str. Erou Ciprian, noise levels recorded values in between 61 and 85 dB, the lowest values being recorded on Saturday and Sunday. During the entire time of the experiment and in all time intervals, noise values above 65 dB were found in the measuring points Bulevard, Luca and Optic Plus.

**DESCRIPTION OF CERTAIN VARIETIES OF SEA
BUCKTHORN (*HIPPÖPHAE RHAMNOIDES L.*)
HOMOLOGATED AND PATENTED
BY PROF. RATI IOAN VIOREL**

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Sea buckthorn (*Hippöphae rhamnoides L.*) is a very important species for pharmaceutical, cosmetic and food industry.

In the spontaneous flora of Romania there are many biotypes that confirm the favorable conditions of the pedoclimatic conditions, which are very diverse.

In order to obtain quantities of uniform fruits with determined biochemical composition and obtaining a large lot of fruits, the necessity of obtaining varieties was imposed.

The existence of certified and patented varieties allows them to multiply in nurseries, obtaining valuable biological material. In accordance with the law of fruit growing, it allows the establishment of agricultural expense and the species "sea buckthorn".

The plantations thus set up will only be exploited by technologies endorsed by firms approved with an ecological system.

The varieties made by the author constitute the proposed range for the multiplication and establishment of ecological plantations and constitute the research activity in the field of genetic improvement from 1990 to 2017.

