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THE CURRENTNESS OF GRIGORE ANTIPA'S OBSERVATIONS ON THE CONDITION OF STURGEON POPULATIONS AND HIS PROTECTION PROPOSALS

Dumitru MURARIU ^{1,2}

¹ Vicepresident of the Romanian Academy

² Romanian Academy, Institute of Biology, Bucharest, dmurariu@antipa.ro

Among the fish species that inhabit the waters of the Black Sea, the ones of the greatest food and commercial importance are undoubtedly the Acipenserids or Sturgeons: sterlet - *Acipenser ruthenus* L., bastard sturgeon - *A. glaber* Marsigli, starry sturgeon - *A. stellatus* Pall., Russian sturgeon - *A. güldenstaedtii* Brandt, European sea sturgeon - *A. sturio* L., and beluga sturgeon - *Huso huso* L. Their meat is highly valued for its delicate taste and because it is almost as nutritious as that of mammals and birds, and is a staple in the large canning industry. Their roe is a healthy, delicious and highly sought after food. Their swim bladder still has an important industrial use today, in the preparation and clarification of wines. Due to the rapacity of people, statistics show that their abundance has decreased, and large specimens that were once caught in considerable numbers have become increasingly rare, and that overall sturgeon production has decreased drastically. The rational exploitation of this great natural wealth, based on strict measures to protect and multiply these fish, has become a strict necessity, to guarantee the great economic and social interest of the riparian countries. Both by the richness of the production and by the commercial and food value, of all the species of Acipenserinae, the Beluga (*Huso huso*) is indisputably of the greatest economic importance. *Huso huso* is undoubtedly the king of fish in the Black Sea and indeed in all the seas that bath the European coasts. The monthly variations in the ratio of caviar weight to overall body weight are instructive. While the caviar weight in June represents only 4-5%, in September it reaches 11% and increases in January to 16%, continuing to remain at this level until spawning. It is also important to determine the spawning period and the migrations of this species. The

weight of the ovaries reaches their full maturity, varies between 10% of the body weight in young and old specimens, and 20% in middle-aged specimens. The spawning period is from early May to mid-June, and the timing of spawning is determined by water temperature conditions. Immediately after the laying of the eggs and the return of the females to the sea, the formation of eggs in the ovaries starts again, with the following percentage rate: - June = 4 – 5 %; - July = 4.8 – 7.3%; - August = 8.6%; - September = 11.2%; - October = 12.7%; - November = 13.0%; December = 13.0%; - January = 15.8%. The couplings of males with females take place in the coastal area of the Black Sea, at the beginning of winter, continue when they enter and migrate with breaks and periods of rest in the Danube, until spawning. Then the males go back to the Sea, swimming in the upper layer of water, thus using the force of the current. At the end of June, approximately 95% of the males are in Sea, near the mouths of the Danube. The females stay and wait in the river until their fry are able to endure the journey to the Sea. Only a limited number of "latecomers", who did not have the opportunity to enter the river, lay down their decks on the sandbanks in the muddy waters, in front of the river mouths. The fry make a long journey into the maritime territorial waters to take advantage of the abundance of food, to move out to sea in autumn and descend to the depths, to the shoals of shells, to feed and winter. The adults disperse in the Sea, in search of optimal feeding places, also entering the cyclonic coastal current to catch sardines, after which they retreat to the depths, to the shoals with bean horse mussel - *Modiola phaseolina*, also to feed in the winter. Based on the examination of the stomach contents of several thousand belugas, Grigore Antipa (1936???) found that *Huso huso* is a predatory fish during March to October, along with sea snails and crustaceans it also consumes large quantities from all species of fish, especially shad, European anchovy - *Engraulis encrassicolus*, carp - *Cyprinus carpio*, Eurasian daces - *Leuciscus*, common rudd - *Scardinius erythrophthalmus*, asp fish - *Aspius aspius*, etc. Remains of waterfowl have often been identified. For international rivers, the measures indicated by the natural conditions can only be implemented through an agreement between the interested riparian States. For Sea, the territorial area is a national matter. But for the Sea, further from the Romanian coasts (the

international area), the matter is much more difficult, because even between the riparian States it is not easy to respect the protection measures. It must be taken into account that Sturionids, having a double habitat (maritime and fluvial), the measures to protect them must also be of a dual nature. For international rivers, the measures indicated by the natural conditions can only be implemented through an agreement between the interested riparian States to take and apply identical measures, each in the waters that are part of its territory.

SKELETOCHRONOLOGY - A VALUABLE TOOL IN ECTOTHERM POPULATION BIOLOGY STUDIES

Dan COGALNICEANU^{1,2*}, Florina STANESCU², Sabina E. VLAD²,
Diana SZEKELY³

¹ Correspondence member of the Romanian Academy

² 'Ovidius' University of Constanța, Faculty of Natural Sciences and
Agricultural Sciences

³ Universidad Tecnica Particular de Loja, Ecuador

* corresponding author: dcogalniceanu@univ-ovidius.ro

Accurate age determination is vital for understanding life-history strategies and their evolutionary implications. There is a growing body of published data on age parameters based on sclerochronology. This technique is based on counting the growth markers deposited annually in bones (skeletochronology) or other hard body structures, like teeth, otoliths, epidermal scutes or scales. Sclerochronology proved to be useful for age estimation in a variety of organisms, such as mollusks, corals, echinoderms, fishes, amphibians, reptiles and mammals among others. One frequently used version of this technique is called skeletochronology, which implies visualization of growth layers in transverse thin sections of skeletal elements. Skeletochronology allows to determine the age of individuals by examining their bones, based on the presence and number of annual lines of arrested growth deposited in the bone tissue during periods of inactivity like hibernation and/or aestivation. Additionally, changes in the rate of growth as a result of transitions from a life-stage to another can be detected in the bone structure, allowing for example to estimate the age when an individual becomes capable to produce offspring. Several age-related parameters can be estimated from the cross sections: average lifespan, longevity (i.e., maximum age observed), and age at sexual maturity (considered either as the youngest breeding age class or inferred from the bone growth pattern).

The method of skeletochronology became established and widespread since the '90s through the studies of Castanet and Smirina, who proposed a standardized protocol. This encouraged their use in macroecological and evolutionary studies, either focused on single wide-spread species with many populations or large-scale studies involving tens of species (e.g., altitudinal or latitudinal variation in lifespan, range and/or body size in relation to age). Some limitations of the method were highlighted, mostly related to the difficulty of estimating the age in old individuals (>15 yrs). An extensive database on the subject includes about 500 papers on amphibians, and 470 on reptiles (snakes, lizards and crocodiles). Compared to capture-mark-recapture, sclerochronology is a faster and more reliable method for estimating individual age in amphibians and reptiles, despite its limits and difficulties. Overall, the data obtained through sclerochronology can be considered robust, especially if validation methods are employed. This is especially true, since the general goal is to characterize population parameters and trends, rather than determining the exact age of one specimen in particular.

Keywords: skeletochronology, individual age, amphibia, reptilia

DIVERSITY, ECOLOGY AND BIOTECHNOLOGICAL APPLICATIONS OF FUNGI

Cătălin TĂNASE^{1,2,3}

¹ Correspondence member of the Romanian Academy

² 'Alexandru Ioan Cuza' University of Iași, Faculty of Biology

³ "Anastasia Fătu" Botanical Garden, Iași, tanase@uaic.ro

Fungi represent a numerous group of eukaryotic organisms and because of this they are considered a major component of biodiversity. Their ecology underlines the fact that they are sensitive bioindicators for several substrates and specific habitats, thus being important elements in the stability of natural ecosystems. The presentation includes, besides novel aspects regarding case studies and sustainable use of fungi, the scientific results of the researchers and PhD students from the Laboratory for Research of fungi with applications in the ecological reconstruction of soils (RECOSOL), from the Faculty of Biology, 'Alexandru Ioan Cuza' University of Iași. These results gather original information regarding the taxonomy, ecology and chorology of fungi, and from the biotechnological point of view, aspects that focus on the potential of fungi in bioconversion, mycoremediation of certain pollutants and biocontrol of pathogens. The pure cultures that were used in these researches were obtained by isolating the mycelium from fungal species that are present in natural ecosystems, which are being kept in the RECOSOL Laboratory collection, and some of them are deposited in internationally renowned collections. With these aspects in mind, it is necessary to consider fungi as suitable candidates for the management and nature conservation.

Key words: fungi, taxonomy, ecology, bioconversion, mycoremediation, biocontrol, RECOSOL

*Biodiversity of aquatic
organisms*

TOWARDS PROTECTING AN ENDEMIC CRAYFISH SPECIES IN ROMANIA: DISTRIBUTION, CONSERVATION STATUS AND THREATS

Mihaela C. ION¹, Antonio V. LAZA², Andrei ACS^{2,3}, Alina PITIC³, Andrei TOGOR⁴, Oana Paula POPA⁵, Lucian PÂRVULESCU^{2,6*}

¹ Institute of Biology Bucharest, Romanian Academy, Bucharest, Romania.

² Department of Biology-Chemistry, Faculty of Chemistry, Biology, Geography, West University of Timisoara, Romania.

³ Centre for Protected Areas and Sustainable Development, Oradea, Romania.

⁴ Aqua Crisius Association, Oradea, Romania.

⁵ “Grigore Antipa” National Museum of Natural History, Bucharest, Romania.

⁶ Environmental Advanced Research Institute, West University of Timisoara, Romania.

* corresponding author:

The newly discovered European crayfish species, the endemic idle-crayfish (*Austropotamobius bihariensis*), has been documented to inhabit the tributaries of the Criş rivers in the western Apuseni Mountains (Romania). Here the species encounters significant challenges, predominantly from the adverse impacts of urbanization and stream regularization. Furthermore, the invasion of North American crayfish species represents a significant hazard due to their role as carriers of the *Aphanomyces astaci* pathogen, which causes the crayfish plague. The Ministry of Research, Innovation, and Digitization (Romania) has granted funding for the project titled “Idle Crayfish: from the unknown to the next generation of species conservation assessment” through the UEFISCDI (PN-III-P4-ID-PCE-2020-1187) program. The project’s objectives include assessing the conservation status of idle crayfish populations using the relevant criteria of the IUCN Red List of Threatened Species and establishing conservation measures for these populations. The field survey spanning from 2020 to 2023 confirmed known populations and revealed the presence of the species in a new river basin. Based on

distributional criteria, with an extent of occurrence of 3800 sq. km, an area of occupancy of 128 sq. km, and the threat posed by invasive species and crayfish plaque, this species can be considered endangered. A species distribution map will be presented, highlighting the areas covered by protected areas and potential ark sites. By incorporating the findings from this extensive field assessment, additional population genetic data, and distribution modeling techniques, we can potentially acquire the necessary tools to design and implement effective conservation measures for the idle-crayfish populations.

Keywords: *Austropotamobius bihariensis*, idle crayfish, conservation status

BEGA RIVER WATER QUALITY REFLECTED BY BENTHIC MACROINVERTEBRATES

Diana-Ioana ARDELEAN¹, Milca PETROVICI^{1*}

¹ West University of Timișoara, Department of Biology-Chemistry, Faculty of Chemistry, Biology, Geography, 16 Pestalozzi Street, 300315, Timișoara, Romania

* corresponding author: milca.petrovici@e-uvt.ro

Macroinvertebrates are part of almost every freshwater ecosystem in the world, forming the base of the aquatic food chain, serving as an important food source for other animals. Because they are non-migratory and spend their entire lives in a small area, benthic macroinvertebrates often show the effects of habitat modification, being good indicators of environmental health, especially waterways.

The importance of the study lies in the significant role of these benthic species on the water quality of the Bega Canal, being studied a distance of 3.9 km from the river course, upstream and downstream of the water outlets from the Aquatim S.A. Timișoara Wastewater Treatment Plant.

It was observed that the main impact of the sewage treatment plant is the discharge of flows higher than its wastewater processing capacity. Thus, the large volume of partially purified water drains the benthic macroinvertebrates.

The most frequent groups of invertebrates identified were Oligochaeta, present and very abundant in all stations, respectively Chironomidae which is less abundant. These organisms live where pollution products often accumulate as a result of human activity, being able to metabolize organic contaminants and various pollutants in their tissues.

Keywords: benthos, macroinvertebrates, anthropogenic impact, density, abundance

THE METAZOAN ECTO AND ENDOPARASITES OF SOME COMMERCIALY IMPORTANT FISH FROM PRUT RIVER

Angelica DOCAN¹, Iulia GRECU^{1*}, Lorena DEDIU¹, Mirela CREȚU²

¹ Faculty of Food Science and Engineering, University “Dunarea de Jos” of Galati, Romania,

² Research-Development Institute for Aquatic Ecology, Fisheries And Aquaculture, Galați, Romania

* corresponding author: iulia.grecu@ugal.ro

The parasitic fauna of some commercial fish species (*Cyprinus carpio*, *Silurus glanis*, *Abramis brama*) from the Prut River was investigated in May 2023. The aim of our investigation was to assess the fish health condition from wild population from the Prut River in order to evaluate the quality of its aquatic environment conditions, as part of a larger ecosystem approach study: register qualitative and quantitative of all parasites that have invaded the host, independent of the group to which it belongs parasite. Parasitological investigations were performed on fresh samples by classic methods. Infestation level expressed by prevalence (extensivity) and intensity level. In the analysed fish, 9 parasitic species were identified belonging to 5 systematic groups: *Monogenea* (*Ancylo-discoides siluri*, *Dactylogyrus* sp.), *Cestoda* (*Proteocephalus* sp.), *Nematoda* (*Raphidascaria* sp., *Hepaticola petruschewskii*), *Acanthocephala* (*Acantocephalus lucii*, *Pomphorhynchus laevis*), *Hidrudineea* (*Piscicola fadejewi*). The abundances of some parasite species showed positive correlations with the size of the hosts, but the condition factor of the fish was not affected by the parasitism levels.

Keywords: ecto and endo parasites, Prut River, wild fish

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PERSISTENT ORGANIC POLLUTANTS ALTERS OXIDATIVE STRESS MARKERS IN TURBOT DEPENDING ON SEX

Diana DANILOV^{1,2}, Angelica DOCAN^{2*}, Mirela CREȚU^{2,3},
Lorena DEDIU^{2*}, Cristian DANILOV¹

¹ National Institute for Marine Research and Development “Grigore Antipa”, Constanța, Romania

² Faculty of Food Science and Engineering, “Dunărea de Jos” University of Galați, Romania

³ Research and Development Institute for Aquatic Ecology, Fishing and Aquaculture, Galați, Romania

* corresponding author: lorena.dediu@ugal.ro

Organochlorine pesticides (OCPs) represent a category of extremely hazardous pesticides that saw extensive use until the early 1980s. Despite being prohibited, these chemicals continue to endure due to their remarkable persistence. They accumulate in the adipose tissues of aquatic organisms and having the tendency to concentrate as they move up the food chain.

The turbot, scientifically known as *Scophthalmus maeoticus*, is a benthic fish species inhabiting the seabed of the Black Sea, feeding on a diet comprising mollusks, crustaceans, flounder, horse mackerel, and gobies. Given that OCP concentrations are elevated in sediment and in animals that feed at the bottom, turbot is at a greater risk of accumulating pollutants. The primary objective of this study is to identify oxidative stress by analyzing plasma biomarkers in these fish and to evaluate the degree of correlation between OCP levels detected in various tissues and markers of oxidative stress.

Keywords: oxidative stress, persistent organic pollutants, turbot

BIODIVERSITY OF AQUATIC ENTOMOFAUNA, CASE STUDY: RÂMNICU SĂRAT RIVER

Ionuț-Dănuț COSTACHE¹, Mircea Nicușor NICOARĂ¹,
Camelia URECHE², Dorel URECHE²

¹ 'Alexandru Ioan Cuza' University of Iasi, Faculty of Biology

² 'Vasile Alecsandri' University of Bacău, Faculty of Sciences

* corresponding author: costacheionutdanut@yahoo.com

The Râmnicu Sărat River springs from under the Furu peak in the Vrancei Mountains and flows into Siret, near Măxineni village.

This study analyzes the diversity of entomofauna in aquatic environments, with a focus on the Râmnicu Sărat River in Romania. Entomofauna play a vital role in maintaining ecological balance in aquatic ecosystems. Through this study, the diversity of invertebrate species and the impact of polluting factors on the ecosystem are explored.

This river provides a relevant case study as it is an ecosystem with distinct characteristics, hosting a diverse range of invertebrate species. By investigating the entomofauna of this area, we have the opportunity to assess the diversity, ecology and roles of these organisms within the aquatic ecosystem.

The study aims to highlight the importance of insects to ecosystem health and stability, as well as to highlight the risks and threats facing entomofauna in an aquatic environment, such as pollution and ecosystem disturbances. This aims to raise sensitization and raise awareness of the need to protect aquatic habitats.

In the study, a Surber-type Bentometer, 70% alcohol, and laboratory equipment such as a stereomicroscope, refractometer, granulometric sieves, and multiparameter device were used. Samples were collected from 14 stations. In these stations, 5 orders comprising 12 macrozoobenthic families were identified based on which the river water quality was established from the source to the discharge.

The results of this study can play an important role in the process of developing conservation strategies and favorable management for the Râmnicu Sărat River and other similar rivers, contributing to the conservation of biodiversity and promoting a sustainable approach in the management of aquatic ecosystems.

Keywords: aquatic entomofauna, Râmnicu Sărat River

THE RESERVOIRS FROM BISTRIȚA RIVER BASIN AS SIGNIFICANT SHELTERS FOR BIRD FAUNA IN THE EASTERN PART OF ROMANIA

Carmen GACHE^{1*}

¹ 'Alexandru Ioan Cuza' University of Iasi, Faculty of Biology

* corresponding author: cgache@uaic.ro

This ornithological study presents data on the diversity of bird species recorded on the territory of six reservoirs from the valley of Bistrița River – three of them located in the mountain sector of this river (Pângărați, Vaduri and Bâta Doamnei), the other three in the lower sector of it (Gârleni, Lilieci and Bacău). We done ornithological surveys for the perimeter of the first three reservoirs in the middle January (as national Mid-winter waterfowls census program) during the last 18 years, starting from the winter of 2006 year. Our field monitoring activity in the perimeter of the lower basin of Bistrița River began in the spring of 2010 year and is still ongoing.

We analyse the diversity of bird fauna for the each investigated reservoir, and we present quantitative data for the observed bird species, too. The three mountain reservoirs represent significant wintering areas for the aquatic birds in the northern Romania sheltering thousands waterfowls, the ducks and swans being dominant species through their population. The reservoirs from the lower Bistrița River present a mosaic of suitable habitats for the bird fauna representing significant stopover territories during the birds' migration, but also important wintering and breeding areas for the aquatic bird species in the eastern Romania.

We present the status of the bird species mentioned in the Annex 1 to the Birds Directive, but also of the bird species included in the Romanian Red Book of Vertebrates as we assess it during our monitoring activity in the investigated perimeter. We identified the main threatening risks for the bird fauna in the area.

Keywords: bird fauna, reservoirs, Bistrița River basin, Natura 2000 network.

SOME ASPECTS OF THE INFLUENCE OF INTENSIVE AQUACULTURE IN FLOATING CAGES, ON SOME CHEMICAL PARAMETERS OF THE ACTUALLY SEDIMENTS IN IZVORU MUNTELUI-BICAZ RESERVOIR

Romeo CAVALERIU¹, Gabriel PLAVAN^{*2}, Oana MARE ROȘCA³,

¹ Iasi National College

² "Alexandru Ioan Cuza" University of Iasi, Faculty of Biology

³ Technical University of Cluj-Napoca, North Baia Mare University Center

* corresponding author: gabriel.plavan@uaic.ro

The previous investigations focused on the influence on the mineral and organic matter resulted from the aquaculture activity represented by unconsumed feeds, faeces and excreta on the sediment composition from the floating cages area, have been made during 1979 – 1983 period, when the trout production was between 3 and 10 tons per year and the quantity of feeds administrated to the fishes was between 8.7 and 27 tons per year. In 2021 we have resumed the researches on the chemical parameters of the actually sediments in the aquaculture floating farm area and in other areas, uninfluenced by this activity. The influence of the trout aquaculture in floating cages upon the chemical characteristics of the actual sediments in the farms neighboring area is reduced by a series of factors which cause that just a part of the organic and mineral matter introduced in the ecosystem to arrive on the bottom, under the cages. These effects appear on limited areas in the farms neighboring area and may be explained as forms of a limited eutrophication.

Keywords: intensive aquaculture, chemical parameters, Izvoru Muntelui-Bicaz reservoir

A PROVISIONAL CHECKLIST OF FRESHWATER LEECHES (ANNELIDA, CLITELLATA, HIRUDINEA) OF ROMANIA

Victor SURUGIU^{1*}

¹ Alexandru Ioan Cuza University of Iași, Faculty of Biology, Iași, Romania

* corresponding author: vsurugiu@uaic.ro

The objective of this study is to summarize historical and recent data on diversity and distribution of freshwater leeches in Romania and to update their taxonomic information. Leech fauna of Romania was studied based on comprehensive literature review, museum collections and results of recent field surveys conducted from 2014 to 2023. A provisional list of 32 leech species reported in Romania is presented. They belong to 2 orders, 2 suborders, 5 families, and 14 genera. Though some of the records in the list are erroneous or dubious, it is expected that the number of species in Romania is underestimated because of the still insufficient research. Data about habitat preferences, ecology, and protection status for selected species are also provided. According to an evaluation through the IUCN categories and criteria, four leech species were included in the Red Book of Invertebrates of Romania (2021).

Keywords: inventory, Hirudinea, leeches, Romania, faunistics, taxonomy, ecology, geographical distribution, freshwater

**GENETIC DIVERSITY OF THE EXTINCT IN THE WILD
PETZEA RUDD (SCARDINIUS RACOVITZAI)
PRELIMINARY STUDY**

Mitică CIORPAC¹, Ovidiu A. POPESCU², Gabriela GRIGORAȘ^{3,4},
Cecilia ȘERBAN^{3,4}, Dragos-Lucian GORGAN^{5*}

¹ CEMEX - Advanced Research and Development Center for Experimental Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, Iași, Romania

² Praxis Medica, Iasi, Romania

³ Museum Complex of Natural Sciences, Galati, Romania

⁴ "Dunarea de Jos" University Galați, Romania

⁵ Alexandru Ioan Cuza University of Iași, Faculty of Biology

* corresponding author: lucian.gorgan@uaic.ro

Scardinius is a genus of ray-finned fish within the Cyprinidae family, native to Europe and middle Asia, with an area from Western Europe to the Caspian and Aral Sea basins. The genera comprise 10 species, more than half of them have a status from near threatened to critically endangered. Insufficient or even complete absence of molecular data, for species such as *S. racovitzai*, have induced multiple uncertainties and miscellaneous phylogenetic relationship within Scardinius genera. To infer the genetic diversity taxonomic status and phylogenetic relationships between *S. racovitzai* and *S. erythrophthalmus*, a combined analysis of the mitochondrial marker COX1 and the nuclear marker RAG1 has been performed. This study infers the phylogenetic relationship within Scardinius genera, the genetic diversity and the differentiation degree between *S. racovitzai* and *S. erythrophthalmus*. We observed a phylogenetic incongruence among 3 species, *S. plotizza* and *S. scardafa* lineages exhibits a lack of genetic differentiation and the monophyly of *S. erythrophthalmus* was rejected. *S. racovitzai* individuals exhibits a failure in describing their own clade and a lack of the haplotype's convergence in a species specific ancestral lineage. In conclusion, we highlighted the level of genetic diversity and an evolution from at least two different lineages of *S. erythrophthalmus* species.

Keywords: *Scardinius racovitzai*, *S. erythrophthalmus*, COX1, RAG1

**REPRODUCTIVE PECULIARITIES AT
PONTIC SHAD (ALOSSA IMMACULATA) FROM THE
LOWER DNIESTER IN THE PRE-REPRODUCTIVE PERIOD**

Nina FULGA¹, Dumitru BULAT¹, Denis BULAT¹

¹ Moldova State University, Institute of Zoology

* corresponding author: fulganina@yahoo.com

Before spawning, the highest values of the gonadosomatic index are observed in five one-year-old females throughout the entire pre-spawning period, and a slight decrease in the fatness coefficient is also observed at the end of May after the release of the first portion of eggs. During this period, the Pontic shad does not feed. It should be noted that over the subsequent months, the length of four and five one-year-old females did not change, while the body weight of four and five one-year-old individuals decreased slightly in parallel with the increase in the gonadosomatic index. This occurs as a result of an increase in the temperature regime of the lower Dniester, which affects the increase in the process of generative metabolism during the 1st - 3rd decade of May, when intensive accumulation of trophic substances occurs in the eggs, followed by an increase in the mass of the gonads and index GSI.

Key words: *Alosa immaculata*, gonads, eggs, gonadosomatic index GSI.

THE CURRENT STATE OF THE PHYTOPLANKTON AND THE WATER QUALITY OF THE COSTEȘTI-STÂNCA RESERVOIR

Laurenția UNGUREANU*, Daria TUMANOVA, Grigore UNGUREANU

State University of Moldova, Institute of Zoology.

* corresponding author: ungur02laura@yahoo.com

The article presents the results of study of qualitative and quantitative indicators of phytoplankton of the Costești-Stâncă Reservoir within the Republic of Moldova in period of 2020-2023. In phytoplankton compositions of the Reservoir were identified 47 species and varieties which belongs to 6 taxonomic groups of *Cyanophyta* (*Cyanobacteria*), *Bacillariophyta*, *Chlorophyta*, *Euglenophyta*, *Chrysophyta*, *Pyrrophyta*. The numbers of phytoplankton changed within the limits 0,33-23,24 mln. cell/l, with biomass 0,74-10,25 g/m³. According to the phytoplankton biomass values river refers to the "eutrophic" trophicity category, and in most cases, they were within the "mesotrophic" area. The values of saprobic indexes, estimated on the basis of species-indicators from phytoplankton composition, which are in proportion of 58% typically beta-mezosaprobic, confirm the following: the water quality of Costești-Stâncă Reservoir in the period of 2020-2023 years was satisfactory for the development of phytoplankton and was attributed mainly to II-III (good-moderately polluted) quality classes.

The investigations are carried out within the framework of project 20.80009.7007.06 "Determination of changes in the aquatic environment, assessment of migration and the impact of pollutants, establishment of the legitimacy of the functioning of hydrobiocenoses and prevention of harmful consequences on ecosystems" (State Program 2020-2023).

Keywords: phytoplankton, trophicity, indicator species, water quality.

RECENT APPROACH REGARDING ZOOPLANKTON COMMUNITY FROM THE NERITIC WATERS OF THE ROMANIAN BLACK SEA COAST

Manuela Diana SAMARGIU^{1*}, Gabriela Mihaela PARASCHIV¹
Daciana SAVA¹

¹ Ovidius University of Constanta, Romania

* corresponding author: manuelasamargiu@yahoo.com

In the last decades the researches regarding planktonic species (zooplankton and phytoplankton) revealed significant qualitative and quantitative changes in the Black sea waters, even in front of the Romanian littoral, compared to the 70s and 90s.

Even in the last 10 years there have been structural changes in the zooplankton populations, both in terms of specific diversity and in terms of abundance, in the sense of their decrease.

In the long term this can have a negative impact at the pelagic level, influencing phytoplankton - zooplankton interrelationships and the quality of coastal marine waters. In addition, a qualitative and quantitative decrease in zooplankton populations will influence the food resource for pelagic, zooplanktonophagous fish that populate the neritic waters of the Black Sea and that depend on the abundance of plankton organisms.

The paper presents data based on some quantitative samples collected in the last years, from the littoral waters along the Romanian shore. An analyses of holoplankton and meroplankton found in the samples will be done, regarding the qualitative structure and the proportion of those. The main representatives of the adult forms were *Noctiluca scintilans* (Cystoflagellata), *Acartia clausi* (Calanoida) and some Cyclopoida and from meroplankton larvae of Bivalvia, Copepoda and *Aurelia aurita*.

In the paper are presented frequency in the studied samples and the dynamics of zooplankton density and biomass of identified species, in different studied sites.

Keywords: The Black Sea, zooplankton, Romanian shore.

LINDENIA TETRAPHYLLA (ODONATA: GOMPHIDAE) FIRST RECORD FROM ROMANIA AND FUTURE PERSPECTIVE IN ROMANIA

Cosmin-Ovidiu MANCI^{1,2,*}, Amalia-Raluca DUMBRAVĂ^{3,4}

¹ “Grigore Antipa” National Museum of Natural History, 1 Kiseleff, 011341 Bucharest, Romania

² “Oceanic-Club” Oceanographic Research and Marine Environment Protection Society, Constanța, Romania

³ Iron Gates Natural Park, Orșova, Mehedinți County, Romania

⁴ University of Oradea, Doctoral School of Biomedical Sciences, Domain: Biology, Oradea, Romania

* corresponding author: cosminom@gmail.com

Lindenia tetraphylla is a species with a huge areal in Euroasia from Spain to Afghanistan and western Pakistan and few known records from North Africa. In Europe the species is mostly known from Greece and especially close to shores of Mediterranean Sea. This paper purpose is to signal the first record of this species in Romania. *Lindenia tetraphylla* is a protected species of Community interest and it is included in the Annexes II and IV of Directive92/43/EEC (known as Habitats Directive). This species is known to be highly nomadic and a strong flier migrating over long distances. The specimen found is probably just an erratic one that originate from populations located in Croatia or Bulgaria (where they are known to breed) but is not excluded that unknown breeding population exist closer to Romania. We discuss the possibility that this species establishes in Romania as a breeding species specially in connection with climatic changes.

Keywords: *Lindenia tetraphylla*, Odonata, first record, Natura 2000

THE IMPACT OF ANTHROPOGENIC FACTORS ON BIOTIC COMMUNITIES AND ECOLOGICAL PROCESSES: AN ECOSYSTEM PERSPECTIVE

Geta RÎȘNOVEANU^{1*}

¹ University of Bucharest, Faculty of Biology, Department of Systems Ecology and Sustainability,

* corresponding author: geta.risnoveanu@g.unibuc.ro

The environment has a hierarchical organization in nested ecological systems whose complexity is correlated with the spatial and temporal scales that characterize them. The concurrent action of natural and anthropogenic factors on ecological systems and the multiple interactions between systems at each level and across the hierarchy make it difficult to detect the mechanisms and pathways that govern the distribution of biodiversity and environmental changes. A spatial scale perspective is essential to understanding anthropogenic factors' impact on biotic communities and ecological processes. This paper aims to identify and discuss the key drivers originating at different spatial scales that shape stream communities. It presents results obtained in catchments with varying land use intensities. The results demonstrate that a suite of hierarchically nested bio-physical processes operating at varying spatial scales controls the structure and functioning of stream systems. A comprehensive understanding of the drivers of stream community changes allows the development of more effective management strategies to protect these critical freshwater ecosystems and the vital ecosystem services they provide.

Keywords: ecosystem approach, streams, aquatic communities, spatial scales, land-use

CHANGES IN LEAF LITTER QUALITY AND ACCUMULATION OF FINE SEDIMENTS SLOW DOWN THE DECOMPOSITION PROCESS IN STREAMS: INSIGHTS FROM A MICROCOSM EXPERIMENT

Valentin DINU¹, Cristina-Maria POPESCU², Darmina NIȚĂ¹,
Florentina GRIGORESCU², Cezara TUDOSE¹, Ioana ENACHE²,
Geta RIȘNOVEANU^{1,2*}

¹ University of Bucharest, Doctoral School in Ecology, Bucharest, Romania

² University of Bucharest, Department of Systems Ecology and Sustainability, Bucharest, Romania

* corresponding author: geta.risnoveanu@g.unibuc.ro

Benthic freshwater detritivores play a major role in the decomposition of leaf litter detritus. The communities of shredders in a stream are shaped by factors such as leaf hardness and leaf nutrient content found in various leaf kinds. Invertebrates contribute to the quick fragmentation of leaves and the assimilation of plant material into secondary production by feeding on leaf litter. The simultaneous effects of fine silt accumulation brought on by hydromorphological changes and decreased food quality caused by plant species that overrun riparian habitats, such as *Fallopia japonica*, are little understood. We developed a full factorial microcosm experiment to separate the effects of the abovementioned stresses on benthic shredder populations and the decomposition process. The experiment lasted 10-12 days and simulated the sediment and food quality changes. Here we show that the native food (*A. glutinosa*) has a higher processing rate than the invasive one (*F. japonica*). The impact of stressors depends on the complexity and composition of the invertebrate biological assemblages. We also show that more complex biological assemblages are more resilient to the stressor's impact. Our results may assist freshwater biodiversity managers in adapting and applying the best measures for conservation.

Keywords: litter decomposition, macroinvertebrates, invasive species, hydromorphological changes, multiple stressors

THE EFFECT OF PHENOTYPES ISOLATION ON THE SUCCESS OF EX-SITU CONSERVATION PROGRAMMES IN *POECILIA WINGEI*

Larisa LUPU¹, Marian TUDOR¹, Lucica TOFAN¹

¹„Ovidius” University of Constanța, Natural and Agricultural Sciences Faculty, Natural Sciences Department, University Lane, no. 1, Building B, Mamaia Boulevard, no. 124, Constanta, 900470

* corresponding author: lupu.larisa14@yahoo.com

Poecilia wingei is a relatively recently discovered guppy species found only in the Cumaná region in Laguna de los Patos and Laguna Malagueña and in the Campoma - Buena Vista lagoon system of the Paria Peninsula, Sucre State, Venezuela. The species was first collected by Franklyn F. Bond in 1937 and later by John Endler in 1975 in the coastal town of Cumaná in northeastern Venezuela.

The aim of the study was to observe whether there are conservation advantages of belonging to one phenotype or another.

In order to test our hypothesis, five phenotypes of *Poecilia wingei* from different areas of the native range were used, namely Cumaná Rainbow, Cumaná El Silverado, Cumaná Orchid, Cumaná BlackBar, and the fifth phenotype occurred in one of the pools in the laboratory and is called Cumaná Spin-off.

In order to achieve the goal, we used the main biometric data such as total body length, median height, maximum height, eye diameter and gonopod length, all of which were measured on both sides of each individual.

Given the high probability that *Poecilia wingei* has disappeared from natural habitats, our experiment have highlighted the possibility of successful ex situ preservation of the species, considering its high prolificacy and ecological plasticity. Finally, further research is needed to determine whether or not there is a dominant phenotype that could replace the others in case of repopulation actions in natural habitats.

Keywords: *Poecilia wingei*, Cumaná, phenotype, conservation

THE TROPHIC SPECTRUM OF CERTAIN FISH SPECIES FROM THE DOAMNEI RIVER

Angelica RUSU^{1*}, Roxana MAXIM¹, Dorel URECHE³, Gabriel
PLAVAN², Viorica RARINCA¹, Ion COJOCARU², Mircea NICOARĂ^{1,2}

¹"Alexandru Ioan Cuza" University of Iasi, Doctoral School of Geosciences,
Faculty of Geography and Geology, Iasi, Romania

²"Alexandru Ioan Cuza" University of Iasi, Department of Biology, Faculty of
Biology, Iasi, Romania

³"Vasile Alecsandri" University of Bacau, Department of Biology, Ecology and
Environmental Protection, Faculty of Sciences, Bacau, Romania

* corresponding author: rusu_angelica@yahoo.com

Macroinvertebrates play a significant role in freshwater ecosystems as trophic resource and are important indicators of water quality. Depending on the types of macroinvertebrates found in a stream, predictions can be made about water quality because different types of macroinvertebrates tolerate different flow conditions and pollution levels. The study aimed to analyze the diversity of macroinvertebrates present in the food of fish populations living in the Doamnei River from the Argeş River basin. The sampling of fish was carried out by the electronarcosis method in the spring-summer of 2006.

Through the quantitative and qualitative analysis of macroinvertebrates from the stomachal content of 6 species of freshwater fish counting 190 individuals, 11 species or groups of macroinvertebrates were identified, and their specimens counted. The macroinvertebrates in the stomachal content were identified to the smallest possible taxon, while their importance in fish feeding was represented by ecological indicators: the Shannon-Wiener index and the Pielou index. Regarding the presence of macroinvertebrates in the digestive contents of fish, the dominance of the Class Insecta was observed, generally over 90% to 100% in all fish species studied. The larvae from the Order Diptera, Family Chironomidae, were the most numerous, representing a percentage of 91% of the total number of

individuals identified. The analysis revealed that *Sabanejewia vallachica* and *Squalius cephalus* have a broad food spectrum and a generalist feeding mode. In addition to macroinvertebrates, microplastic fibers were also identified, predominantly blue, which constitute one of the principal pollution causes.

Keywords: macroinvertebrates, stomach contents, microplastic, feeding mode, Shannon-Wiener index, Pielou index

FEEDING ECOLOGY OF *PHOXINUS PHOXINUS* POPULATIONS FROM RIVER OITUZ

Roxana MAXIM^{1*}, Angelica RUSU¹, Gabriel-Ionut PLAVAN², Dorel URECHE³, Ion COJOCARU², Mircea NICOARĂ^{1,2}

^{1*} "Alexandru Ioan Cuza" University of Iasi, Doctoral School of Geosciences, Faculty of Geography and Geology, Iasi, Romania

^{2*} "Alexandru Ioan Cuza" University of Iasi, Department of Biology, Faculty of Biology, Iasi, Romania

^{3*} "Vasile Alecsandri" the University of Bacau, Department of Biology, Ecology and Environmental Protection, Faculty of Sciences, Bacau, Romania

* corresponding author: roxana_maxim10@yahoo.com

In the present study, the aim was the quantitative and qualitative analysis of macroinvertebrates from the stomach content of the *Phoxinus phoxinus* population living in the Oituz River basin. Fish sampling was achieved by the electronarcosis method in summer 2008, and the macroinvertebrates were identified using a stereomicroscope, up to the smallest possible taxon. The importance in the fishes feeding was represented by ecological indicators, such as the Shannon-Wiener index, based on the relative abundance of prey, which was used to estimate the dietary diversity of the fish species. The stomachal contents of 125 individuals of *Phoxinus phoxinus* were analyzed to determine the trophic spectrum. Thus, it resulted that the most frequent macroinvertebrates identified are represented by the Chironomidae Family, followed by the Ephemeroptera Order, Trichoptera Order, and Diptera Order. Other macroinvertebrates were also identified but in smaller proportions. In most stomachs, the presence of microplastics is represented by blue, red, black, and brown fibers. In addition to these, we also identified: drops of fat, a feather, fish scale, and vegetable fibers. Out of 125 individuals analyzed, 8 of them had empty stomachs.

Keywords: stomach contents, macroinvertebrates, microplastics.

TAXONOMY, GEOPOLITICS AND CONSERVATION - THE CURIOUS CASE OF *POECILIA WINGEI*

Marian TUDOR¹

¹ "Ovidius" University of Constanța, Natural and Agricultural Sciences Faculty, Natural Sciences Department, Constanta

* corresponding author: marian.tudor@univ-ovidius.ro

Poecilia wingei (or Endler's guppy) is one of the species with extremely strange histories and, at the same time, one that poses special conservation problems.

From its discovery in the 3rd decade of the last century on the Paria peninsula in the northern Venezuelan region of Cumana, to its morphological description (not until 2005), the species has experienced brief episodes of popularity, separated by long periods of oblivion. The leading advocate of this species, John Endler, who rediscovered the taxon in the 1970s, drew the attention of the scientific community (more than 20 years ago) to the taxonomic, but above all evolutionary, importance of the taxon and sounded the alarm about its imminent extinction. Several episodes of collection of specimens belonging to the taxon followed, culminating in 2005, the year the species was described. 11 years later, the change of political regime in Venezuela stopped research on the species' habitats and biology and halted conservation efforts initiated by the global community of ichthyologists. Moreover, the Cuman area and the Paria peninsula began to be industrially exploited by the political clients of the new regime.

Today, the species is considered to have disappeared from its native habitats, and the populations that still exist in the Cumana area are thought to be strongly hybridized with *Poecilia reticulata*, as a result of the elimination (through indiscriminate exploitation of mineral resources) of the biogeographic barriers that separated the two taxa.

Taking into account the above, our laboratory is working for the *ex situ* conservation of the species, the preservation of genetic purity while preserving a more diverse gene pool and the dissemination of the species in as many centres interested in conservation as possible.

Key words: Venezuela, geopolitics, *ex situ* conservation, Endler's guppy.

ASSESSMENT OF THE PRESSURES EXERCISED ON THE ICHTHIOFAUNA OF ROSCI0006 BALTA MICĂ A BRĂILEI

Luiza FLOREA¹

¹ “Dunarea de Jos” University of Galați, Cross-Border Faculty

* corresponding author: luizafloreagl@yahoo.com

Balta Mică a Brăilei Natural Park, a wetland of international importance (June 2001), received in 2008 (OM-MMDD 1964/2007) the status of a Natura 2000 Site, as a Site of Community Importance with an area of 20872 ha. On the surface of this SCI they have been designated 26 species of fish of community/national interest. In the process of developing the management plan, an important step is the evaluation of the anthropogenic impact in the analyzed sites on the biotic and abiotic components, in this case on the ichthyofauna. Thus, in the Revision of the Integrated Management Plan project, carried out in 2023, the following five pressures were identified that have a high manifestation intensity: K01.02 Clogging, J03.02 Reduction of habitat connectivity, due to anthropogenic causes, M01.02 Droughts and reduced rainfall, I01 Non-native invasive species, K02.01 Change in species composition (succession). Along with these, two more pressures were recorded with an average intensity: D03.02 Navigation, F05.04 Poaching. Each of these phenomena is described and analysed. A series of proposed management measures are also elaborated to maintain the favorable conservation status of fish species of community interest in ROSCI0006 Balta Mică a Brăilei. The elaborated set of measures includes measures aimed directly at the species in order to ensure the presence of stable, balanced populations on the site with a viable structure, a set of measures aimed at preserving favorable habitats at an optimal level.

Keywords: clogging, reduced connectivity, invasive species, succession

DYNAMICS OF FISH FAUNA IN THE BISTRITA RIVER (NORTH-EASTERN ROMANIA), SPILLWAY AREA, OVER THE PERIOD 2021-2023

Dorel URECHE^{1*}, Teodora-Ramona POPA, Camelia URECHE¹

1 "Vasile Alecsandri" University of Bacau, Romania

2 "Mihail Sadoveanu" National College, Pascani, Romania

* corresponding author: dureche@ub.ro

The study was carried out over a period of 3 years in the lower reaches of the Bistrita River, at its confluence with the Siret River, and its main objective was to investigate the diversity of fish fauna. The need for this study arises from changes in environmental conditions resulting from the influence of anthropogenic activities (road infrastructure works). Fifty sampling points have been scientifically investigated (16 in 2021, 24 in 2022, and 16 in 2023). Sampling was carried out by legal methods, respecting the principles of rare species protection.

Taxonomic analysis revealed the presence of 22 fish species (15 in 2021 and 16 in 2022, and 17 in 2023), belonging to 4 orders and 10 families. Two of these are non-native species: *Pseudorasbora parva* and *Perccottus glenii*. As the study area overlaps the chub zone, the most common and frequent fish species are *Squalius cephalus*, *Alburnus alburnus* and *Carassius gibelio*.

The study revealed some changes in the structure of fish communities, probably due to the influence of infrastructure works. Thus, we note that 3 of the fish species present in the investigated area in 2021 were no longer identified in 2022 and 2023.

On the other hand, in 2022 and 2023 new species were identified that were not present in 2021, such as *Tinca tinca*, *Rutilus rutilus*, *Cyprinus carpio* and the invasive *Perccottus glenii*. It can be considered that changing environmental conditions have favoured the replacement of more sensitive species by more resistant ones and a decrease in the number of species.

Key words: fish fauna, biodiversity, Bistrita River.

COMPARATIVE STUDY ON THE ICHTHIOFAUNA OF COMMUNITY IMPORTANCE FROM ROSCI0006 BALTA MICĂ A BRĂILEI

Luiza FLOREA¹

¹ “Dunarea de Jos” University of Galați, Cross-Border Faculty

* corresponding author: luizafloreagl@yahoo.com

The work is based on the inventory of fish species of community importance in ROSCI0006 during 2012-2013 and in 2023 based on scientific and commercial fishing. From the 12 species of fish of community importance in the first period, 8 species were identified: 4 rheophilic species (*Aspius aspius*, *Alosa immaculata*, *Pelecus cultratus*, *Gymnocephalus schraetser*) and 3 stagnophilic species (*Rhodeus sericeus amaru*, *Misgurnus fossilis*, *Cobitis taenia*). 10 years later, in the year 2023, of the 12 species of fish of community importance, 7 species were identified: 4 rheophilic species (*Aspius aspius*, *Alosa immaculata*, *Alosa tanaica*, *Gymnocephalus baloni*) and 3 stagnophilic species (*Rhodeus sericeus amaru*, *Misgurnus fossilis*, *Cobitis taenia*). In total, of the 12 fish species of community importance 9 species were identified. The fish species that were not found in the inventories made in the two periods are: *Zingel zingel*, *Gobio albipinnatus*, and *Gobio kessleri*. These species were not reported even in the surveys made among the fishermen. Although *Gobio albipinnatus* is considered by Telcean & Bănărescu (2002) as one of the species that expanded its range and became more abundant in recent years, it was not found in ROSCI0006 due to its small size and the impossibility of fishing in the large volume of water in the arms Danube where it would be found. Likewise, its close relative *Gobio kessleri*, a rheophilic species that prefers fast currents and sandy substrate, is difficult to fish in the large volume of water of the Danube. As for the species *Zingel zingel*, a benthic rheophilic species that lives in the Danube in relatively deep areas, it was reported in surveys among commercial fishermen.

Keywords: rheophilic species, stagnophilic species, scientific fishing, commercial fishing

OVERVIEW REGARDING RED ALGAE FROM ROMANIAN BLACK SEA COAST WITH EMPHASIS ON THE CURRENT SITUATION

Daciana SAVA^{1*}, Manuela Diana SAMARGIU¹, Gabriela Mihaela PARASCHIV¹

¹ Ovidius University of Constanta, Faculty of Natural Sciences and Agricultural Sciences, University Alley 1, Campus B, Constanta, Romania

* corresponding author: daciana.sava@gmail.com

As a result of multiple natural factors and complex anthropogenic pressures, the Black Sea ecosystem, and the Romanian coastal area, has changed over the years. Numerous scientific papers reported a reduction of biodiversity, both for plant and animal species, including qualitative decline and quantitative changes in macrophytobenthos structure. Phytobenthos includes all the macroalgae attached to solid substrate, made up of pluricellular green algae (*Ulva*, *Cladophora*), brown algae (*Ectocarpus*, *Cystoseira*) and red algae (*Ceramium*, *Polysiphonia*). Red algae represent an important component at Black Sea ecosystem, even though the number of species have decreased over time. In this paper, an overview on the situation of red algae at our littoral is presented, considering that a particular attention should be paid to this group, because there is a dramatic decline regarding the number of Rhodophyta species, this being explained by the fact that this group is the most sensitive to pollution, even though some genera of red algae (e.g. *Ceramium*) can also develop in eutrophic waters, sometimes covering the hard substratum up to 90%. In particular after year 2000, researches from different fields, signalled some positive signs, in particular regarding the physico-chemical conditions of Black sea littoral waters, which has consequences for all biota. So, it is possible to notice the recurrence of species not mentioned for a long time, and perhaps even the identification of some species that have not been reported so far at our seaside. The present work shows some examples to illustrate the mentioned situations, one red algae species, considered lost for many years and one another species that has never been reported at our littoral. Unfortunately, no exact data about location and biomass could be achieved, as the thalli of both species were collected from the beach, from various sites along the littoral teared away from the rocky bottom, so further investigations are absolutely necessary.

Keywords: Romanian Black sea coast, macrophytobenthos

STUDY OF BENTHIC COMMUNITIES FROM THE SMALL DEPTH INFRA-LITTORAL BETWEEN EFORIE NORD AND EFORIE SUD OF THE BLACK SEA COAST

Gabriela Mihaela PARASCHIV*¹, Daciana SAVA¹, Manuela Diana SAMARGIU¹

¹“Ovidius” University from Constanta, Natural Sciences Department;

* corresponding author: gmparaschiv@gmail.com

The aim of the study was to identify and evaluate the habitats in the 0.5-3m depth interval and the invertebrate fauna associated with each type of habitat in the coastal sector between the Eforie Nord and Eforie Sud resorts; the study is part of a larger research program aimed at evaluating the state of conservation of marine benthic habitats and fauna (including ichthyofauna). It is based on a number of 27 integral samples (flora, fauna, sediments/rock substrate fragments), collected from the depth range of 0.5 - 3 m, in July 2022. The collection method consisted in extracting the sample sample (with known surface area), preservation of the sample to be transported to the laboratory; the macroalgae species were collected and transported fresh, the fauna associated with the plant biomass was collected and preserved separately. Three sub-types were identified from the habitat 1110-Shallow submerged sand banks, 4 sub-types from the habitat 1170-Reefs and towards the southern end of the littoral segment, in 2 locations 8330-Totally or partially submerged sea caves.

The macroalgal flora fixed to the substrate was dominated by species from the green algae group: *Enteromorpha* and *Ulva lactuca*. The benthic fauna included a number of 74 specific taxa from 10 supra-specific ones; from the taxonomic point of view, the polychaets group was dominated (with the specification that among crustaceans only malacostracea were identified to the species level); from a numerical point of view the nematodes are dominated and decapods crustaceans dominated as biomass. We note the presence of the polychaeta species *Ophelia* sp. and the decapod *Upogebia pusilla*, species with special conservation status.

Keywords: marine benthos, invertebrate fauna, benthos

**IMPACT OF HYDROLOGICAL RECONNECTION ON
ZOOPLANKTON COMMUNITIES IN THE DANUBE DELTA
BIOSPHERE RESERVE, ROMANIA**

Iasemin SULIMAN^{1,2}, Lucica TOFAN², Iuliana - Mihaela TUDOR¹,
Orhan IBRAM¹, Adrian BURADA¹, Geta RÎȘNOVEANU³

¹“Danube Delta” National Institute for Research and Development, Tulcea, Romania;

² “Ovidius” University of Constanta, Doctoral School of Applied Sciences, Constanta, Romania;

³“University of Bucharest, Doctoral School in Ecology, Bucharest, Romania

” corresponding author: iasemin.suliman@ddni.ro

Over a two-year period, we conducted a comprehensive assessment of zooplankton populations in three distinct water systems within the Danube Delta Biosphere Reserve, Romania. The natural flooding experienced by the Carasuhat restoration area, led to a high species richness, featuring 55 zooplankton species. Conversely, the Zaghen restoration area, subjected to controlled flooding, presented only 27 species, while the Uzlina lake had 46 species. Rotifers predominated in all areas. We noted variations in zooplankton densities and biomass over the years. Densities ranged from 1128.71 ind/L to 2778.80 ind/L in the first year and 1659.00 ind/L to 2460.52 ind/L in the second year. Biomass fluctuated from 15.78 mg ww/L to 319.72 mg ww/L in 2021 and 24.19 mg ww/L to 58.04 mg ww/L in 2022. The key finding of our research is the positive impact of reestablishing hydrological connectivity in the Carasuhat and Zaghen areas with the Danube River. This reconnection facilitated the development of a zooplankton community that closely resembled that of permanent ecosystems found within the Danube Delta Biosphere Reserve, especially in Carasuhat.

These results not only shed light on the ecological consequences of hydrological management strategies but also provide valuable insights into the restoration and conservation of aquatic ecosystems. The development of a zooplankton community similar to

Biodiversity of aquatic organisms

natural habitats has implications for biodiversity conservation and the overall enhancement of water quality in these critical wetland ecosystems, offering new perspectives for future research and management practices.

Keywords: Danube Delta Biosphere Reserve, zooplankton communities, Carasuhat, Zaghen, Uzlina, natural flooding, controlled flooding, anthropogenic impact, conservation strategies.

*Biodiversity of terrestrial
organisms*

DIURNAL BUTTERFLIES FROM MOUNTAINOUS AREAS AS INDICATORS OF THE CONSERVATION STATUS OF HABITATS

Marius SKOLKA*¹, Dan COGĂLNICEANU¹, Daniyar MEMEDEMİN¹,
Florina STĂNESCU², Ovidiu DRĂGAN², Carla GAVRILESCU²,
Alexandra ȘOIMU³, Teodora TĂNASE³

¹ Ovidius University of Constanța, Faculty of Natural and Agricultural Sciences, Natural Sciences Department, Constanța, Romania

² Ovidius University of Constanța, PhD School of Applied Sciences – Biology, Constanța, Romania

³ Chelonia Association, Bucharest, Romania

* corresponding author: mskolka@gmail.com

The mountainous and alpine areas of the Carpathian Mountains are characterized by a number of lepidopteran species that mostly have strict environmental requirements. Evolution in extreme climate conditions imposed a series of specific adaptations, which allowed lepidopterans to survive in the particular conditions of the mountain environment.

Changes in the structure of the habitats are directly reflected in the composition of the communities of plants and animals, and some of the species could be used as indicator species. Diurnal Lepidoptera represent a group whose biology and ecology is well known, and these species can provide a image of the degree to which natural habitats have been modified over time.

In the recent past, a number of species of diurnal lepidoptera have recorded reductions in their populations or have disappeared from certain areas. On the other hand, another series of species were favored by human activities and by the penetration of characteristic host plants into the mountain areas, which led to the increase of their populations.

The analysis of butterfly fauna from two mountain areas, which have undergone human interventions to different degrees, can give a

measure of habitat modification by highlighting the way in which a number of species are present.

Keywords: lepidoptera, mountain ecosystems, human impact

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RARE SPECIES OF COLEOPTERA AND GASTROPODA FROM THE RETEZAT MOUNTAINS

Constantin CIUBUC^{3,4}, Dan COGĂLNICEANU^{1,2}, Marius SKOLKA^{*1,2}

¹ Ovidius University of Constanța, Faculty of Natural and Agricultural Sciences, Natural Sciences Department, Constanța, Romania

² Chelonia Association, Bucharest, Romania

³ Sinaia Zoological Research Station

⁴ University of Bucharest

* corresponding author: mskolka@gmail.com

The Retezat Mountains represent one of the best-preserved alpine habitats in the entire Carpathian chain. The impact of human activities has been less over time compared to other mountainous areas of Romania, both in terms of deforestation, overgrazing, overhunting of large alpine mammals and birds or, more recently the exploitation of hydropower resources and winter sports and tourism.

Due to its high conservation value and biodiversity, the Retezat Mountains became the first protected park in Romania in 1935, and represent a real sanctuary for many species of aquatic and terrestrial invertebrates. Thus, the flora and fauna show a high degree of conservation, and the presence of rare species is not a surprise.

During the research activity carried out in the period 2022 - 2023, in the Retezat Mountains, rare and localized species of coleoptera and gastropods included on the lists of the Habitats Directive, were identified - *Carabus hampei* (Coleoptera, Carabidae), *Chilostoma banatica* (Gastropoda) - and also a species of new carabid for the fauna of Romania - *Metallina nigricornis* (Coleoptera, Carabidae).

Keywords: Coleoptera, Gastropoda, Retezat mountains

Acknowledgements: this work was supported by the grant PNCD III-P4-PCE2021 AlpChange – “Evaluation of the response of alpine communities to global changes”.

PENTATOMIDAE INSECTS AND THEIR IMPACT ON VEGETABLE AGROECOSYSTEMS IN BACĂU REGION

Gabriel-Alin IOSOB^{1*}, Tina Oana CRISTEA¹, Claudia BĂLĂIȚĂ¹,
Denisa SEVERIN¹

¹ Vegetable Research and Development Station Bacau, Bacau, Romania,

*corresponding author: iosob.gabriel@gmail.com

The Bacau region stands out for the diversity of its agricultural landscapes, being a reference point for vegetable production in Romania. Among the countless factors influencing vegetable cultivation, insects, especially those belonging to the *Pentatomidae* family, have a significant impact on crop health and yield. This study aims to identify the key role that *Pentatomidae* insects play in vegetable agroecosystems in the Bacau region. Using a methodical approach that includes a series of field surveys and data analyses that are conducted during 2021, 2022, and 2023. Our research examines the complex dynamics of *Pentatomidae* populations, their species composition, and distinctive behavioral patterns. The main objective of this research is to highlight the complex impact of *Pentatomidae* insects on vegetable crops, including aspects such as potential damage, feeding preferences, and their complex ecological interactions. In addition, we examine the long-term implications of these findings, exploring their relevance in the development of sustainable pest management strategies for vegetable agriculture in Bacau. In essence, the present study represents a valuable contribution to the expanding knowledge of *Pentatomidae* insects, providing practical insights that can be used by local farmers and researchers to improve agricultural practices in the Bacău region.

Keywords: phytophagous stink bugs; predatory stink bugs; integrated pest management (IPM); vegetable agroecosystems

DIVERSITY OF MAMMAL SPECIES IN THE AREA "SCHINOASA", OR. CODRU, CHISINAU MUNICIPALITY

Veaceslav SÎTNIC¹, Natalia CARAMAN¹, Victor SÎTNIC¹

¹ State University of Moldova, Institute of Zoology

* corresponding author: sitnicv@gmail.com

The study was carried out based on the materials collected in the area during the years 1990-2022. The "Schinoasa" area is located in the southwestern part of Chisinau, at a distance of about 6 km from the city. The surface of the area is about 85 ha. The area includes the marshy biotope, the forest on the northern slope, the pond meadow, apple orchard, wheat, sunflower, corn agricultural land. The diversity of the biotopes of the "Schinoasa" area favored the development of a relatively rich mammal fauna consisting of 3 species of insectivores, 17 species of rodents, species of rabbit, 6 species of carnivores. In total, 27 species were recorded in the area, which represents 38.6% of the total number of mammal species on the territory of the republic. For the common and eurytopic species of insectivores and rodents, such as the Danube hedgehog, the mole, the vole, the forest mouse, the collared mouse, and among the carnivores the fox, a frequency of 35-65% and a common ecological significance was recorded and characteristic ($W = 8.8-42\%$) in the studied ecosystems. Squirrel and squirrel species were mainly observed in the forest and on the edge. *M. avellanarius* was reported exclusively in the forest biotope, and *D. nitedula* was also found in agrocoenoses with woody essences: abandoned orchards and strips of trees bordering grain fields. The communities of small mammals are represented by one species of shrew *Sorex araneus* and 11 species of small rodents. The biotope distribution analysis showed that *A. uralensis*, *C. migratorius*, the species of the *Microtus* and *Mus* genera have a predilection for agrocoenoses, *M. subterraneus* is an exclusively silvicultural species, *C. glareolus* inhabits forest biotopes, and the species *A. sylvaticus*, *A. flavicollis* and *A. agrarius* are widespread and have dominant and eudominant ecological significance. Rodents have a dominant and

eudominant ecological significance (9-27%), with maximum relative densities in the months of May-June and September-October, after the completion of the reproductive process. The most eurytopic species were *A. sylvaticus*, *A. flavicollis* and *A. agrarius* recorded in all studied ecosystems with a frequency of 60-85% and dominant ecological significance. The diversity of biotopes and the abundant trophic base (rodents, rabbits, birds) create favorable conditions for the existence and prosperity of 6 species of carnivorous mammals. Among these, *F. silvestris*, is included in the Red Book of the Republic of Moldova. In the 90s of the 20th century, the ungulate fauna was represented by *Capreolus capreolus* and *Sus scrofa*, which mainly populated the forest ecosystem, but regularly frequented the adjacent sectors in search of food, especially in the second half of the year. The field ecotype of the deer was reported quite frequently near the liziera. In the last 20 years, due to the increase in the intensity of the anthropogenic factor and aridification, these species have not been observed. For the species of small rodents in the year of the growth phase at the beginning of October, a capture coefficient was recorded that varied from 10% in the forest to 15% in the forest-agrocenosis ecotone and 18% in the corn field. At the edge of the clearing, the dominant nutrient species is *A. agrarius* (55%), and at the ecotone - *A. sylvaticus* (70%). In agricultural lands, the most common of all species is *M. spicilegus* - with a dominance of 40%, followed by *A. sylvaticus* (35%), *M. arvalis* (10%) and *A. uralensis* with 15%. In recent years, in microtine populations, due to intrapopulation factors, but also to strong aridification, a relatively low density has been established on uncultivated land, but also on some small plots of perennial grasses. In the autumn period, a density of *M. arvalis* colonies of 40-50 colonies per hectare was recorded on the alfalfa fields. If in April the Simpson index constituted respectively meadow - 0.278, ecotone - 0.552 and forest 0.322, in October, there was an increase in this index, the diversity being respectively 0.472; 0.604 and 0.409. At the edge, the species *A. agrarius* dominates (42.1%), and *C. glareolus* is in second place (21%). They are followed simultaneously by the species *A. flavicollis* and *A. sylvaticus* (10.5%). *A. uralensis* was recorded in a smaller number (5.2%). In the forest, the greatest dominance is also shown by *A. agrarius* (48%), followed by *C. glareolus* (25%). These

species exceed the species *A. flavicollis* (10.7%). In the ecotone – forest-wheat – *M. arvalis* dominates with 35%. The dominant species is *M. arvalis* in the year of the growth phase in the meadow (44%), also followed by the species *A. agrarius* (21%). Carrying out an analysis of the rodent diversity indices in the natural and anthropogenic biotopes, the greatest diversity was established according to the Menhinic index at the edge (1.62), followed by the palustrine biotope (1.57). In the studied territory under current conditions, an unstable balance between environmental resources and the diversity and structure of small mammal communities was registered. For the protection of animals, it is necessary to preserve the areas with thickets of shrubs, deciduous trees and the grassy carpet of clearings and meadows. The studied area is strongly affected by the anthropogenic factor.

Key words: diversity, anthropogenic impact, rare species, adaptation, dominance, ecotone.

Acknowledgments: This study was supported by the research project State Program 20.80009.7007.02. "Evolutionary changes of the economically important terrestrial fauna, of rare and protected species under the conditions of anthropogenic and climatic changes", funded by National Research and Development Agency.

THE ORNITHOFAUNA OF THE BANKS OF THE TIMIȘ RIVER IN THE VICINITY OF MACEDONIA FOREST, TIMIȘ COUNTY

Theodora CHIRILĂ¹, Milca PETROVICI^{1*}

¹ West University of Timișoara, Department of Biology-Chemistry, Faculty of Chemistry, Biology, Geography, 16 Pestalozzi Street, 300315, Timișoara, Romania

* corresponding author: milca.petrovici@e-uvt.ro

The following study concerns the ornithological fauna near the village Macedonia (Timiș county) and near the homonymous forest, on the banks of the Timiș River. The area is formed out of a mix of deciduous forest, dams, lakes and pools limitrophe to the main stream of the Timiș River, agricultural fields and grasslands, in a moderate continental climate. The researched area is part of two important Natura 2000 sites: ROSCI0109 Lunca Timișului and ROSPA0095 Pădurea Macedonia.

During the study (August 2022 – October 2023), a number of 66 species have been observed. We have used the simple line transect method (17 km) and simple point count method (45°31'04"N 21°01'16"E, 45°30'43"N 21°01'33"E, 45°29'29"N 21°02'04"E, 45°29'18"N 21°01'08"E, 45°29'16"N 21°00'52"E).

The Ardeidae colony in the Macedonia Forest is a mixed colony of a minimum of 350 nests, of three species: *Ardea cinerea*, *Egretta garzetta* și *Nycticorax nycticorax*.

The importance of the studied area is particularly high from the migration point of view, during the autumn passage (*Platalea leucorodia*, *Ciconia nigra*, *Vanelus vanelus*, *Falco cherrug*, *Anthus trivialis*), and the spring passage (*Anas penelope*, *Platalea leucorodia*, *Cygnus olor*, *Vanelus vanelus* și *Grus grus* – max. 200 individuals).

Keywords: ornitofauna, Timiș River, Macedonia Forest

ANTHROPIC ADAPTATION INDEX OF RODENT SPECIES FROM CHISINAU CITY, REPUBLIC OF MOLDOVA

Natalia CARAMAN¹, Veaceslav SÎTNIC¹, Victoria NISTREANU¹

¹ Institute of Zoology, Moldova State University

* corresponding author: cnatusea@yahoo.com

Rodents represent an important component of urban ecosystems, because they are an indicator of the state of urban cenosis. In large cities, various types of biotopes with varying degrees of anthropization are recorded, including natural and swampy ones. The forms of human use of city territories determine the specificity of urbanized biotopes and, to a large extent, the structure of rodent populations. These ecosystems are still insufficiently studied.

The aim of the work was to elucidate the anthropic adaptation index of rodents, which inhabit different biotopes of the urban environment. During the conducted research, 10 species of rodents were identified. The anthropic adaptation index of rodent species was determined. The highest index was registered in the synanthropic species *Mus musculus* (22.2) and *Rattus norvegicus* (15.4). They are followed by the hemisynanthropic species *Apodemus agrarius* (20.2), *Microtus sp.* (16.7), *A. uralensis* (12.5), *Arvicola terrestris* (11.8), *Clethrionomys glareolus* (11.1), *A. sylvaticus* (10.5), *M. spicilegus* (9.3), *A. flavicollis* (9.0).

It was determined that the index of anthropogenic adaptation for the forest-wheat ecotone (50%) exceeds the one calculated for the meadow (38.8%), which indicates a greater adaptation in the ecotone area.

The anthropic adaptation of the rodent communities will be the greater, the more species are from the group of synanthropic and hemisynanthropic species, with higher indices of anthropogenic adaptation.

The study was performed within the fundamental project 20.80009.7007.02.

DIVERSITY OF CHIROPTERA COMMUNITIES IN MOLOVATA NOUĂ MINES (NEW RESEARCH SITE)

Vladislav CALDARI¹, Victoria NISTREANU¹, Alina LARION¹, Natalia DIBOLSCAIA¹

¹ Institut of Zoology, Moldova State University, Chisinau, Republic of Moldova

* corresponding author: vlad.caldari@mail.ru

The abandoned mines of Molovata Noua are located in the central area of the Republic of Moldova (47°19'53" N, 29°05'91" E). It represents an underground shelter for chiroptera during the active period, as well as during the hibernation period. It is an area little influenced by human activity, far from towns, being surrounded by forest strips with thickets. Research took place in early September 2020, June 2021 and October 2021. The first bats were identified 20m from the entrance. The depth of the mine exceeds 1km, bats have been identified up to 600m from the entrance.

In September 2020, 396 individuals of 9 bat species were identified: *M. daubentonii* 43.94%, followed by *E. serotinus* 25.25%, *M. mystacinus* 23.29%, *M. myotis* 3.03%, *P. austriacus* and *M. dasycneme* each 1.26%, *P. auritus* 0.76%, *M. blythii* and *Rh. hipposideros* each 0.25%. We mention a great diversity of chiroptera with a relatively large number. The species of the genus *Myotis* were the most numerous, more than 70% of the total number of bats identified. A rare species *M. myotis* has been identified that has not been found since the 80s of the last century.

In June 2021, 60 individuals of 6 bat species were identified: *M. daubentonii* 76.67% followed by *M. mystacinus* 8.33%, *E. serotinus* 6.67%, *P. auritus* 5%, *M. dasycneme* 1.67% and *P. austriacus* 1.67%. It observes a relatively high diversity with a small numerical effect compared to September 2020.

In October 2021, 240 individuals from 6 chiropteran species were identified: *M. daubentonii* 66.67% followed by *M. myotis* 16.67%, *E. serotinus* 14.17%, *Rh. hipposideros* 1.67%, *M. dasycneme* 0.42% and *M. dasycneme* 0.42%. The diversity is similar to that of June, but the population is larger. In all periods the species of the genus *Myotis* predominate, in total 696 bats from 9 species were identified. We see

the greatest abundance and diversity in the fall when bats create mating and hibernation colonies. We mention a relatively negative dynamic of the year 2021 compared to 2020. The Molovata Nouă mine is a very important new research site for chiroptera hibernation, which harbors very rare species that have not been identified in other mines in the country.

Keywords: bats, mines, species, diversity.

RESULT-BASED PAYMENT SCHEMES FOR BIODIVERSITY PROTECTION. LESSONS LEARNED, PERCEIVED BENEFITS AND OBSTACLES IN ROMANIA

Cerasela TEODORESCU¹

¹ 'Ștefan cel Mare' University of Suceava

* corresponding author: acatincai.cerasela21@gmail.com

Result-based payments are so-called agri-environment schemes in which farmers and land managers are paid for allowing or enhancing the presence of bird, butterfly, or flower species of particular biodiversity importance on their land, with the farmer receiving a payment corresponding to the result desired by the environmental authority. In Romania, ADEPT Foundation implemented a pilot scheme of result-based biodiversity payments to reward practical land management.

The semi-structured questionnaires were conducted in the Pogany-Havas region and in the Târnava-Mare region in 2022-2023. At the same time, in 2021, the questionnaire was applied to Vicovul de Jos farmers who received agri-environmental payments based on actions from the Agency for Payments and Interventions for Agriculture (APIA). Farmers were asked questions capturing information on i) socio-demographic characteristics (year of birth, gender, last school graduated); ii) agricultural land, machinery, and costs; iii) views on PBR; iv) previous participation in agri-environment schemes; v) satisfaction with the pilot agri-environment scheme and vi) role of agri-environment schemes in biodiversity conservation.

Following analysis of European and national result-based payment contracts, the common objective was to protect biodiversity. Romanian farmers mentioned that unclean pastures lead to biodiversity loss. They consider that this type of scheme requires less effort, time, and cost of production, but the income is lower than the traditional schemes.

As a result, an important performance indicator of this scheme is the freedom of decision of the owner on the measures to be applied to achieve the desired result. Implementing payments for ecosystem services and biodiversity on a large scale requires overcoming two

main obstacles: lack of indicator species and opposition from the authorities. The basic condition for the implementation of result-based payment schemes is that the legislative system allows for the voluntary commitment of owners to conservation objectives.

Keywords: result-based payments, agri-environment, biodiversity, farmers.

BIOLOGY AND ECOLOGY OF *SPERMOPHILUS CITELLUS* L. 1766 (MAMMALIA: RODENTIA) IN LUNCA MUREȘULUI NATURE PARK

Andrada MARTIN¹, Milca PETROVICI^{1*}

¹ West University of Timișoara, Department of Biology-Chemistry, Faculty of Chemistry, Biology, Geography, 16 Pestalozzi Street, 300315, Timișoara, Romania

* corresponding author: milca.petrovici@e-uvt.ro

Spermophilus citellus (European ground squirrel) is an endemic species in Europe and is considered endangered according to the IUCN Red List. In Romania, it has a protected status.

The study was done in Lunca Mureșului Natural Park (LMNP) which is also Natura 2000 site (ROSCI0108 Lunca Muresului Inferior).

In order to determine the anthropogenic impact on the species and to assess the population size within the LMNP, transects were carried out in four areas occupied by the target species and Distance 7.5 software was used.

It was observed that the main anthropogenic impacts are grazing, agriculture, tourism, and habitat fragmentation.

A total area of 35 ha was surveyed and an average density of 33 individuals/hectare was obtained from the total analysis. A comparison with other surveys carried out in the LMNP in 2012 and 2016 showed a decrease in the European ground squirrel population over the last 10 years. Compared to other studies carried out in Romania on European ground squirrel population density, LMNP shows stable populations with higher or similar densities to other colonies in Romania.

Comparing the data from this study with data obtained in various studies from other European countries, it was observed that in LMNP the European ground squirrel population densities are higher than the average densities in the identified studies.

Keywords: *Spermophilus citellus*, PNLM, density, population size, anthropogenic impact

SPATIAL DISTRIBUTION AND PREY PREFERENCES OF THE WHITE-TAILED SEA EAGLE (*HALIAEETUS ALBICILLA* L.) IN THE DANUBE DELTA BIOSPHERE RESERVE AND SURROUNDINGS (ROMANIA)

Vasile ALEXE^{1*}, Lucian-Eugen BOLBOACĂ¹, Mihai MARINOV¹,
Alexandru-Cătălin DOROȘENCU¹, Attila D. SÂNDOR², Botond J.
KISS¹, Dumitru MURARIU³

¹ Danube Delta National Institute for Research and Development, 165 Băbadag Street, 820112 Tulcea, Romania

² 'Babeș-Bolyai' University of Cluj-Napoca, Department of Taxonomy and Ecology, 5-7 Clinicilor Street, 400006 Cluj-Napoca, Romania

³ Institute of Biology of the Romanian Academy, Department of Ecology, Taxonomy and Environmental Protection, 060031 București, România

* corresponding author: vasile.alexe@ddni.ro

Recent 15-year field investigations reveal a notable growth in the White-tailed Sea Eagle population in Romania's Danube Delta Biosphere Reserve and surrounding areas. The number of occupied nests has consistently increased, reaching 80 in 2023, with additional eight breeding pairs observed during the reproductive season, but whose nests could not be located.

Detailed analysis of prey remnants collected from nest vicinity sheds light on the eagle's dietary preferences. Out of 186 identified prey animals, fish dominates at 57% (n = 106), followed by birds at 36% (n = 67), and mammals at 7% (n = 12). Beyond numerical findings, this study significantly contributes to understanding the ecological dynamics of the White-tailed Sea Eagle in the Danube Delta region. Insights into spatial distribution and prey preferences enrich our comprehension of the species-environment relationship, with implications for conservation strategies in the Biosphere Reserve.

In conclusion, continuous monitoring and research are crucial for safeguarding the White-tailed Sea Eagle population. By unraveling spatial and dietary nuances, we can formulate targeted conservation measures, ensuring the sustained coexistence of this iconic species in the unique habitat of the Danube Delta Biosphere Reserve.

Keywords: White-tailed Sea Eagle, nest, food, Danube Delta Biosphere Reserve.

CHEMICAL COMPOSITION OF VOLATILE OILS IN *LAVANDULA ANGUSTIFOLIA* MILL CV. 'PROVENCE BLUE'

Gabriela – Alina ȘTEFAN^{1*}, Anca MIRON², Ana Clara
APROTOSOAI², Lăcrămioara IVĂNESCU³, Maria-Magdalena
ZAMFIRACHE³, Lucian – Dragoș GORGAN³

¹ „Ștefan cel Mare” University of Suceava, Faculty of Medicine and Biological Sciences, Suceava, Romania

² University of Medicine and Pharmacy “Grigore T. Popa” Iasi, Department of Pharmacognosy, Faculty of Pharmacy, Iași, Romania

³ „Alexandru Ioan Cuza” University of Iași, Faculty of Biology, Iași, Romania

* corresponding author: gabriela.stefan@usm.ro

Lavandula species are economically important plants grown for their essential oils, which have numerous medicinal benefits due to the biological activity of particular oil constituents.

The purpose of this study was to analyze the chemical composition of essential oil of *Lavandula angustifolia* Mill cv. 'Provence Blue'. The experiment was carried out in a protected (greenhouse) and unprotected (field) space. To achieve the objectives proposed in this experiment, plants of the species *Lavandula angustifolia* Mill cv. 'Provence Blue' were used, with four experimental variants, respectively: watered with H₂O (v1); watered with standard Hoagland nutrient solution (v2); watered with Hoagland nutrient solution containing a double amount of K (v3) and watered with Hoagland nutrient solution containing a double amount of P (v4). The plant material was collected, in the flowering period, in June 2019. The essential oil was extracted by hydrodistillation according to European Pharmacopoeia standards. The separation and the identification of the components have been carried out using GC-MS (gas chromatography coupled with mass spectrometry).

After analyzing the chemical composition of the volatile oil, over 70 distinct organic compounds were identified in the 'Provence Blue' variety, including, in high concentrations, linalool, linalyl acetate, borneol, terpinen-4-ol, lavandulyl acetate and α - terpineol.

Keywords: *Lavandula*, essential oil, GC-MS

STUDY ON THE TROPHIC NICHE OF ONE BARN OWL *TYTO ALBA* S. 1769 (AVES: STRIGIFORMES) FROM THE COUNTY ARAD

Teodora-Roxana ZĂNOAGĂ¹, Milca PETROVICI^{2*}

¹ 'Babeş-Bolyai' University of Cluj-Napoca, Faculty of Biology and Geology, 44 Republicii Street, 400015, Cluj-Napoca, Romania

² West University of Timișoara, Department of Biology-Chemistry, Faculty of Chemistry, Biology, Geography, 16 Pestalozzi Street, 300315, Timișoara, Romania

* corresponding author: milca.petrovici@e-uvt.ro

Analyzing owl pellets is a common, easy, and inexpensive way to study diet and feeding behavior. It can also be a way to learn about the community of preys.

The purpose of the present research was to determine the trophic niche of the barn owl, one of the most common species of Strigiformes worldwide. 169 pellets were collected, dissected and analysed from the territory of the Peregu Mare commune over several seasons from 29.08.2022 to 26.02.2023. The analysis of pellets showed a diversified diet, with a number of 12 species: *Microtus arvalis*, *Apodemus agrarius*, *Apodemus flavicollis*, *Apodemus sylvaticus*, *Micromys minutus*, *Mus musculus*, *Mus spicilegus*, *Rattus norvegicus*, *Crocidura leucodon*, *Crocidura suaveolens*, *Sorex minutus* and *Passer montanus*. In total, a number of 765 prey items were identified. Of the total prey belonging to the class Mammalia, the Cricetidae family dominates with a percentage of 51.05%, the other half of the percentage of prey is divided into Muridae 25.20%, Soricidae 23.75% and Passeridae 0,39%. The Levins index was 3,34, and the standardized Levins index 0,21.

The dominance of mammal species (11 species) is observed at the expense of bird species (1 species), thus the prey species of this owl once again underlines the importance of the *Tyto alba* species in the control of small mammals populations that could cause agricultural damage.

Keywords: *Tyto alba*, pellet analysis, trophic niche

BEETLES IDENTIFICATION FROM THE FAUNA OF THE REPUBLIC OF MOLDOVA USING DNA BARCODES

Sorina ISTRATI*, Natalia MUNTEANU-MOLOTIEVSKIY,
Anna MOLDOVAN

Moldova State University, Institute of Zoology
*corresponding author: istratisorina98@gmail.com

Identifying insects is a time-consuming and sometimes difficult process, often requiring trained specialists with deep knowledge of taxonomy. Along with globalization and international trade, many insects are changing their distribution area, thus requiring tools for their rapid identification. The difficulties that have arisen guided researchers to use molecular techniques, like DNA barcoding, to speed up the traditional routine allowing experts and non-experts to quickly identify species, including immature stages, small or damaged specimens, cryptic species, etc. Coleoptera is one of the most numerous groups of insects, and their rapid identification is necessary, especially in the areas with insufficient experts. Thus, the study aimed to test the efficacy of the DNA barcoding technique in the identification of beetle species. DNA barcode region was amplified using primer pairs LepF1/LepR1 and LCO1490/HCO2198. Sequence editing, alignment and phylogeny tests were done using Mega X software. Obtained sequences were aligned with similar sequences from the GenBank® and BOLDSystems databases. As a result, 88.8% of the specimens were identified at the species level, and the other 11.1% of samples were determined to the genus level. Mainly, Helophoridae, Scirtidae, Cantharidae, Melyridae, Phalacridae, Nitidulidae, and Coccinellidae families were identified. DNA barcoding is a promising tool in species identification, although efforts should be made to provide users with comprehensive databases of reference sequences.

Keywords: Coleoptera, DNA barcode, species identification, Republic of Moldova.

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EXPLORING THE ACOUSTIC HERITAGE OF THE CARPATHIANS - A CASE STUDY FROM RETEZAT NATIONAL PARK

Florina STĂNESCU^{1, 2, 3}, Ana-Maria DRĂGAN^{1, 4},
Dan COGĂLNICEANU^{1, 4, *}

¹ Faculty of Natural and Agricultural Sciences, Ovidius University, Constanta, Romania

² Black Sea Institute for Development and Security Studies, Ovidius University, Constanta, Romania

³ Center for Research and Development of the Morphological and Genetic Studies of Malignant Pathology, Ovidius University, Constanta, Romania

⁴ Asociatia Chelonia Romania, Bucharest, Romania

*corresponding author: dan_cogalniceanu@yahoo.com

The advancement of innovative monitoring techniques has led to increased availability of tools for the passive collection of field data, effectively mitigating issues associated with the observer effect. Passive acoustic monitoring (PAM) stands out as an increasingly cost-effective means of gathering acoustic data from various environments over extended durations. We employed PAM to investigate the acoustic characteristics of distinct habitat types, such as deciduous and coniferous forests, dwarf pine and rocky terrain, across an altitude range from 963 to 2089 m within Gemenele Scientific Reserve, Retezat National Park, Romania. We collected 1-min recordings from June 25th to September 1st, 2022, using Audiomoth v. 1.2. autonomous sound recorders. The recordings were first visually explored using Raven Pro v. 1.5. and then analyzed using RStudio, using the following packages: “seewave”, “soundecology”, “tuneR”, “ineq” and “rgl”. We used acoustic indices to characterize and compare the complexity, richness, diversity, and disturbance levels of the soundscape in the four habitat types. We found that soundscapes were significantly shaped by altitude and habitat type. Acoustic complexity, richness and diversity decreased with higher altitude. Coniferous forests and the rocky habitats exhibited the least complex soundscapes. High-altitude habitats (those above 2000 m a.s.l.) were notably affected by low-frequency noise, attributed to air traffic and wind. Distinguishing between disturbances of anthropogenic and natural origins remains a challenge that cannot be automated at

present. The acoustic complexity and bioacoustic indices showed the strongest correlation with the number of vocalizing species. Hence, we show that PAM and acoustic indices can be used as a robust method in biodiversity monitoring in mountain ecosystems. In addition, we highly recommend that conservation managers should also consider (sources of) noise pollution when designing protected areas and/or conservation measures.

Keywords: soundscape, mountain, protected area, passive acoustic monitoring

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BUTTERFLY FAUNA (INSECTA: LEPIDOPTERA) FROM SOUTHEASTERN AREA OF APUSENI NATURE PARK

Maria-Claudia COVACIU^{1*}, Milca PETROVICI²

¹ “Alexandru Ioan Cuza” University of Iași, Department of Biology, Faculty of Biology, B-dul Carol I no. 11, 700506, Iași, Romania

² West University of Timișoara, Department of Biology-Chemistry, Faculty of Chemistry, Biology, Geography, 16 Pestalozzi Street, 300315, Timișoara, Romania

* corresponding author: covaciu.claudia.maria@gmail.com

The study aimed to inventory the fauna of Lepidoptera and their distribution in the Apuseni Nature Park. The research study of butterfly species in the southeastern area of the Apuseni Nature Park was realized over two years (2021 and 2022). A number of 56 species of Lepidoptera were recorded in the investigated area. The following species protected by European and / or National Legislation were identified: *Parnassius mnemosyne*, *Neptis sappho*, *Euphydryas maturna* and *Euplagia quadripunctaria*. Threats to some populations of butterflies were reported, predominantly the loss of preferential habitats. Several measures have been proposed for the conservation of the Lepidoptera species including maintaining preferential habitats, mowing meadows at the right time and moderate grazing of animals.

Keywords: Lepidoptera, biodiversity, conservation, Apuseni Nature Park

REED BEDS CONVERSION TO FLOODPLAIN PASTURES A CHALLENGE FOR BIODIVERSITY CONSERVATION

Mihai DOROFTEI¹, Silviu COVALIOV^{1,2,*}, Simona Dumitrița CHIRILĂ¹,
Marian MIERLĂ¹, Cristian TRIFANOV¹, Matei SIMIONOV¹, Adrian
BURADA¹, Katarina TOŠIĆ³, Gabriel LUPU¹, Liliana ENE¹, Marius
FĂGĂRAȘ²

¹ Danube Delta National Institute for Research & Development Tulcea, Romania

² "Ovidius" University of Constanța, Faculty of Natural and Agricultural Science,
Department of Biology

³ University of Belgrade, Faculty of Biology, Serbia

*corresponding author: silviu.covaliov@ddni.ro

This study analyzed the vegetation succession and species composition of the 2002 and 2022 periods to determine the changes in marsh edges dominated by *Phragmites australis*. Throughout the years, the compact reed areas are dominant and tend to be stable if well managed, with just a few accompanying species. Still, at the edge of the habitat, changes occur in time. We investigated the Danube delta's wetlands in seven designated areas (10 x 10 km). Reed rhizomes and soil samples were collected from 22 plots to analyze the heavy metal accumulation in different plant communities with *Phragmites australis*. Communities' similarity, plant composition, structure, species richness, and succession of nine vegetation types were analyzed in surveyed areas. In six plots, the changes from marsh habitats (*Scirpo-Phragmitetum* W. Koch 1926) to floodplain pastures (*As. Cyperetum flavescens* W. Koch ex Aichinger 1933; *As. Dichostylido micheliana-Gnaphalietum uliginosae* Timár 1947; *As. Pulicario vulgaris-Menthetum pulegii* Slavnić 1951; *As. Limosello-Eleocharitetum acicularis* Wendelberg-Zelinka 1952) are noticeable: mixed sedges with reeds (MSR) to tall mixed reeds with sedges and gray willows (MRSG) in plot 41, MRSG to tall mixed reeds with sedges and white willows (MRSW) in plot 48, reeds on gleyic soil (R-gley) to tall mixed reeds with white willows on the gleyic substrate (MRW-gley); in plot 53, reeds on peaty gleyic soil (R-pgley) to tall mixed reeds with

gray willows on peaty gleyic soil (MRG-pgley) in plot 51, compact reedbeds (CRB) to fragmented reedbeds with gray willows (FRBG) and in fragmented reedbeds (FRB) to FRBG in plot 58. With these changes, *Phragmites australis* coverage decreases in stem density but grows in height and diameter due to the die-back process. These successions, which occurred over 20 years at the marsh edges, show the tendencies of reed stands in the Danube Delta Biosphere Reserve. Maintaining large areas with reeds and their high filtering capacity is vital for wetland ecosystems. However, the floodplain pastures have a higher species diversity. Both species richness and the Shannon–Wiener index had similar tendencies: decreased in reed stands and then increased within floodplain pastures. Both reed communities and floodplain pastures are vulnerable to invasive species, drought, and grazing along the channels in favor of hydrotechnical works.

Keywords: vegetation succession; floodplain pastures; Danube delta; heavy metals accumulation; species diversity

STUDY OF THE ANALYSIS OF THE FLORISTIC COMPOSITION OF THE GRASSLANDS IN THE DANUBE DELTA AND THE IMPACT OF ENVIRONMENTAL FACTORS

Silviu COVALIOV^{1,2}, Simona Dumitrița CHIRILĂ^{1,*}, Mihai DOROFTEI¹,
Marian MIERLĂ¹, Marius FĂGĂRAȘ²

¹ Danube Delta National Institute for Research and Development, Babadag street no. 165, 820112 Tulcea, Romania

² Faculty of Natural and Agricultural Sciences, Ovidius University of Constanța, 1B Aleea Universității, 900470 Constanța, Romania

*corresponding author: simonachirilasc@yahoo.com

The Danube Delta Biosphere Reserve (RBDD) is a unique and ecologically important region located at the end of the Danube River in Romania and Ukraine. It is known for its exceptional biodiversity (over 11,000 species), comprising numerous plant and animal species and diverse habitats such as wetlands, lakes, canals, forests, dunes, and marshes. The study aimed to determine the floristic composition and identify the environmental factors that influence the variation of the floristic composition from the Danube Delta Biosphere Reserve. Ecological variables include soil characteristics, water availability, salinity levels, nutrient content, temperature, and hydrologic patterns. For the syntaxonomic attribution of the vegetation, 12 relevés were analyzed, with an area of 100 m². Plant associations were identified using hierarchical agglomerative clustering methods (β -flexible algorithm, $\beta = -0.25$ and Bray-Curtis dissimilarity). The output dendrogram was cut into nine partitions with ten clusters. The optimal number of clusters was chosen based on the corrected Rand index and the mean Silhouette index. The diagnostic species for each cluster were identified based on their indicator value (IndVal). Vegetation-environment relationships were investigated with Principal component analysis (PCA) and Redundancy Analysis (RDA). The variance inflation factors (VIF) were used to check the multicollinearity of the variables under study (environmental variables and floristic composition). Only variables with a value >5 were taken into account.

The results showed that plant communities in the study areas grow in R1 Dry grasslands and R3 Seasonally wet and wet grasslands. RDA analysis showed that plant communities were ordered along the rainfall gradient, from *Trifolio fragiferi-Cynodontetum* communities occurring at low precipitation and neutral pH to *Rumici crispi-Agrostietum stoloniferae* communities occurring at high precipitation. In conclusion, the expansion of human activities, especially the raising of grazing animals, has exerted significant pressure on the vegetation in the investigated areas. These situations with temperature rising values led to the change of vegetation. Currently, the Danube Delta – which consists mainly of marsh areas, tends to develop meadows and mesic pastures and less wet grasslands that could have been used for agriculture, particularly as hay meadows, where grasses are grown and harvested as feed for livestock.

Keywords: Danube Delta; floristic composition; diversity index; plant associations; RDA; PCA.

THE PHYTOSOCIOLOGICAL STUDY OF LILAC MANNA ASH THICKETS OF SEMENIC-CARAŞ GORGE NATIONAL PARK

Rareş-Ciprian ROMÂNU¹, Adrian SINITEAN^{1*}

¹ Department of Biology-Chemistry, Faculty of Chemistry, Biology, Geography, West University of Timișoara, Romania

*corresponding author: adrian.sinitean@e-uvv.ro

The aim of the study was the analysis of the 40A0* habitat, in which lilac manna ash thickets are found. The study area chosen for the study is Semenic-Caraş Gorge National Park, more exactly, the sunny slopes of Caraş and Gârlişte Gorges. The edifying species forming the researched associations are smoke trees (*Cotinus coggygria* Scop.), common lilac trees (*Syringa vulgaris* L.), manna ash trees (*Fraxinus ornus* L.) and oriental hornbeam trees (*Carpinus orientalis* Mill.) The two methods that were used in the study were as follows: the microclimatic method which involves the collecting of data about abiotic indices inside the habitat and the field study of plant associations in the form of relevés. The relevés were conducted between May and June 2023. A floristic list of every vascular plant species found in these associations was made, in which the plants were taxonomically classified and analyzed on different categories such as bioforms, geoelements, humidity and temperature scales.

The results are as expected. There is an impressive abundance of edifying species characteristic to the study, although the oriental hornbeam trees (*Carpinus orientalis* Mill.) are found rather sporadically in some areas. Humidity is low due to gusts of wind that are found throughout the gorge's valley. The area is confirmed to be mostly semi-arid by the humidity and temperature scales. Plant species geoelements like mediterranean and sub-mediterranean are found in the area. Considering the results mentioned above, the study confirmed the existence of habitat 40A0* in which lilac manna ash thickets are found and all its characteristics.

Keywords: thickets, plant association, microclimate, relevés, Semenic-Caraş Gorge National Park

THE COMPARATIVE ANALYSIS OF BEECH FORESTS FROM THE DOMOGLED-VALEA CERNEI AND SEMENIC CHEILE CARAȘULUI NATIONAL PARKS

Vlad IORDĂNESCU¹, Adrian SINITEAN^{1*}

¹ Department of Biology-Chemistry, Faculty of Chemistry, Biology, Geography, West University of Timișoara, Romania

*corresponding author: adrian.sinitean@e-uvt.ro

The present study aims to analyse different plant associations within the Domogled-Valea Cernei and Semenic Cheile Carașului National Parks in which beech (*Fagus sylvatica*) is the dominant species. The forests in the study area are recognized as being part of a network of habitats with a high degree of conservation importance or being part of a UNESCO site such as the virgin beech forest of Izvoarele Nerei.

This work examined the beech forests from a qualitative point of view: it was based on the field identification of several habitats present in the literature referring to the area of interest. It is worth mentioning that quantitative studies were also carried out, such as several phytosociological surveys or the measurement of several abiotic parameters that we considered relevant in the distribution of vegetation. All the data collected were analysed and compared in order to finally create an overall picture of the variety of habitats of which beech is present, indirectly reflecting the need to protect the species within and nature in general.

The study showed that the conservation level of the forests is relatively good and the number of species identified within the study area was considerable and the taxa were varied.

Keywords: thickets, plant association, microclimate, relevés, Semenic-Caraș Gorge National Park

ASPECTS REGARDING VEGETATION DYNAMICS ON THE NEWLY EXTENDED BEACHES OF THE CITY OF CONSTANTA – REYNA BEACH CASE STUDY

Marius FĂGĂRAȘ¹, Daniela MĂCEȘEANU²

¹ Ovidius University of Constanta, Romania

² Doctoral School of Applied Sciences (Biology), Ovidius University of Constanta, Romania

*corresponding author: marius.fagaras@univ-ovidius.ro

During 2015-2016, the beaches of the city of Constanta have been subjected to extension works within the project "Protection and rehabilitation of the southern part of the Romanian coast of the Black Sea in the area of Constanta and Eforie Nord", financed by European funds. Reyna Beach (formerly Tataia Beach) is one of the beaches in the Faleză Nord Constanta which was rehabilitated within the mentioned project, currently reaching a considerable width, between 140 and 180 m. Practically, before the start of the works, there was only a small stretch of beach in the northern area of the bay, next to the Reyna restaurant, which explain the name of the beach. In the rest of the bay, the beach was missing, the shore area being reinforced with a cordon of stone and gravel (in the mid-littoral area) and one of large stone blocks (at the base of the cliff), for to limit the erosion and to ensure cliff stability near inhabited areas. Vegetation began to develop on the new sandy substrate first at the edge of the beach, towards the cliff, in the spring of 2017, with the appearance of pioneer species that ensured the colonization stage, mainly *Xanthium orientale* subsp. *italicum*, *Cynodon dactylon*, *Argusia sibirica* and *Salsola kali* subsp. *ruthenica*. The evolution of psammophilous vegetation continued in the following years by the expansion of vegetation on increasingly larger areas, by the progressive increase of the number of species and the populations size of psammophilous plants, both annual and perennial, especially on the sand dunes formed at the base of the cliff and around the stabilopods (where beach

administrators did not applied leveling works of beach and removal of vegetation). In the last 3 years, the multi-annual dynamics of the vegetation on Reyna beach has intensified, both on the sand dunes and near them, with the formation of phytocoenoses similar morphologically and floristically to those on the old sandy beaches from the Romanian coastal area. The comparative observations made upon the phytocoenoses on Reyna beach and in the coastal area of the Danube Delta Biosphere Reserve, revealed that on Reyna beach the process of vegetation dynamics is very intense, with progressive increases from one year to the next, of the number, of the abundance and of species coverage, with establishing of some dominant species, what it indicates a beginning of vegetation stabilization, at least on the sand dunes.

The observations made on the dynamics of the vegetation on Reyna beach can provide valuable information regarding the stages of occupation of the newly formed sandy lands by vegetation, on the time required to establish a stable vegetation on the sandy beaches and how the anthropogenic impact influences this process.

Keywords: vegetation, dynamics, evolution, Reyna beach, Constanta city, new sandy beach

ORNITOFAUNA ROSPA0012 BORCEA CHANNEL: SPECIFIC RICHNESS AND THREATS

George-Valentin CUCU^{1*}, Ana-Maria MIHĂLCESCU²

¹ S.C.Topo Miniera S.R.L, Constanța, Romania

² Ovidius University from Constanța, Faculty of Natural Science and Agricultural Science, Constanța, Romania

* corresponding author: georgevalentin778@gmail.com

Created in October 2007, ROSPA0012 Borcea Channel is a natural area implemented by European ecological network Natura 2000, for special protection of 35 species of European interest.

The present paper is based on the monitorization study of ornitofauna during almost two years (March 2020 – October 2022) in ROSPA0012 Borcea Channel and analyzes the threats and pressures that could have a negative impact on bird species.

Using the specific methods for birds monitoring protocols applied out in the field, there were collected data about the presence of species, the number of their appearances, to estimate the populations based on field counts or extrapolation. The conservation status and phenology for identified species of ornitofauna were analyzed using specific methods based on synchronous arrays and the nesting status.

The necessity of this impact study is determined by the lack of scientific work on bird species diversity and possible disturbing factors which can affect them in ROSPA0012 Borcea Channel.

Keywords: ornitofauna, Aves, protected area, Natura 2000, impact, monitorization

REDISCOVERY OF *NEMOBIUS SYLVESTRIS* IN ROMANIA IN AN URBAN GREEN SPACE

Ionuț Ș. IORGU¹, Alexandra F. POPA², Elena I. IORGU^{1*}

¹ “Ștefan cel Mare” University of Suceava, Faculty of Medicine and Biological Sciences, 13 Universității, 720229 Suceava, Romania

² “Grigore Antipa” National Museum of Natural History, 1 Kiseleff, 011341 Bucharest, Romania

* corresponding author: elenaiuliaiorgu@gmail.com

The species *Nemobius sylvestris* (Bosc, 1792) is herein reported for the first time in Bucharest. The first and also the last mention of the species in Romania, dates back from the past century, stating its presence in the forests close to Suceava, in north-eastern Romania, more than 400 km away from the new location. In the autumn of 2022, the wood-cricket was surprisingly found in a park in the northern part of Bucharest. The species was also confirmed molecularly through DNA-barcoding and a median joining network was constructed using available COI sequences from public databases, showing moderate genetic variability within European samples

Keywords: Wood-cricket, new record, Bucharest, park, species rediscovery

LIGNYOPTERA FUMIDARIA (LEPIDOPTERA: GEOMETRIDAE) IN ROMANIA: DISTRIBUTION, CONSERVATION, FUTURE PERSPECTIVES

Cosmin-Ovidiu MANCI^{1,2,*}, Maria-Claudia COVACIU³,
Cristian SITAR^{4,5}, Geanina-Magdalena SITAR^{6,7}

¹ “Grigore Antipa” National Museum of Natural History, 1 Kiseleff, 011341 Bucharest, Romania

² “Oceanic-Club” Oceanographic Research and Marine Environment Protection Society, 41 Decebal, 900674 Constanța, Romania

³ MSc student, Alexandru Ioan Cuza” University of Iași, Department of Biology, Faculty of Biology, B-dul Carol I no. 11, 700506, Iași, Romania

⁴ Babeș-Bolyai University (UBB), Zoological Museum, Cluj-Napoca, Romania, 5-7 Clinicilor, 400006, Cluj-Napoca, Romania

⁵ Emil Racovita Institute of Speleology, Cluj Napoca, Romania, 5-7 Clinicilor, 400006, Cluj-Napoca, Romania

⁶ PhD student, Doctoral School “Education, Reflection, Development”, Faculty of Psychology and Sciences of Education, Babes-Bolyai University, Cluj-Napoca, Romania

⁷ PhD student, Faculty of Animal Sciences and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

* corresponding author: cosminom@gmail.com

Lignyoptera fumidaria is a little-known and rare geometrid species is on wing from October to December. This species occupies a vast range, predominantly within the Eurasian Steppe habitat, spanning from Austria in the west to eastern Russia, Mongolia, and the northern regions of China. Despite its expansive distribution, it is only documented in a handful of isolated areas. In Romania, this species was first discovered in 2014 when a solitary male specimen was found and collected to the south of Iasi. Subsequently, in 2021, over 10 males were observed or collected to the west of Iasi. *Lignyoptera fumidaria*, a geometrid moth, holds the status of a protected species of Community interest. It is included in the Annexes II and IV of Directive 92/43/EEC (known as Habitats Directive). The initial discovery occurred within an area proposed to be a site of Site of Community Importance (SCI), while the subsequent records were documented within ROSCI0256 Valea lui David. The limited

knowledge of the distribution and life cycle of this species can be ascribed to its late autumn behavior. During this period, weather conditions are frequently unfavorable, and most entomologists are typically not active in the field, given that this is when the species is most active. Additionally, the species is not attracted to artificial light sources. Our primary objective is to contribute significantly to the understanding of this species and create a potential distribution map to aid further research.

Keywords: Lignyoptera fumidaria, Geometridae, Natura 2000

MIGRATION OF BIRDS ON THE CHITUC GRIND BETWEEN 30.10.2022 - 06.11.2022

Alexandra OLARU¹, Milca PETROVICI^{1*}

¹ West University of Timișoara, Department of Biology-Chemistry, Faculty of Chemistry, Biology, Geography, Timișoara, Romania

* corresponding author: milca.petrovici@e-uvt.ro

Romania's territory is crossed by the eastern corridor of birds migration from Europe to Africa. The Chituc Grind is a protected area, crossed by the migration wave due to its geographical position.

From 30.10.2022 to 06.11.2022 a total of 475 birds of 28 species were captured/recaptured and ringed in a ringing camp of the Milvus Group - Bird and Nature Protection Association: *Accipiter nisus*, *Acrocephalus schoenobaenus*, *Asio otus*, *Certhia familiaris*, *Chloris chloris*, *Cettia cetti*, *Cyanistes caeruleus*, *Emberiza schoeniclus*, *Erithacus rubecula*, *Fringilla coelebs*, *Locustella luscinioides*, *Panurus biarmicus*, *Parus major*, *Passer montanus*, *Phoenicurus ochruros*, *Phylloscopus collybita*, *Pica pica*, *Prunella modularis*, *Regulus ignicapillus*, *Regulus regulus*, *Remiz pendulinus*, *Spinus spinus*, *Troglodytes troglodytes*, *Turdus iliacus*, *Turdus merula*, *Turdus philomelos*, *Turdus pilaris* and *Turdus viscivorus*.

In full migration, with a daily catch frequency (100%), the following species were in the study period: *Erithacus rubecula*, *Regulus regulus*, *Troglodytes troglodytes*, *Turdus merula* and *Turdus philomelos*.

In terms of percentage numerical abundance for the 8 days of the study, the dominant species was *Troglodytes troglodytes* (19%), followed by *Erithacus rubecula* (15%) and *Turdus philomelos* and *Turdus merula*, each with an abundance of 12%.

Rare species with one individual caught were: *Accipiter nisus*, *Acrocephalus schoenobaenus*, *Asio otus* and *Certhia familiaris*.

Keywords: migration, birds, Chituc Grind, ringing

HABITAT SELECTION IN DOMINANT MOUNTAIN RODENTS

Ana Maria BENEDEK^{1,2*}, Ioan SÎRBU¹

¹ Faculty of Sciences, Lucian Blaga University of Sibiu, Dr. I. Rațiu 5-7, 550012, Sibiu, Romania

² Department of Systems Ecology and Sustainable Development, Doctoral School in Ecology, Faculty of Biology, University of Bucharest, Splaiul Independenței 91-95, 050095, Bucharest, Romania

* corresponding author: ana.benedek@ulbsibiu.ro

Habitat selection may vary in relation to elevation, intra- and interspecific density, with habitat segregation usually considered as a result of past competition, but little is known about these effects combined. Therefore, we aimed to evaluate the differential habitat selection by dominant rodents - *Apodemus flavicollis* (yellow-necked mouse) and *Clethrionomys glareolus* (bank vole) - in relation to intra- and interspecific density and elevation in forests of the Romanian Carpathian Mountains. We hypothesized that 1. habitat selection varies with elevation and 2. population density, 3. habitat segregation facilitates coexistence of the two dominant rodents, 4. the “ghost of competition past” is weaker at high elevations, 5. abundance and intensity of habitat selection by *C. glareolus* are affected by the dominance of *A. flavicollis*, known to be more competitive. As predicted, habitat selection by *C. glareolus* was less intense at high elevations and in odd years, but for *A. flavicollis* results were not significant. The two rodents showed significant opposite responses to most habitat characteristics, invoking past competition. As expected, the dissimilarity between their responses was smaller at high elevations, as a possible result of the recent elevational expansion of *A. flavicollis* favoured by climate warming. Contrary to expectations, the intensity of habitat selection by this species increased with the dominance of *C. glareolus*, showing lower abilities to cope with habitat variability where its competitor was dominant. Our study provides insight into the interactions between *C. glareolus* and *A. flavicollis* in forests along the elevational gradient, suggesting asymmetrical competition and recent elevational expansion of the latter.

Keywords: elevational gradient, intra- and interspecific density, the ghost of competition past, yellow-necked mouse, bank vole.

OVERVIEW ON SYSTEMATIC SAMPLING OF CENTIPEDES IN ROMANIA

Ștefan Cătălin BABA^{1,2*}

¹ Faculty of Biology, University of Bucharest, Bucharest, Romania

² "Emil Racoviță" Institute of Speleology, Bucharest, Romania

* corresponding author: b.stefan@bio.unibuc.ro

Centipedes (Myriapoda: Chilopoda) are important edaphic macroinvertebrates with significant trophic interactions as predators. The centipede communities, as a whole, have been the subject for a series of studies in different areas of the country.

In this overview we attempt to cover all the systematic studies made in Romania using at least one sampling method and comprising a minimum of 3 seasons in one year span on certain areas.

There have been 15 published papers in accordance with these criteria from Matic et al., 1979 to Baba et al., 2023.

Even though it is complicated to establish accurately and compare the composition of centipede communities in various areas when different singular sampling methodologies were used, this allows us to underline several patterns regarding sampling deficiencies and the centipede diversity in Romania.

The most used sampling techniques are efficient for ground surface-dwellers. Consequently, Lithobiomorpha was by far the main order sampled but their dominance in these communities is not accurately reflected. Geophilomorphs, on the other side, are vastly undersampled.

The analyses provide also some distribution patterns in the case of Cryptops species and highlights Lithobius burzenlandicus as the most abundant centipede in the Carpathian Mountains with decreasing populations in adjacent areas.

Keywords: Chilopoda, sampling

PREDATION PRESSURE ON COLOR MORPHS OF A EUROPEAN VIPER IN POLYMORPHIC VS. PURELY MELANISTIC POPULATIONS

Viviana VICOL¹, Petronel SPASENI^{1,2}, Iulian GHERGHEL^{2,3},
Tiberiu SAHLEAN^{2,4}, Ionuț-Cătălin PETREANU¹, Ștefan
ZAMFIRESCU¹, Alexandru STRUGARIU^{2,*}

¹ Faculty of Biology, Alexandru Ioan Cuza University of Iași, Romania

² Department of Exact and Natural Sciences, Institute of Interdisciplinary Research, Alexandru Ioan Cuza University of Iași, Romania

³ Faculty of Natural and Agricultural Sciences, Ovidius University of Constanța, Romania

⁴ Bucharest Institute of Biology, Romanian Academy, Bucharest, Romania

* corresponding author: alex.strugariu@gmail.com

Animal colorations represent adaptations to different biotic or abiotic environmental factors and play crucial roles in predator avoidance (via crypsis, aposematism, or mimicry), inter- and intraspecific communication and sexual selection. In ectothermic animals, coloration may also be important for thermoregulation. Color polymorphism (i.e. the occurrence of two or more phenotypic morphs in the same population) is present along numerous animal lineages, and melanism is probably the most studied type.

Several Eurasian viper species comprise polymorphic populations, where one morph is melanistic and the other is a patterned, generally characterized by a dark dorsal zigzag band, contrasting the general dorsal background. While the zigzag pattern is believed play critical roles in predator avoidance via crypsis, aposematism, and flicker fusion, melanistic vipers exhibit faster heating rates, higher reproductive success and superior post-partum survival rates – as a result of more efficient thermoregulation. On the other hand, melanistic vipers should face higher predation risks, (as they lack the predator-avoidance properties demonstrated for the zigzag morph), as well as increased mortality in periods of low food availability, and a lower tolerance to heat.

Current theory would predict that melanistic vipers should be more frequent in colder environments. Nevertheless, the southernmost lineages of the adder (*Vipera berus*), which occur in warm environments, exhibit a surprisingly high frequencies of melanistic individuals, and even regions with completely melanistic populations (fragmented range from southern Romania to Southern Russia). Here we aimed to explored (i) whether a more relaxed predation pressure on melanistic vipers in these regions might play a role in maintaining high frequencies of melanism, (ii) whether the aposematic function of the zigzag pattern still persists in areas where (adult) vipers are purely melanistic, and/ or (iii) whether the melanistic coloration might have gained aposematic function in areas inhabited only by melanistic vipers.

Keywords: ectotherms, thermogulation, color polymorphism, predators, aposematism, crypsis.

NEW DATA REGARDING THE DISTRIBUTION AND STATUS OF THE HERPETOFAUNA FROM URBAN AND PERI-URBAN HABITATS IN THE CITY OF PITEȘTI, ARGEȘ COUNTY (ROMANIA)

Ionuț-Cătălin PETREANU^{1*}

¹ Faculty of Biology, Alexandru Ioan Cuza University of Iași, Romania

* corresponding author: icpetreanu@yahoo.com

Identifying urban and peri-urban areas inhabited by species of reptiles and amphibians represents the first step in understanding how herpetofauna can adapt to anthropogenic factors. This is particularly true for regions where sampling biases have left significant gaps in our knowledge of fauna distribution, such as Romania. The aim of the study is to show my preliminary observations on the herpetofauna and its use of habitats in the urban and peri-urban environments from the city of Pitești, Argeș County, located in southern Romania. I identified nine species of amphibians (*Salamandra salamandra*, *Lissotriton vulgaris*, *Triturus cristatus*, *Bombina variegata*, *Bufo bufo*, *Bufotes viridis*, *Hyla orientalis*, *Pelophylax ridibundus* and *Rana dalmatina*) and nine species of reptiles (*Emys orbicularis*, *Trachemys scripta*, *Lacerta agilis*, *Lacerta viridis*, *Podarcis muralis*, *Anguis colchica*, *Coronella austriaca*, *Natrix natrix* and *Natrix tessellata*). The most abundant species in urban environments were *Podarcis muralis* and *Bufotes viridis*, with other species naturally present in the same habitats being *Lacerta viridis*, *Hyla orientalis* and *Bufo bufo*. In an artificial urban pond there were present *Emys orbicularis* and *Trachemys scripta* (together with other exotic turtles belonging to other genera) as a result of translocation and releases. When taking into account the peri-urban areas as well, the most abundant species in the study area were *Bombina variegata*, *Rana dalmatina* and *Bufotes viridis*, the first two being limited to the woodland area. The most widespread species were *Hyla orientalis*, *Bufotes viridis*, *Lacerta viridis*, *Podarcis muralis* and *Natrix natrix*. These widespread species were present throughout

all the study area. I have also recorded some species of reptiles with very few observations in the Argeş County: *Natrix tessellata* and *Trachemys scripta*. Finally, I identified anthropogenic factors that negatively impact the herpetofauna, such as habitat loss, direct persecution, road mortality, invasive species and poaching.

Keywords: herpetofauna, urban and peri-urban environments, urbanization, reptiles, amphibians, Argeş.

CENTIPEDE COMMUNITIES FROM ARGEŞ VALLEY

Andreea MÎRLENEANU^{1*}, Cezara TUDOSE¹, Ştefan Cătălin BABA¹

¹ Faculty of Biology, University of Bucharest, Bucharest, Romania

* corresponding author: mirleneanu.andreea22@s.bio.unibuc.ro

In this study we analyse the distribution and diversity of the chilopoda fauna in three different types of habitats and along an altitudinal gradient (192 – 795 m.a.s.l.). For a period of seven months, from May to November 2018, invertebrates were sampled from 18 sites located in the Argeş Valley. The sites are placed in the following habitats: riparian habitat, managed herbaceous groundcover and mixed forests.

The only sampling method used was represented by pitfall traps filled with ethylene glycol as preservative. This method targets mainly soil surfaces dwellers.

We collected a total of 177 specimens, belonging to 14 distinct species. There is one family of Lithobiomorpha and three of Geophilomorpha: Fam. Lithobiidae (*Harpolithobius* sp, *Lithobius agilis*, *L. burzenlandicus*, *L. forficatus*, *L. latro*, *L. lucifugus*, *L. microps*, *L. mutabilis*, *L. muticus*, *L. parietum*). Fam. Mecistocephalidae (*Dicelophillus carniolensis*), Fam Geophilidae (*Clinopodes flavidus*), Fam. Linotaeniidae (*Strigamia acuminata*, *S. transsilvanica*).

From a biogeographical perspective, the dominant chorotype is Central European, followed by the European and South European chorotypes. The dominant species among the Lithobiomorpha is *Lithobius muticus*, meanwhile *Strigamia acuminata* is the most frequently found geophilomorph. We also identified some species considered rare as *Harpolithobius* sp. and *Lithobius agilis*.

This research is the first step for a better understanding of the biodiversity of centipede fauna from the Argeş Valley.

Keywords: Chilopoda, Argeş Valley, biodiversity

EVALUATING THE IMPACTS OF FUTURE CLIMATE CHANGE ON PHENOTYPIC DIVERSITY DISTRIBUTION OF EUROPEAN GRASS SNAKE (*NATRIX NATRIX*) THROUGH SPECIES DISTRIBUTION MODELS

Iulian GHERGHEL^{1,2*}, Raluca MELENCIUC¹, Tiberiu Constantin SAHLEAN³, Alexandru STRUGARIU², Petroni SPASENI⁵, Geanina FĂNARU¹, Stefan Remus ZAMFIRESCU⁴, Ryan Andrew MARTIN⁵, Dan COGĂLNICEANU¹

¹ Faculty of Natural and Agricultural Sciences, Ovidius University, Constanta, Romania

² Department of Exact and Natural Sciences, Institute of Interdisciplinary Research, Alexandru Ioan Cuza University, Iasi, Romania

³ Institute of Biology, Romanian Academy of Sciences, Bucharest, Romania

⁴ Faculty of Biology, Alexandru Ioan Cuza University, Iasi, Romania

⁵ Department of Biology, Case Western Reserve University, Cleveland, Ohio, United States of America

* corresponding author: iuliangherghel@gmail.com

Climate change has emerged as a significant factor inducing range alterations, habitat degradation, and species extinction, with already observable impacts on biodiversity. Particularly, polymorphic species, owing to their diverse morphs, inhabit distinct ecological niches and exhibit varying thermal physiological optimums, thus responding differently to climate alterations. In light of this, understanding how climate change influences the distribution of phenotypic diversity within such species is imperative. In the present study, we harnessed a comprehensive database delineating the distribution of European grass snake (*Natrix natrix*) phenotypes, collated from an array of citizen science data-sharing platforms. This robust dataset enabled the construction of nuanced species distribution models (SDMs) aimed at evaluating the effects of 21st-century climate change on the distribution of phenotypic diversity of *N. natrix*. Our analysis unveiled a discernible northward shift in the species distribution coupled with significant modifications in the predicted phenotype frequencies across the species range. Intriguingly, the impact on different phenotypes was found to be

geographically heterogeneous. For instance, regions conducive for lighter phenotypes are projected to expand, leading to a more frequent occurrence of these phenotypes due to climate change. This observation underscores the evolving nature of habitat suitability for different phenotypes in response to climate change. The integration of phenotypic data into SDMs has proven to be a highly effective approach in dissecting the potential effects of climate change, offering a granular understanding of how populations across diverse regions of the species' range will be affected. Our study accentuates the critical importance of incorporating phenotypic data in climate change research, thereby contributing a novel dimension to the broader discourse on climate change-induced biodiversity shifts.

Keywords: Citizen Science, Climate Change, Phenotypic Diversity, Large-scale phenotype analysis, Niche models

GEOGRAPHIC PHENOTYPE CLUSTERING AND CLIMATIC CORRELATES OF DORSAL PATTERN VARIABILITY IN EUROPEAN GRASS SNAKES

Raluca MELENCIUC¹, Iulian GHERGHEL^{1,2*}, Dan COGĂLNICEANU¹

¹ Faculty of Natural and Agricultural Sciences, Ovidius University, Constanta, Romania

² Department of Exact and Natural Sciences, Institute of Interdisciplinary Research, Alexandru Ioan Cuza University, Iasi, Romania

* corresponding author: iuliangherghel@gmail.com

European grass snakes encompassing *Natrix natrix*, *Natrix helvetica*, and *Natrix astreptophora* are notably polymorphic natricid snake species with a broad distribution across the Western Palearctic, exhibiting substantial variations in dorsal coloration and pattern morphologies. The majority of these snake specimens bear distinctive temporal spots in shades of yellow, orange, white, red, or a lack thereof, located posterior to their heads. Laboratory analyses have identified a connection between the coloration of these spots and the thermal conditions endured during the incubation period of the eggs. The aggregation of phenotype data through citizen science-driven platforms like iNaturalist provides a rich resource for examining the correlation between large-scale phenotype distribution patterns sourced from these platforms and environmental conditions. In this study, we analyzed photos of European grass snake specimens shared on citizen science platforms, covering the full geographic range of the species under consideration to explore the associations between the temporal neck spots, dorsal color, and pattern variations in relation to overarching temperature and precipitation trends. Temperature-centric bioclimatic variables tied to each observation were extracted to establish temperature profiles for every phenotype, corresponding to the coloration of the temporal neck spots and dorsal patterns. Our findings revealed a strong geographic phenotype clustering, mirroring the pattern delineated in laboratory settings, where snakes from warmer climates predominantly exhibited white or

no temporal spots, while those from cooler climates displayed red or orange spots. Furthermore, snakes with darker dorsal coloration were found to be more prevalent in cooler regions, whereas those with lighter hues were common in warmer locales. The study underscores the value of melding data harvested from citizen science platforms with laboratory-based or experimental data for delving into large-scale hypotheses.

Keywords: Bioclimatic variables, Morphological polymorphism, Large-scale phenotype analysis

ASSESSING THE IMPACT OF CLIMATE CHANGE ON PHENOTYPIC DIVERSITY AND DISTRIBUTION OF THE SAND LIZARD (*LACERTA AGILIS*)

Iulian GHERGHEL^{1,2*}, Raluca MELENCIUC¹, Petronel SPASENI³, Sabina VLAD¹, Stefan Remus ZAMFIRESCU³, Alexandru STRUGARIU², Ryan Andrew MARTIN⁵, Dan COGĂLNICEANU¹

¹ Faculty of Natural and Agricultural Sciences, Ovidius University, Constanta, Romania

² Department of Exact and Natural Sciences, Institute of Interdisciplinary Research, Alexandru Ioan Cuza University, Iasi, Romania

³ Faculty of Biology, Alexandru Ioan Cuza University, Iasi, Romania

⁴ Department of Biology, Case Western Reserve University, Cleveland, Ohio, United States of America

* corresponding author: iuliangherghel@gmail.com

Climate change has resulted in significant consequences, including alterations in species ranges, loss of habitats, and even the extinction of certain species. Species that exhibit polymorphism, display distinct responses to environmental changes due to differences in their ecological niches and optimal temperature preferences. One such species exemplifying this polymorphism is the Sand Lizard (*Lacerta agilis*), which exhibits a wide range of diversity in its phenotypic characteristics, including variations in back color, dark side markings, patterns, and vertebral region coloration. The broader implications of such extensive phenotypic diversity within the context of climate change are not yet well understood. To address this knowledge gap, we conducted a comprehensive study utilizing a database sourced from various citizen science platforms. This database contained detailed information on the distribution of *L. agilis* phenotypes across its extensive range, spanning from Western and Central Europe to Siberia and Lake Baikal. To assess the impact of twenty-first-century climate change on the distribution and diversity of these lizard phenotypes, we employed Ecological Niche Models (ENMs). Our research findings suggest a potential northward shift in the distribution of the species and notable changes in the predicted

diversity of phenotypes across its range. Importantly, these effects were observed to vary among different phenotypic traits. By incorporating phenotypic data into our ENMs, we have enhanced our ability to comprehend how climate change may affect populations in various geographical regions. This study lays the groundwork for future research endeavors that employ a more mechanistic approach to investigate the distinct responses of different phenotypes to the challenges posed by climate change.

Keywords: Bioclimatic variables, Climate change, Morphological polymorphism,

INVERTEBRATE COMMUNITIES FROM UNDERGROUND ANTHROPIC VOIDS

Rodica PLĂIAȘU¹, Ștefan Cătălin BABA^{1,2}, Robert OPRAN¹,
Ioana NAE¹, Raluca Ioana BĂNCILĂ¹

¹ Institute of Speleology “Emil Racoviță” of the Romanian Academy

² Faculty of Biology, University of Bucharest

* corresponding author: rodica_plaiasu@yahoo.com

Underground anthropic voids generated for various purposes by human activities, e.g. tunnels and underground mines, have similar characteristics to natural subterranean habitats, such as caves. Because subterranean anthropic ecosystems are structurally simpler, characterized by low microhabitats diversity and are younger compared to caves, they are often much less biologically diverse and have low endemism. Still, these artificial cavities have been shown to provide habitats for animals and sometimes have relatively high species richness. The goal of this study was to document the composition and structure of invertebrate communities from anthropic (mines and tunnels) and natural (caves) underground habitats. This will improve the understanding of the role played by the artificial subterranean ecosystems in the protection of subterranean biodiversity in the context of increasing human pressures on subterranean ecosystems. We identified 22 taxa in both type of habitats. Among the anthropic voids the highest diversity was found in mines, this type of habitat being most similar to natural cavities.

Keywords: anthropic subterranean habitats, caves, biodiversity

DENTAL DIMENSIONAL VARIABILITY OF PAST HUMAN POPULATIONS: CASE STUDY ON THE M2 MOLAR TEETH

Ozana-Maria CIORPAC-PETRARU^{1,*}, Vasilica-Monica GROZA¹,
Mariana POPOVICI¹, Luminita BEJENARU^{1,2}

¹ Romanian Academy – Iași Branch, “Olga Necrasov” Center of Anthropological Research, Iasi, Romania, Iasi, Romania

² “Alexandru Ioan Cuza” University of Iași, Faculty of Biology, Iasi, Romania

* corresponding author: ozanapetraru@gmail.com

Teeth are a valuable source of information for studies concerning the past human populations in archaeological and forensic contexts. Several studies of dental anthropology approached the linear measurements of tooth crowns for assessing the sexual dimorphism in both modern human populations and past ones, as well the dental variability between groups. The aim of this study is to assess the M2 molar crown variability in past human populations from Prehistory (Chalcolithic and Bronze Age, ~ 5000-1150 BCE) and Middle Ages (13th-17th centuries) discovered in archaeological sites from North-Eastern Romania. The mesio-distal (MD) and bucco-lingual (BL) crown diameters diameters, were digitally performed on occlusal digital images acquired stereo-microscopically. The crown index (CI), crown area (CA) and the sexual dimorphism index (SDI), along with the two linear measurements were subjected to several statistical tests including Shapiro-Wilk test, student T test and Mann-Whitney. Pearson's and Spearman's tests were used to analyze the correlations between the BL and MD measurements. To evaluate the accuracy of the variables in assessing sexual dimorphism, the Discriminant Analysis (DA) was used. Our results show that the variation coefficient (CV) for the MD variable in the female upper M2 molars, is higher in the medieval sample than the prehistoric one. In females, the MD and CA variables for mandibular M2 molars and the BL and CA for maxillary molars showed higher values for the Middle Ages samples. Similar result was obtained in males, for the CA variable in the upper

M2 molars. In our study, the sexual dimorphism was highlighted only in the mandibular M2 molars from Prehistory.

Keywords: M2 molar teeth, past human population, variability.

NATRIX NATRIX AFTER DARK: A CITIZEN SCIENCE VIEW INTO COMMON GRASS SNAKES' NIGHTLIFE

Petronel SPASENI^{1,2,*}, Tiberiu SAHLEAN^{2,3}, Iulian GHERGHEL^{2,4}, Ștefan-Remus ZAMFIRESCU¹, Cătălin-Ionuț PETREANU¹, Raluca MELENCIUC⁴, Cristina Florentina ALISTAR (PELCARU)⁵, Viorel Dumitru GAVRIL³, Alexandru STRUGARIU²

¹ Faculty of Biology, Alexandru Ioan Cuza University of Iași, Romania

² Department of Exact and Natural Sciences, Institute of Interdisciplinary Research, Alexandru Ioan Cuza University of Iași, Romania

³ Bucharest Institute of Biology, Romanian Academy, Bucharest, Romania

⁴ Faculty of Natural and Agricultural Sciences, Ovidius University of Constanța, Romania

⁵ Department of Biochemistry and Molecular Biology, Faculty of Biology, University of Bucharest, Bucharest, Romania

* corresponding author: awpe94@gmail.com

Nocturnal activity is a significant aspect of a species' biology, present in a wide variety of animal groups. Diel and seasonal activity of ectothermic animals, like snakes, are highly influenced by environmental temperatures fluctuations. Snakes exhibit a wide range of daily activity patterns, with many species from warm climates, such as the tropics, being mostly nocturnal. By contrast, most European species are diurnal, and a limited number of them are nocturnal or a mix of both. Although nocturnal behavior in diurnal ectotherms can be detrimental due to suboptimal thermoregulation, it can offer benefits such as predator evasion, increased prey availability, and avoidance of high temperatures. The common grass snake (*Natrix natrix*) is a polymorphic species with a wide distribution range, spanning from the Rhine eastward to Lake Baikal, including northern Europe, the Balkan Peninsula, and a part of the Middle East. Throughout its range, *N. natrix* is considered both diurnal and nocturnal, although there is very limited data available. Most data on the nocturnal activity in grass snakes come from its sister species, *Natrix helvetica*. Consequently, our study aims to document the patterns of crepuscular and nocturnal activity patterns in *N. natrix* across its distribution range using both

citizen science and our own data to understand: a) how common is this behaviour, b) whether there are any variations in geography of the behavior, c) what are the environmental conditions in which nocturnal activity is more likely, and d) whether there are any associations between the phenotype of the individuals and nocturnal activity.

Keywords: Natrix natrix, common grass snake, nocturnal activity, citizen science, snake behavior

ECONOMICALLY IMPORTANT SPONTANEOUS PLANTS OF THE FAMILY BRASSICACEAE FROM THE TERRITORY OF ROMANIA

Milian GURĂU^{1*}

¹ "Vasile Alecsandri" University of Bacau, Romania

* corresponding author: milian_gurau@yahoo.com

Plants from the Brassicaceae family, found in the wild flora of Romania, are reputed for their value for nutrition, medicine, agriculture, environmental protection, horticulture and toxicology. There are 73 spontaneous species with different uses, which contain characteristic, spicy substances and impose a limitation in their consumption. Over 30 species are of interest for phytomedicine, 17 species have seasoning value as food, 2 species are of use in veterinary medicine, only 18 species are toxic, while for industry there are no species of particular economic value although 6 species contain oil. A new category of uses has emerged, including 10 species of plants that resist the accumulation of polluting substances in the soil and that contribute to the phytoremediation of areas contaminated with polluting and sometimes very dangerous substances. Only 9 species belong to the category of melliferous plants and they have no economic importance. 11 species can be cultivated for decoration. For cosmetics, there are only 6 species, whose oils are more valuable for soap making. A small number of species are useful for biological treatments in agriculture: of these, 6 species can be used to control insects and 1 species is effective to control fungi. Excepting rape, *Brassica rapa*, the wild species of this family are not of melliferous importance.

Keywords: Brassicaceae family, phytomedicine, melliferous

*Biotehnologies for enviromental
protection and resources'
valorization*

THE SENSORY GARDEN OF “ION BORCEA” NATURAL SCIENCE MUSEUM COMPLEX OF BACĂU – AN INGENIOUS WAY TO PROMOTE THE NATURAL PATRIMONY

Gabriela GURĂU^{1*}

¹ Natural Science Museum Complex "Ion Borcea", Bacau, Romania

* corresponding author: gabriela_gurau@yahoo.com

During the year 2020, in order to make known the ornamental plants we adapted the surroundings of Natural Sciences Museum from Bacau and turned them into a Sensory Garden. The project aimed also to enrich the open space activities organized by the specialists of the museum. The entire project creation and implementation is a collective work of the team of specialists and employees of Natural Science Museum of Bacau. The garden is now an open air exhibition with a scientific part (the presentation of the human senses), a collection of living plants and an interactive area with several exhibits. We also developed a sensory alley, wonderfully appreciated by the regular public but also by the disabled persons. In this part of the garden, the visitors can walk on the sensory alley to test some materials from natural and anthropic environment. Over 150 taxa that enrich the collections of living plants of the "Ion Borcea" Natural Science Museum Complex of Bacau can be admired by the visitors.

Along with the permanent, the temporary exhibitions and the ornamental plants greenhouse, the sensory garden is part of a complete visit tour of the Museum of Natural Sciences of Bacau.

The sensory Garden was opened as a space dedicated to cultural activities especially designed to promote and value the natural patrimony for the public in order to learn and relax in the same time.

Keywords: Sensory Garden, human senses, ornamental plants, open space exhibitions, natural patrimony.

CYTOTOXICITY AND GENOTOXICITY ASSESSMENT OF HELLEBORUS ODORUS WALDST. & KIT. EXTRACTS AND THEIR NANOFORMULATIONS

Nicoleta Anca ȘUȚAN^{1*}, Ștefania MITROIU¹, Codruța Mihaela DOBRESCU¹, Cristina SOARE^{1*}, Denisa Ștefania VÎLCOCI², Georgiana UȚĂ², Diana Ionela (STEGARUS) POPESCU³

¹Department of Natural Sciences, National University of Science and Technology Politehnica Bucharest, Pitești University Center, Romania

²Regional Research and Development Center for Innovative Materials, Products and Processes from Automotive Industry, University of Pitești, Romania;

³National Research and Development Institute for Cryogenics and Isotopic Technologies – ICSI Ramnicu Valcea, Romania

* corresponding author: anca.sutan@upit.ro, cristina.soare@upit.ro

Helleborus is a genus in the buttercup family (Ranunculaceae) and consists of more than 20 species. Extracts and tinctures of roots and rhizomes of various hellebore species have a long history in traditional medicine, being used for their diuretic, cardiotoxic, antiinflammatory and antipyretic properties. In this study we report the assessment of the cytotoxicity and genotoxicity of *Helleborus odorus* Waldst. & Kit. hydroalcoholic extracts obtained by microwave-assisted extraction (MAE) and their nanoformulations. Twenty-two experimental variants were established, according to type of solvent, extract dilution, silver nitrate (AgNO₃) concentration, temperature of incubation for silver nanoparticles biosynthesis. The cytogenotoxic activity of the extracts and their nanoformulations was evaluated using *Allium* assay. Evans blue test was applied to assess the viability of the onion meristematic root cells. The *H. odorus* extracts proved to be an excellent reducing agent of AgNO₃ to nanometer-sized metallic silver. The cytotoxicity of *H. odorus* extracts is influenced by the dilution of the extracts, the type of solvent and the presence/ absence of AgNPs, as well as by the biosynthesis conditions of the metallic nanoparticles.

Keywords: Helleborus, UAE, MAE, cytotoxicity, genotoxicity

THE USE OF CLAYS INTERCALATED WITH DENDRIMERS IN THE RETENTION OF UNDESIRABLE COMPOUNDS IN WINE

Andreea HORTOLOMEU¹, Diana-Carmen MIRILĂ¹, Dorel URECHE²,
Ileana-Denisa NISTOR¹

¹ Laboratory of Catalysis and Microporous Materials, Department of Environmental Engineering, Faculty of Engineering, "Vasile Alecsandri" University of Bacau;

² Department of Biology, Ecology and Environmental Protection, Faculty of Sciences, "Vasile Alecsandri" University of Bacau;

* corresponding author: miriladiana@ub.ro

In the winemaking industry, there is always the problem of the presence of different compounds, which lead to affecting the quality of the wine. Unwanted compounds that can be found are the presence of the microorganism *Bretanomyces/Dekkera*, the excess of tannins and other macromolecules in the composition of the wine (such as: total proteins, polyphenols, pectins, compounds from the class of phenolic acids (cinnamic acids), which are responsible for scraping brown and white wine colored etc.), mycotoxins and phthalic compounds. These compounds can be detected either in the raw material following the treatment of the soil with different adjuvants, technological processes used during the production of the wines or during the bottling and storage process. Another factor that affects the quality of wines is the presence of esters of phthalic acids such as di-ethylhexyl phthalate (DEHP) and di-butyl phthalate (DBP).

The nanomaterial synthesized, characterized and used to treat the analyzed wine from the European Aligoté variety, was sodium bentonite intercalated with Boltron-type dendrimers of different generations (second- NBtH20, third- NBtH30, fourth- NBtH40). The role of these nanomaterials was to adsorb the unwanted target compounds (DEHP and DBP and polyphenolic compounds) from the analyzed wine, as well as to determine their reaction during the thermal stability process (hot) and on the turbidity of the wine.

After performing the thermal stability test, a 30% decrease in total polyphenolic compounds was found after treating the wine with bentonite interspersed with (NBtH20, NBtH30, NBtH40), hydroxycinnamic substances decreased by 20% when the nanomaterial (NBtH40) was used, flavonoid compounds decreased by 50% using the nanomaterial intercalated with NBtH20.

Clay sorbents modified with Boltron dendrimers are nanomaterials with good properties that can be used in the treatment of white wines for the retention of phthalates and the reduction of polyphenolic compounds.

Keywords: wine, bentonite, Boltron dendrimers, proteins, phthalates, polyphenols.

ADVANTAGES AND DISADVANTAGES OF CLONAL MULTIPLICATION OF PLANTS THROUGH IN VITRO TECHNIQUES

Mihai LEȘANU¹

¹ Moldova State University, Chisinau, Republic of Moldova

* corresponding author: mglesanu@yahoo.com

Currently, the clonal multiplication of valuable genotypes by in vitro techniques is widely applied in plant biotechnologies. As a result of multiple investigations, they have demonstrated their advantages through the rapid multiplication of various valuable species, obtaining virus-free planting material with superior agronomic qualities, increasing the effectiveness of breeding programs, preserving rare and endangered plant species, etc.

Over the years, he experimented with different species of plants, including agricultural crops, medicinal and landscape plants, trees and shrubs. For each of them, the physico-chemical conditions for in vitro cultivation were developed. The optimal nutrient media were developed and the morphogenetic capacities of different types of primary explants were determined. As a result, the investigated plants (tomatoes, mint, echinacea, thyme, carnations, chrysanthemums, mulberry, oak, etc.) can be successfully multiplied by in vitro techniques.

It should be mentioned that along with the advantages that clonal multiplication technologies represent, they can also generate a series of disadvantages. Methodically, every time there is a risk of losing the planting material as a result of an infection in the in vitro cultivation process. Also, there is a risk of inducing somaclonal variations during the cultivation of plants in isolated conditions. But perhaps the biggest danger is the homogenization of planting material and the loss of genetic diversity. From this point of view, it is absolutely necessary to develop in parallel the programs for the creation of genetic collections of plants involved in plant biotechnologies.

Keywords: clonal multiplication, in vitro culture, plant biotechnologies.

RESEARCH CONCERNING THE VALORISATION OF EGGHELLS AS BIOSORBENT FOR HEAVY METALS

Elena-Petronela BRAN^{1*}, Irina-Claudia ALEXA², Elena-Mirela SUCEVEANU², Daniela NICUȚĂ³, Adriana-Luminița FÎNARU²

¹Doctoral Studies School, "Vasile Alecsandri" University of Bacău, 157, Calea Mărășești, Bacău, 600115, Romania

²"Vasile Alecsandri" University of Bacău, Faculty of Engineering, Department of Chemical and Food Engineering

³"Vasile Alecsandri" University of Bacău, Faculty of Sciences, Department of Biology, Ecology and Protection of Environment

* corresponding author: petronelabran@yahoo.com

Environmental pollution with heavy metals is a major problem nowadays. Metals are continuously released into the biosphere, which causes increases in concentrations of metal ions such as Pb^{2+} , Zn^{2+} , Cd^{2+} , Ni^{2+} , etc. both in the aquatic and terrestrial environment. There are many methods of removing heavy metals from water, including biosorption. Various biological materials (eggshells, agricultural waste, algae, yeasts, etc.) have been described as having biosorbent properties when in contact with water polluted with heavy metals. Due to their structure, these materials have the ability to bind metal ions to their surface, thus reducing the metal concentration in the water.

In Bacău County, the food processing industry is very well developed generating high amount of by-products and wastes. This fact led us to pay more attention to the recovery of chicken eggshells, a waste produced in large quantities by the most important company Agricola International S.A. Bacău. At the same time, lately, many quail egg farms have been developed in the region because consumer demand for this product has increased. In this regard, there are large quantities of eggshells that end up in the environment and which deserve to be exploited, through their use in the biosorption process.

Therefore, the present research was carried out in order to compare the influence of chicken and quail eggshells for the removal of Pb^{2+} and Zn^{2+} ions from aqueous solutions, without any preliminary modification on the eggshells (calcination or structural changes).

For this, experiments were carried out at ambient temperature and at a temperature of 40°C, using several types of agitation (classical, orbital, microwave and ultrasound).

Heavy metal content after the biosorption process was determined using Atomic Absorption Spectrophotometer AAS ZEE nit 700 (Analytik Jena AG, Germany) in collaboration with Bacău Water Quality Laboratory - Siret Water Basin Administration. The samples were analyzed according to SR ISO 8288: *Water quality - Determination of cobalt, nickel, copper, zinc, cadmium and lead - Flame atomic absorption spectrometric methods.*

The obtained results revealed that the concentration of lead and zinc ions decreased significantly in all solutions following the treatment with eggshell powder under different conditions. It was observed that chicken eggshells are more effective than quail eggshells for biosorption process of both ions. Moreover, better results were obtained when using classical stirring at 40 °C compared with ambient temperature, both for chicken and quail eggshells.

Keywords: biosorption, chicken eggshells, heavy metals quail eggshells.

BOOSTING TOMATOES NATIVE RESISTANCE TO ABIOTIC STRESS THROUGH EXOGENOUS SALICYLIC ACID UTILIZATION IN TISSUE CULTURE TECHNIQUES “IN VITRO”

Tina Oana CRISTEA^{1*}; Gabriel-Alin IOSOB¹, Andreea ANTAL-TREMURICI¹, Mariana CALARA¹, Claudia BĂLĂIȚĂ¹, Andreea Beatrice IGNAT¹, Denisa SEVERIN¹

¹Vegetable Research and Development Station Bacau, Calea Bârladului street, no. 220, Bacău, Romania

*corresponding author: tinaoana@yahoo.com

Tomato (*Solanum lycopersicum* Mill.), an economically vital crop, faces rising abiotic stress due to climate change, impacting growth and yield. This study investigates the potential of enhancing the native resistance of tomato plants to abiotic stress "in vitro" by applying exogenous salicylic acid (SA) in a controlled tissue culture environment, using various concentrations of SA in the standardized culture media MS and 1962. Three different concentrations of SA (1 mM/l, 0.5 mM/l, and 0.1 mM/l) were assessed for their impact on seed germination, shoot initiation, proliferation, root development, and physiological parameters (phenolic and chlorophyll content). Exogenous SA improves tomato abiotic stress tolerance, promoting growth, raising chlorophyll levels, reducing oxidative stress, and activating defense genes. The use of exogenous SA "in vitro" to enhance tomato plant abiotic stress resistance offers promise for sustainable agriculture by reinforcing native defenses and mitigating yield losses, thereby contributing to food security and agricultural sustainability. In conclusion, this study showcases the effectiveness of exogenous salicylic acid application in tissue culture techniques for enhancing native resistance in tomato plants against abiotic stress, providing valuable insights for developing strategies to bolster crop resilience in the face of changing environmental conditions in agriculture.

Keywords: salicylic acid; in vitro; sustainable; vegetable; breed

VALORIFICATION OF THE BENTONITE PARTICLES AS ADSORBENT IN AIR DE POLLUTION. DYNAMIC STUDY IN FLUIDIZED BED

Gabriela MUNTIANU^{1*}, Ana Maria GEORGESCU¹, Ana Maria ROȘU¹,
Ileana Denisa NISTOR¹

¹"Vasile Alecsandri" University of Bacau, Faculty of Engineering, Department of Chemical and Food Engineering, Bacau, Romania

* corresponding author: muntianu.gabriela@ub.ro

This study aims to apply the fluidized bed as a technique to intensify the mass transfer processes in the adsorption of gaseous effluents on bentonite particles. In order to minimize or even completely eliminate the pollutants concentrations in the air, intensive gas-particle contact techniques are used. The particles used in dynamic study in fluidized bed are sodium bentonite particles and calcium bentonite particles with different physical properties. The influence of the average particle diameter and the height of fixed bed particles on bed porosity, minimum pressure drop and minimum fluidization velocity at the incipient fluidization were studied. Experimental values for the minimum pressure drop and for the minimum fluidization velocity were compared with theoretical values by applying empirical equations. Also, applying regression analysis to the all experimental data, an empirical model was obtained for minimum fluidization velocity in the case of sodium bentonite particles and calcium bentonite particles. Fluidized bed offers multiple advantages including a high gas-solid contact surface, particle transport, intense mixing of particles and uniform temperature in the bed and can be used in the valorization of bentonite particles as an effective adsorbent.

Keywords: bentonite particles, fluidized bed, bed porosity, minimum pressure drop, minimum fluidization velocity, mathematical model

ASPECTS REGARDING BIOSAFETY, BIOSECURITY, BIOPROTECTION IN THE MEDICAL ANALYSIS LABORATORY

Daniela TIȚĂ^{1*}, Tatiana CIUREA², Ionuț STOICA³,
Dumitra RĂDUCANU³, Diana Ioana TIȚĂ⁴

¹ Bacau Emergency County Hospital, Romania

² Bagdasar-Arseni Emergency Clinical Hospital, Bucharest

³ „Vasile Alecsandri” University of Bacau, Faculty of Science, Department of Biology, Bacau, Romania

⁴ Coltea Clinical Hospital, Bucharest

* corresponding author: danielatita2007@yahoo.com

The Medical Analysis Laboratory (LAM) must be structured and equipped in such a way as to prevent the risk of accidental contamination and to be able to function fluently. Based on the National Biosafety Guide, each LAM must draw up its own "Biosafety Manual", a manual focused on biological safety (safe handling of pathogenic microorganisms), biosecurity (protection of biological material against theft, loss or diversion that can lead to the inappropriate use of these agents and to public health damage), Bioprotection (specific work safety rules that include specific work safety provisions for the prevention of work accidents and occupational diseases, in the activities carried out in medical analysis laboratories) .

Ensuring these aspects involves: functional circuits, space and optimal environmental conditions, decontamination and waste management, biosecurity program management, staff training, safe handling of laboratory samples, intervention plans in case of accidents (prevention and limitation of the consequences of natural disasters), disinfection and sterilization, creation of a Biosafety Committee.

Keywords: risk profiles, risk management, equipment safety, laboratory facilities

BACILLUS VELEZENSIS P3.3S - A PUTATIVE BACTERIAL BIOCONTROL AGENT

Loredana-Elena MANTEA^{1*}, Amada EL-SABEH¹, Théo DABOUDET²,
Marius MIHĂȘAN¹, François KRIER², Marius STEFAN¹

¹ BioActive Research Group, Alexandru Ioan Cuza University of Iasi, Iasi, Romania

² UMR-T 1158, BioEcoAgro, University of Lille, 59650 Lille, France

* corresponding author: mantealoredana9@gmail.com

Plant diseases represent a serious threat to global food security. Moreover, many phytopathogens have developed resistance to antimicrobials used in agriculture which are highly toxic and are causing extended environmental pollution. Therefore, in recent years there has been an increasing interest in identifying bacteria capable of producing various types of antimicrobial compounds. In this context, the aim of this study was to identify the antimicrobial potential of *Bacillus velezensis* P3.3S, a bacterial strain isolated from saline soil. The draft genome of the strain was sequenced using the Illumina NovaSeq 6000 platform and assembled using Spades 3.15. The antiSMASH 7 webserver was used for the identification of secondary metabolite biosynthetic gene clusters and MALDI-TOF mass spectrometry was employed to confirm the production of lipopeptides. The antagonistic test was performed against *Rhizoctonia solani* and *Agrobacterium tumefaciens* GV220 strains. Our results showed that 11 secondary metabolite gene clusters encoding NRPS, PKS, transAT-PKS, T3PKS and terpene were predicted in the whole genome of P3.3S strain. Among these, six clusters showed 100% similarity and were linked to the synthesis of bacillaene, fengycin, difficidin, bacilysin, macrolactin H and bacillibactin. One cluster had 95% similarity (responsible for surfactin production) and four clusters showed no similarity with the database. *B. velezensis* P3.3S exhibited antagonistic activity against the tested plant pathogens. Using MALDI – TOF mass spectrometry, three classes of lipopeptides were

detected: surfactin, iturin and fengycin. In conclusion, *B. velezensis* P3.3S showed important antifungal and antibacterial potential, probably related to its ability to produce lipopeptides and polyketides.

Keywords: *Bacillus velezensis*, biocontrol, secondary metabolites, antimicrobial.

THE USE OF DIFFERENT METHODS FOR THE OBTAINED *ALLIUM URSINUM* EXTRACT FOR THE USE IN BIOTECHNOLOGIES

Ana-Maria ROSU^{1*}, Vasilica-Alisa ARUS¹, Nicoleta PLATON¹,
Ileana Denisa NISTOR¹

¹"Vasile Alecsandri" University of Bacau, Faculty of Engineering, Department of Chemical and Food Engineering, Bacau, Romania

* corresponding author: ana.rosu@ub.ro

Allium plants are odourless if their parts do not suffer mechanical degradation. When plant cells are crushed, they release volatile compounds with a high sulphur content. The concentration of volatile chemical compounds can vary depending on the time, mode of harvest and storage conditions. Experimental extraction studies aimed at selecting optimal methods for obtaining primary extracts from wild garlic leaves. These extracts contain chlorophyll and carotenoids pigments. Ultrasound-assisted extraction (EAU) and microwave-assisted extraction (EAM) were used as green methods for primary extraction of leaves pigments. The conventional extraction method was carried out using a Soxhlet extractor. Extraction methods complied with ecological principles by using as solvent a 1:1 hydroalcoholic mixture.

Concentrations of carotenoids, chlorophyll *a* and *b* from obtained extracts were determined spectrophotometrically at different wavelengths (470, 645 and 662 nm).

The obtained results showed that the extraction methods can vary the influence of pigments quantity. In the case of wild garlic study, the conventional method (Soxhlet) was more efficient method than green extraction methods, obtaining a quantity of 28.64 µg/ml total chlorophyll pigment and a carotenoid pigments amount of 3.95 µg/ml. As a perspective, these pigments can be used in different fields such as medicine, pharmacy and the food industry, as an alternative to the synthetic dyes used.

Keywords: wild garlic, primary extracts, chlorophyll pigments, carotenoids, green extraction methods

NOVEL NANOEMULSIONS FOR FOOD BIOTECHNOLOGIES. THEORETICAL STUDY

Ana-Maria ROSU^{1*}, Roxana Elena VOICU², Daniela NICUTA²

¹"Vasile Alecsandri" University of Bacau, Faculty of Engineering, Department of Chemical and Food Engineering, Bacau, Romania

²"Vasile Alecsandri" University of Bacau, Faculty of Sciences, Department of Biology, Ecology and Environmental Protection, Bacău, Romania

* corresponding author: ana.rosu@ub.ro

Nanoparticles are characterized as ultrafine particles with a larger surface area, and less sensitivity to physical and chemical changes. These nanoproducts can be characterized and optimized for use in the food industry. Nanoemulsions are composed of two phases: an oil phase and an aqueous phase. They are treated as one of the most encouraging systems to permit solubility, bioavailability, and functionality of bioactive compounds.

In the food biotechnologies, the most commonly used are oil-in-water nanoemulsions, whose particles are of the core-shell type. The body is made of a lipophilic material and the outer layer is composed of a surface-active amphiphilic substance (*Shehzad, et al., 2020, Waglewska, E. et al., 2021*). Nanoemulsions have been demonstrated to be a significant delivery system for protecting, encapsulating, and improving the bioavailability of bioactive lipophilic drugs, nutraceuticals, etc. (*Pérez-Soto, E. et al., 2021*). The application of emulsion technology in the food industry can lead to new product structures and new physico-chemical properties such as flavor, texture, stability, taste, and extension of shelf life. Milk contains almost all the nutrients needed to maintain life and is consumed on its own or used as a raw material to produce various products, such as yogurt, cheese, cream, ice cream, and butter (*Ozogul, Y. et al, 2022*).

The benefits of using nanoemulsion technologies within the dairy industry and related research on their potential applications for preserving and improving food qualities continue to expand. The use of natural substances, as food preservatives, is a challenge since they

generally have low water solubility, chemical instability, or are low efficiency. Due to these inconveniences, in order for natural substances to be used as food preservatives, they must be converted into nanoemulsions (Ozogul Yesim, et al., 2022). Nanoemulsions delivery systems must be compatible with the food matrix in which they are incorporated and cannot adversely affect the organoleptic properties of the final product.

In conclusion, nanoemulsions have proved to be quite effective in terms of product safety, bioavailability, and bioactivity of phytochemical compounds and various bioactive substances, their digestibility and stability are still a matter of concern regarding food safety.

Keywords: nanoemulsions, nutritional quality, encapsulation, films, biotechnologie

ALLIUM CEPA ASSAY – IN VIVO INVESTIGATION OF CYTOTOXICITY POTENTIAL OF DIFFERENT EXTRACTS OF NATURAL SOURCES

Daniela NICUȚĂ^{1*}, Irina-Claudia ALEXA², Luminița GROSU²,
Oana-Irina PATRICIU², Adriana-Luminița FÎNARU²

¹“Vasile Alecsandri” University of Bacău, Faculty of Sciences, Department of Biology, Ecology and Protection of Environment, Bacău, Romania

²“Vasile Alecsandri” University of Bacău, Faculty of Engineering, Department of Chemical and Food Engineering, Bacău, Romania

*corresponding author: daniela.nicuta@ub.ro

In recent years, the biological properties of various plants extracts have received increasing attention in order to clarify and evaluate their therapeutic potential, also to identify the major compounds and possible synergisms.

Studies on the genotoxicity of extracts from natural sources and cytotoxicity tests, using plant test systems *in vivo*, such as *Allium cepa*, can provide information on the possible therapeutic indications of plants extracts.

The *Allium cepa* test represents an important model *in vivo* where the roots grow in direct contact with the substances of interest (plants extracts). The *Allium cepa* test is one of the few direct methods for measuring damage in systems that are exposed to mutagens or potential carcinogens, and enables the evaluation of the effects of these damages through the observation of chromosomal alterations.

The present work was conducted in order to investigate *in vivo* genotoxicity and cytotoxicity of different extracts from natural sources. In this view, aqueous and hydroethanolic extractions were carried out. The extracts were spectrophotometrically evaluated using Shimadzu Spectrophotometer UV-1280. The content of total polyphenols was also determined by the Folin-Ciocalteu method.

Further, *in vivo* investigation of extracts was achieved using *Allium cepa* test. Onion bulbs were placed in tap water for 72 hours. Series of 3 bulbs onion were maintained into plants extracts for

24 hours in a LEEC growth chamber, in controlled conditions. The length of the roots grown after immersion in water and respectively in extracts, was measured compared to the control.

A microscopic evaluation of onion root-tips was completed using an optical microscope with 40x and 100x magnification. Different stages of mitotic division and several types of chromosomal aberrations were observed.

Preliminary results of microscopic evaluation of root-tips of *Allium cepa* indicated that the tested extracts did not affect the cell division process, as cells were observed in all phases of mitotic division. Along with normal cells, some cells with chromosomal aberrations were also highlighted.

Keywords: *Allium cepa*, plant extracts, mitotic division, chromosomal aberrations.

BIOCOMPOSITE MATERIAL BASED ON *LACTOCOCCUS LACTIS* – A NEW CHALLENGE IN BIOSORPTION PROCESSES

Narcis-Teodor NIȚĂ¹, Elena-Mirela SUCEVEANU²,
Lăcrămioara RUSU^{*2}

¹ Doctoral Studies School, “Vasile Alecsandri” University of Bacău, Romania

² “Vasile Alecsandri” University of Bacău, Faculty of Engineering, Department of Chemical and Food Engineering, Romania

* corresponding author: lacraistrati04@yahoo.com

Water is nature's greatest gift because it is essential for the existence of many biotas on our planet. Being one of the indispensable natural resources, we face a global demand that is increasing considerably with each passing day. Unfortunately, in recent decades, various pollutants have entered the water bodies, causing a severe decline in water quality and, implicitly, limited water resources. Thus, current and future generations will pay a huge price as a result of an acute contradiction between limited resources and economic development. Therefore, efficient and green technologies are needed to remove persistent pollutants from water.

This study aimed to develop a biosorbent by immobilizing *Lactococcus lactis* biomass on natural polymer (alginate) and to evaluate the biosorptive potential for removal of pharmaceuticals and dyes from aqueous solutions. As target molecules, 2 pharmaceutical compounds (ethacridine lactate and rifampicin) and 3 dyes (indigo carmine, malachite green and brilliant green) were chosen considering the fact that they represent a potential risk for aquatic environments and human health.

The synthesized biosorbent was characterized by scanning electron microscopy (SEM) and Fourier transform infrared spectroscopy (FTIR) techniques and its point of zero charge was evaluated.

The resulting beads, named LLA 5%, have an average diameter of 3.073 ± 0.011 mm and a regular, spherical shape.

The evaluation of its biosorption capacity for selected target molecules was interpreted as a function of initial solution pH, biosorbent dose, and initial pollutant concentration. All of the investigated compounds exhibited removal efficiencies between 80 and 90%, according to the data, with the limitation that each one's procedure conditions were specific.

As a result, the developed biocomposite material is a promising biosorbent for the removal of persistent organic pollutants like pharmaceuticals and dyes. It should be mentioned that LLA 5% is an inexpensive, simple-to-use, environmentally friendly biosorbent that can be synthesized from renewable resources.

Keywords: *Lactococcus lactis*, natural polymers, immobilization technique, biosorption, renewable resources

THE INFLUENCE OF ROSEHIP POWDER ADDITION ON YOGURT QUALITY

Vasilica Alisa ARUS^{1*}, Nicoleta VARTOLOMEI^{2*}, Nicoleta PLATON¹,
Ileana Denisa NISTOR¹

¹"Vasile Alecsandri" University of Bacau, Faculty of Engineering, Department of Chemical and Food Engineering, Bacau, Romania

²Technological High School of Targu Ocna, Bacau County, Romania

* corresponding author: morarescua@ub.ro, vartolomeinicoleta28@yahoo.com

From a nutritional point of view, yogurt largely reflects the nutritional value of milk, the raw material from which it is obtained. In order to compensate for some deficiencies of milk or to improve its bioactive properties, yogurt is often fortified by adding other ingredients. Fortification of yogurt is achieved by enriching it with different ingredients, the most widespread being cereals and fruits. Although fruits have been added to yogurt for a long time, recently numerous studies have been reported that investigated the influence of the addition of fresh cut fruits and dried fruits in pieces or under powder form on the physico-chemical, sensory and functional properties of yogurt. Rosehip fruits (*Rosa canina* L.) are used in food due to their rich content of bioactive compounds such as polyphenols, essential fatty acids, galactolipids, folates, antioxidants, vitamins and minerals, especially for vitamin C (ascorbic acid), rosehips being recognized as vegetable source rich in vitamin C. The aim of this work is to determine the influence of the addition of rosehip powder on the quality of yogurt. Sensory analysis was performed using the 20-point test. The yogurt with the addition of rosehip powder has good sensory properties, appreciated when tasting. The most valued sensory attributes were appearance, smell and taste. Yogurts with the addition of rosehip powder received a higher score than the control, which means that they were accepted by the tasters.

Keywords: milk, yogurt, rosehip powder, sensory properties

PRELIMINARY RESEARCH REGARDING SOME VALUABLE GENOTYPES OF ROSEHIP FROM BACĂU

Diana-Elena MAFTEI¹, Delia-Andreea IANĂU¹

¹ "Vasile Alecsandri" University of Bacău, Faculty of Sciences, Dept. of Biology, Ecology and Environmental Protection, Bacău, Romania

* corresponding author: diana.maftei@ub.ro

This present paper comprises a research on the biology and importance of a well-known species, namely the rosehip (*Rosa canina* L.). All the experimental data may represent a starting point for its medicinal and phytotherapeutical research. The rosehip is a perennial shrub. The fruit colour ranges from red to orange. The rosehips contain large amounts of vitamins (mainly C vitamin), minerals, fatty acids, carotenoids, flavonoids, sugars, aminoacids, and essential oils. Their therapeutic properties are: fortifying, tonic, facilitate the peripheral blood circulation through capillary blood vessels, stimulate bile secretion, soothen liver damage, stomach aches, intestinal inflammation, prevent kidney stones, ameliorate cough and hoarse voice.

There were studied nine genotypes of *Rosa canina* L., belonging to five native populations from Bacău county. The rosehips were harvested and observed (200 fruit/each GPS location). A rather large variability was noticed in our survey on rosehip fruit, regarding fruit number/plant, fruit shape and size, as well as colour range (dark red to orange). Based on the turnover of the investigated five plant populations, the highest score was provided by population number 3 (from Racova village). This population lies in the Bistrița River's major river bed and meadow. The microclimate is nevertheless more favourable, compared to the other populations' we observed. Further studies on other rosehip populations will complete our research.

Keywords: genotypes, rosehip

*Ecology and sustainable
development*

CURRENT ECOLOGICAL STATE OF THE FISH FAUNA FROM FLUVIO-MARITIMAL OF DANUBE DELTA (ROȘU- PUIU LAKES-COMPLEX)

Aurel NĂSTASE^{1*}, Marian IANI¹, Ștefan HONȚ¹, Marian
PARASCHIV¹, Irina CERNIȘENCU¹

¹ DDNIRD – Danube Delta National Institute for Research and Development
Tulcea, Romania

* corresponding author: aurel.nastase@ddni.ro

This paper is an outline of the current state of the fish fauna of the fluvio-maritime environment of the Danube Delta most recently, in 2020. Rosu-Puiu complex-lakes became in time more fluvial area because of appropriate to deltaic area and breaking connection to the sea, while Musura and Sahalin sea areas became fluvio-maritime freshwater areas very slightly salty in a dynamics of sediment deposition. Fish fauna collecting was realized with two complementary methods of sampling: Nordic gillnets for open water and electric fishing for vegetated shoreline. The results are expressed in relative abundance and biomass as Catch Per Unit of Fishing Effort (CPUE standardization is done by a calculation system so that catches can be compared over time or between lakes or complexes), but also ecological indicators as biodiversity index Shannon-Wiener, Evenness and ecological status using Ecoframe methods and Biological Integrity Indicator (IBI) are comparative / complementize used for characterization of lakes-complex. The IBI index was adapted for metapotamal and hypopotamal region (bream and ruffe/carp fish region) where missing or weak-represented are Salmonidae family, replaced by Percidae family for good reasons. With few exceptions the ecological status of Roșu-Puiu complex of lakes for 2020 was between moderate and good status (native fish gene pool affected to the limit by numerical and areal reduction, recovery capacity is not affected, yet). Sustainable fishing is at risk in the next future because all fish catches are on a downward trend.

Keywords: fish fauna, deltaic environment, fluvio-maritim, ecological indicators, Danube Delta

INDICATORS FOR ASSESSING THE IMPACT OF HYDROPOWER COMPLEXES AND CLIMATE CHANGE ON RUNNING RIVER ECOSYSTEMS

Elena ZUBCOV*, Laurenția UNGUREANU, Olga JURMINSKAIA,
Nina BAGRIN, Natalia ZUBCOV, Dumitru BULAT, Denis BULAT,
Lucia BILETSCHI

Moldova State University, Institute of Zoology, Center of Research of
Hydrobiocenoses and Ecotoxicology

* corresponding author: ecotox@yahoo.com

We propose the following:

- hydrological (water discharge, speed, temperature in river ecosystems, quantity, composition and distribution of suspensions and alluvium, hydromorphological modifications of the hydrographic basin, quantitative assessment of the river waters originated from atmospheric precipitation, including snowmelt in mountains, and from groundwater, to prevent the drainage of the hydrographic basin, especially downstream of the HPP dams);
- hydrochemical (gaseous regime (O_2 , CO_2 , COD_{Mn} , COD_{Cr} , BOD), the ratio between the main ions and their correlation with the hydrological parameters, the processes of migration of the chemical substances in the water-suspensions-silt system);
- hydrobiological (indicators of biodiversity, number and productivity of planktonic and benthic organisms (bacteria, algae, invertebrates), ichthyofauna status, their reproductive potential, biological pollution);
- ecotoxicological and of the ecosystem functioning (level of tolerance of hydrobionts, buffer potential of the ecosystem, its trophicity and saprobity, level of eutrophication, intensity of self-cleaning and secondary pollution processes, production-destruction processes and reproduction of aquatic organisms, including ichthyofauna).

These indicators should also base the assessment of the impact and, conversely, of the socio-economic benefits of HPPs.

Keywords: hydropower, water quality, suspension, hydrobionts, ecosystems potential

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BIOLOGICAL EFFECTS OF PESTICIDES EXPOSURE ON FISH IN AQUATIC ECOSYSTEMS

Corneliu-Mihăiță POHONȚU¹

¹ 'Ștefan cel Mare' University of Suceava, Department of Forestry and Environmental Protection, Faculty of Forestry, Suceava, Romania

* corresponding author: corneliu.pohontu@yahoo.com

Intensive agriculture practice which contributes to feeding a constantly expanding human population has become the biggest threat to the environment. Using different pesticides from chemical synthesis have led to the pollution of most ecosystems and consequent deterioration in environmental water quality. The most common are herbicides, used on large areas to combat weeds. Consequently, aquatic ecosystems will eventually take over high concentrations of herbicides. Fish communities from aquatic ecosystems are continuously affected with particularly severe effects on biodiversity. The aim of this study is to evaluate toxic effects of Glifosat herbicide on *Ciprinidae* fish species *Puntius titteya*. At laboratory scale, the specimens were exposed at a spectrum of percentage concentrations of Glifosat between 0% (blank), 6.25%, 12.5%, 25%, 50% and 100% to evaluate acute toxicity. Following these determinations, the non lethal concentration was detected, and then, starting from it, the chronic toxicity was evaluated. The harmful effects have been recorded on swimming performance. At higher concentrations was observed the aggressive behavior significantly increasing.

Keywords: pesticides, fish, toxicity, pollution, aquatic ecosystem.

**PROTECTIVE EFFECT OF PROBIOTICS WITH
FRUCTOOLIGOSACCHARIDE PREBIOTIC AND VITAMIN C
ON HEAVY METALS AND ANTIBIOTIC-INDUCED
BEHAVIORAL, OXIDATIVE STRESS AND HOMEOSTASIS
ALTERATIONS IN ZEBRAFISH**

Roxana STRUNGARU-JIJIE^{1*}, Ira SIMIONOV², Emanuela
PĂDURARU³, Alexandru CHELARU³, Alin CIOBÎCĂ⁴
Mircea NICOARĂ^{3,4}

¹ Research Center on Advanced Materials and Technologies, Department of Exact and Natural Sciences, Institute of Interdisciplinary Research, Alexandru Ioan Cuza University of Iasi, Romania

² Department of Food Science, Food Engineering, Biotechnology and Aquaculture, "Dunarea de Jos" University Galati, Romania

³ Doctoral School of Geosciences, Faculty of Geography and Geology, Alexandru Ioan Cuza University of Iasi, Romania

⁴ Department of Biology, Faculty of Biology, Alexandru Ioan Cuza University of Iasi, Romania

* corresponding author: roxanajijie@uaic.ro

The presence of pharmaceutical compounds and heavy metals in the environment has become a worldwide concern, threatening human health and aquatic ecosystems. In addition, few data are available on the potential toxic effects triggered by chemical mixtures, most studies assessing the impact of single substance exposure on aquatic biota. In this context, the aim of the present study was to evaluate the adverse effects are occurring as a result of exposure to ampicillin (AMP), lead (Pb) and cadmium (Cd) on zebrafish (*Danio rerio*) behavior, oxidative stress biomarkers and metal homeostasis. Thus, the changes in social and 3D swimming behaviors of zebrafish as well as in the acetylcholinesterase (AChE) activity, protein carbonyl (PC) and lipid peroxidation (MDA—malondialdehyde) levels, activity of some oxidative stress markers (SOD—superoxide dismutase and GPx—glutathione peroxidase) and the essential elements content (Ca, K, Mg, Na, Zn and Fe) were

evaluated after 21 days of exposures. Moreover, we likewise assessed the possible protective effect of probiotics (two *Bifidobacterium* strains and one *Lactobacillus* strain) along with fructooligosaccharide prebiotic and vitamin C supplementation against the joint chronic toxic effects of the three stressors. Our results revealed that ternary mixture induced higher behavioral and biochemical alterations than individual contaminants. Moreover, a significant decrease in content of Na, but elevation of K and Zn, after exposure to mixture was observed in the zebrafish body when compared with the control group. Our data also support that the co-administration of probiotics with fructooligosaccharide prebiotic and vitamin C has the potential to mitigate some of the adverse effects induced by AMP, Cd and Pb mixture. In addition, biochemical responses showed significant correlations with behavioral parameters.

Keywords: lead; cadmium; ampicillin; probiotic complex; protective role; combined effects;

SINGLE AND COMBINED TOXICOLOGICAL EFFECTS OF MEROPENEM AND VALPROIC ACID TREATMENTS ON ZEBRAFISH BEHAVIOR

Ionuț-Alexandru CHELARU^{1,2,*}, Alexandra SAVUCĂ^{1,2}, Roxana JIJIE³,
Alin Stelian CIOBÎCĂ^{4,5,6}, Mircea Nicușor NICOARĂ^{1,4}

¹ Doctoral School of Geosciences, Faculty of Geography and Geology, “Alexandru Ioan Cuza” University of Iași, Romania

² Doctoral School of Biology, Faculty of Biology, “Alexandru Ioan Cuza” University of Iași, Romania

³ Department of Exact and Natural Sciences, Institute of Interdisciplinary Research, “Alexandru Ioan Cuza” University of Iași, Romania

⁴ Department of Biology, Faculty of Biology, “Alexandru Ioan Cuza” University of Iași, Romania

⁵ Academy of Romanian Scientists, Bucuresti, Romania

⁶ Center of Biomedical Research, Romanian Academy, “Alexandru Ioan Cuza” University of Iași, Romania

* corresponding author: chelaru.alexandru@yahoo.com

Medicines and pharmaceuticals are used worldwide, and their chemicals end up in the environment through wastewater discharges from water treatment plants, as well as improper disposal of medicine and pharmaceutical waste. These compounds have the potential to harm water quality, aquatic life, and ecosystems. The presence of these substances in natural water sources and drinking water has led to concern. Consumption of water contaminated with pharmaceutical pollutants may have consequences on the human endocrine system and on public health in general. A major issue currently is overuse, which eventually leads to the release of chemicals into the environment. The study's goal is to investigate the effects that might occur when organisms are exposed to valproic acid (VA, antiepileptic) and meropenem (MPM, carbapenem antibiotic) in the range of environmentally relevant concentrations. In this context, the novel aquarium and sociability tests were performed to assess the acute effects of VA alone and in mixture with MPM. The results revealed that the simultaneous presence of two drugs in the aqueous environment

may lead to additive, synergistic or antagonistic effects. Individual chemicals and their mixtures cause toxicity, resulting in behavioral changes. From the first given dosage, the two forms of exposure (single and mixture) had effects on swimming indicators and anxiety levels. Meropenem appears to have a higher exploratory impact than valproic acid shows. There might also be toxic consequences, as evidenced by variations in the examined parameters when compared to the control group. In nature, however, a significant anxiolytic effect paired with changes in swimming characteristics might cause issues for the survival of the species. Based on the results of the experiment, we will conduct more research to learn more about the toxicological impacts of these drugs.

Keywords: ecotoxicity; behavior; pharmaceuticals

IMPROVING ECOLOGICAL RESILIENCE AND SWEET PEPPER (*CAPSICUM ANNUUM* L.) CROP YIELD VIA BIOCHAR AND WOOD VINEGAR APPLICATION

Dan Ioan AVASILOAIEI¹, Mariana CALARA¹, Claudia BĂLĂIȚĂ¹,
Andreea ANTAL-TREMURICI¹

¹ Vegetable Research and Development Station, Bacău

* corresponding author: calaramariana@gmail.com

Modern agriculture is increasingly focused on sustainable and eco-friendly practices to meet growing global food demands while reducing the environmental footprint. This study investigates the application of biochar and wood vinegar as potential eco-agricultural tools to improve the growth, yield, and ecological sustainability of DarianaBac sweet pepper (*Capsicum annuum* L.) variety in an ecological farming system. Over the course of 2023 growing season, field experiments were conducted to evaluate the effects of the two horticultural applications and the outcome highlighted that biochar and wood vinegar treatments had a synergistic effect, leading to increased sweet pepper plant growth, including greater plant height, leaf and flower number per plant, and overall biomass production. Moreover, an improved quality of the sweet pepper harvest was underscored. These findings highlight the potential of the two treatments of enhancing the ecological sustainability of sweet pepper cultivation in an eco-agricultural system while reducing the environmental impact associated with conventional farming practices. Further studies are warranted to optimize application methods and dosages, as well as to assess the potential of these amendments in other ecological crop systems.

Keywords: sustainability, charcoal soil-enhancer, eco-friendly, harvest quality, biomass yield

STUDENTS PERCEPTIONS OF URBAN NATURAL AREAS CASE STUDY: BĂNEASA FOREST, BUCHAREST, ROMANIA

Simona LUNGU^{1*}, Geta RÎȘNOVEANU¹

¹ University of Bucharest, Doctoral School of Ecology, Bucharest, Romania

*corresponding author: simona.lungu@drd.unibuc.ro

The literature emphasizes the multifunctional role of urban natural areas, including biodiversity conservation, provisioning of benefits essential for the human population's well-being, reduced vulnerability to natural hazards, and increased sustainability and resilience of the cities to global changes. It is increasingly advocated as a win-win solution for nature and human communities. This paper aims to assess the students' perception of ecosystem services (ESs) provided by Băneasa forest, located in the northern part of Bucharest, which is under permanent pressure from the chaotic expansion of the city. We applied face-to-face questionnaires to students of the University of Bucharest with different educational backgrounds. We found that less than half (48.6%) of attendees consider themselves familiar with the ESs concept, most of them (56.5%) having a background in life sciences (biology, ecology, geography). However, about 28% of those familiar with the concept could not define it accurately. On average, over 50% of respondents consider ESs to be the benefits that humans receive from nature. While a greater proportion of students in life sciences (65%) and philology (74%) perceive ESs as benefits offered by nature, a significant proportion of students with training in social sciences (19%) and in business and administration (22%) point to the decisive role of ESs for human well-being. Only 11 to 14% of respondents are aware of the direct and indirect, tangible and intangible services provided by the forest. Only one student with a background in life sciences associates ESs with the functions and processes in natural systems. Another highlights the importance of the concept in assisting the decision-making process. The results obtained in this research underline the need to develop transversal skills of students through short-term training programs in order to form a human resource ready to identify solutions to the problems of today's society.

Keywords: Urban green areas, students, academic background, perceptions, civic engagement, ecosystem services

MAIN IONS AND MINERALIZATION IN THE PRUT WATERS

Nina BAGRIN^{1*}

¹ Moldova State University, Institute of Zoology,
Center of Research of Hydrobiocenoses and Ecotoxicology

*corresponding author: nina.bagrin327@gmail.com

The permanent monitoring of the water quality of the Prut River, as a transboundary stream, and also of its catchment, which is located in areas with many anthropogenic pressures, is a necessity for authorities and an object of detailed researches, aiming to contribute to the protection of quality of water resources. Water sampling from the Prut River (sampling locations - Braniste, Sculeni, Leuseni, Cahul, Caslita-Prut, Giurgiulesti) was carried out seasonally during 2023. The collection and analysis of main ions in water samples from the Prut River was carried out according to ISO methods adapted by national standards.

The winter and spring periods were characterized by the maximum content of hydrocarbonate and carbonate ions (177.2 ± 7.7 mg/l), while the summer and autumn periods - by minimum values (149.7 ± 7.1 mg/l), these values being within the multiannual limits (Zubcov et al., 2013). An increase in sulfate content was observed downstream of the river. The content of chloride ions in Prut waters not exceeded 40.0 mg/l, with one exception – in winter downstream to Cahul, when it reached 41.3 mg/l.

Calcium ions dominated among cations; their concentration was relatively stable, in most of cases around to 60 mg/l in the winter and spring periods and around to 50 mg/l in the summer and autumn periods. The concentration of magnesium ions ranged 7.3 – 14.0 mg/l, revealing the highest values in the first half of the year. The content of sodium and potassium ions was similar to that of chlorides, sodium cations reaching a concentration of up to 40.0 mg/l. Sodium and potassium are not the dominant cations in the waters of the Prut, but a change in their ratio downstream has been observed. The highest values of water mineralization were registered in winter (380.1 ± 33.3 mg/l) and spring (379.2 ± 15.6 mg/l), and the lowest – in summer (313.9 ± 16.4 mg/l) and autumn (314.0 ± 17.0 mg/l). It is worth to mention that the lowest values of mineralization, and certainly, of main ion concentrations in rivers from the researched geographical area are

registered during the period of spring floods, and the highest – during the summer-autumn low flow. The obtained results revealed an opposite dynamics – increased mineralization up to 425 mg/l in the spring, this fact showing an anthropic pressing on the river. Prut waters referred to the quality classes I-II.

Keywords: mineralization, water, Prut River

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PUBLIC APPRECIATION FOR THE CULTURAL ECOSYSTEM SERVICES OF BĂNEASA FOREST

Dumitru-Mircea DUȘCU^{1*}, Geta RÎȘNOVEANU^{1,2}

¹ University of Bucharest, Faculty of Biology, Doctoral School in Ecology

² University of Bucharest, Faculty of Biology, Department of Systemic Ecology and Sustainability

* corresponding author: dimitru.duscu@drd.unibuc.ro

Urban forests make an important contribution to the health and well-being of the population and provide a wide range of ecosystem services, in cities where green infrastructure and the availability of ecosystem services are limited. They are used as meeting places and hold great potential for natural and environmental science education. Our research aimed to assess and map the cultural ecosystem services provided by the Băneasa Forest. The potential of the forest to provide services was assessed based on the citizens' stated preference. We applied the georeferenced survey method of the public (Public Participation Geographic Information System - PPGIS), using the online survey tool Maptionnaire. 816 respondents have marked 882 points on the Baneasa Forest map that they consider to be the most important for the provision of cultural ecosystem services. Based on the points, we created maps with hot spots of the cultural ecosystem services offered by the Băneasa Forest. Spatial distribution maps of ecosystem services complement existing forestry map-based planning tools and provide important information for decision-making process. Our results support forest managers to adapt management according to public preferences, anticipate potential conflicts and set management priorities for the conservation of Baneasa Forest.

Keywords: Urban forests, Cultural ecosystem services, PPGIS

**DANUBE DELTA NATIONAL INSTITUTE FOR RESEARCH
AND DEVELOPMENT - SCIENTIFIC RESEARCH PROGRAM
FOR THE DEVELOPMENT OF RESEARCH SKILLS AND
CAPACITIES IN THE FIELD OF HEALTH AND
ENVIRONMENTAL PROTECTION OF WETLANDS -
"DANUBE DELTA 2030"**

Gabriel LUPU¹, Mihaela TUDOR¹, Daniela POREA¹, Anca CRACIUN¹,
Adrian BURADA¹, Ștefan RĂILEANU¹, Cristina DESPINA¹, Alexandru
BĂNESCU¹, Liliana ENE¹

¹ Danube Delta National Institute for Research and Development, Tulcea,
Romania

* corresponding author: gabriel.lupu@ddni.ro

"Danube Delta 2030" Program implements the consolidation of the national vision on investments in research and innovation in SNCISI (National Strategy for Research, Innovation and Smart Specialization 2022-2027), the Strategic Plan for Institutional Development DDNI 2023-2028, as well as coordination in the design and implementation of the system of excellence in environmental protection and ecosystem and adaptive management of wetlands in Romania, through concerted action between the functions of research infrastructure and human capital and by involving the mix of key policies in the field of health and environmental protection, which are part of the goals and global environmental conventions (from the Rio de Janeiro Convention on Biological Diversity -1992 - to COP27 Sharm El-Sheik - 2022), in the policies and strategies of the European Union (EU), which are regulated by EU Directives and also transposed into Romanian legislation: Directive 92/43/EEC ("Habitats Directive"); Directive 79/409/EEC ("Birds Directive"); Directive 2000/60/EC ("Water Framework Directive"); Directive 2007/60/EC ("Floods Directive"); Directive 2007/2/EC ('INSPIRE Directive'), Directive 2014/89/EU ('MSP Framework Directive'); Directive

2008/56/EC (Marine Strategy Framework Directive); European Green Deal, Europe 2030 Strategy.

Through the promoted projects, the "Danube Delta 2030 Program" captures on the one hand the continuous evolution in the way of operating research, development and innovation, as well as the organization of science in the current context, with a long-term approach – RDI services based on incremental innovation processes activated by digital technologies and globalization of the scientific community, and on the other hand by society's demand, constantly growing to address the great challenges of our time given by climate change. They have an impact on the entire research cycle, especially by looking at how this cycle is organized, with all the institutional involvement through approaches to new scientific topics, but also how the acquired knowledge is disseminated. These trends are irreversible and have grown far beyond individual projects, and the impact of these trends is already visible, and include interconnected changes that are consistent towards a more open science in which the research process involves, among other things, trends towards the use of open data.

Keywords: Danube Delta, NUCLEUS Research Program, DDNI

NATURA2000 HABITATS MAP IN DANUBE DELTA, SITE FOR COMMUNITY IMPORTANCE

Mihai DOROFTEI¹, Ion GRIGORAȘ¹, Silviu COVALIOV¹, Jenică HANGANU¹, Culiță SÂRBU², Adrian OPREA³, Marian MIERLĂ^{1*}, Cristian TRIFANOV¹

¹ Danube Delta National Institute for Research and Development, Tulcea, Romania

² Iasi University of Life Sciences, Faculty of Agriculture, Iasi, Romania

³ „Anastasia Fatu” Botanical Garden, Iasi, Romania

* corresponding author: marian.mierla@ddni.ro

The Danube Delta represents a distinctive ecological region characterized by the coexistence of a multitude of species spanning various taxonomic kingdoms, with particular emphasis on taxa such as Fungi, Plantae, and Animalia. In total, this diverse assemblage encompasses over 10,000 distinct species. These organisms are found in habitats ideally suited to their ecological requirements. This scientific paper elucidates the systematic approach undertaken to identify and delineate the habitats within the Danube Delta that are considered both ecologically sensitive and rare in accordance with the directives specified in The Habitats Directive of the European Union. Given the extensive expanse of the Danube Delta, a comprehensive methodology was employed for habitat demarcation, including the utilization of remote sensing techniques. In the context of remote sensing, this encompasses the deployment of high-resolution aerial imagery procured through both manned and unmanned aerial vehicles, as well as the extrapolation of data to encompass the entire Danube Delta territory via satellite images. These procedures were facilitated by interdisciplinary teams comprising biologists and Geographic Information System (GIS) experts, who conducted fieldwork expeditions supplemented by drone reconnaissance flights. Throughout these fieldworks, the teams relied on the Global Positioning System (GPS) to ensure the accuracy of data collection concerning the geographical locations. The significance of the

resulting habitat map lies in its capacity to aid the governing body responsible for the management of the Danube Delta site in enhancing the precision and efficacy of decision-making processes. The Danube Delta stands as a reservoir harboring a rich assortment of species and habitats, the preservation of which remains perpetually open to refinement and advancement through conservation efforts. This habitat map, therefore, serves as a valuable tool in the pursuit of this overarching conservation objective.

Keywords: natura 2000 habitats, mapping, segmentation, Danube Delta

THE TRANSFORMATION OF REED BEDS INTO FLOODPLAIN PASTURES: A COMPLEX TASK IN PRESERVING BIODIVERSITY

Mihai DOROFTEI¹, Silviu COVALIOV^{1,2*}, Simona Dumitrița CHIRILĂ¹,
Marian MIERLĂ¹, Cristian TRIFANOV¹, Matei SIMIONOV¹, Adrian
BURADA¹, Katarina TOŠIĆ³, Gabriel LUPU¹, Liliana ENE¹, Marius
FĂGĂRAȘ²

¹ Danube Delta National Institute for Research and Development Tulcea, Romania

² "Ovidius" University of Constanța, Faculty of Natural and Agricultural Science, Department of Biology

³ University of Belgrade, Faculty of Biology, Serbia

*corresponding author: silviu.covaliov@ddni.ro

This investigation delved into the analysis of vegetation succession and species composition within marsh edges predominantly occupied by *Phragmites australis* during the years 2002 and 2022, with the objective of elucidating alterations in these ecosystems over time. While compact reed-dominated areas demonstrated stability under effective management, accompanied by a limited presence of co-occurring species, the periphery of the habitat displayed temporal shifts. The study encompassed a survey of wetlands within seven specified areas (each measuring 10 x 10 km) in the Danube delta.

For the purpose of examining heavy metal accumulation within various plant communities featuring *Phragmites australis*, specimens of reed rhizomes and soil were collected from 22 distinct plots. The research scrutinized the similarity of communities, plant composition, structural attributes, species diversity, and the succession dynamics of nine different vegetation types present in the surveyed areas.

Noteworthy transitions were observed in six of the plots, notably, a transformation from marsh habitats, identified as *Scirpo-Phragmitetum* W. Koch 1926, to floodplain pastures, including *As. Cyperetum flavescens* W. Koch ex Aichinger 1933, *As. Dichostylido*

micheliana-Gnaphalietum uliginosae Timár 1947, As. Pulicario vulgaris-Menthetum pulegii Slavnić 1951, and As. Limosello-Eleocharitetum acicularis Wendelberg-Zelinka 1952. The observed shifts ranged from mixed sedges with reeds (MSR) to tall mixed reeds with sedges and gray willows (MRSG) in one plot and from MRSG to tall mixed reeds with sedges and white willows (MRSW) in another. Additionally, changes occurred from reeds on gleyic soil (R-gley) to tall mixed reeds with white willows on gleyic substrate (MRW-gley) and from reeds on peaty gleyic soil (R-pgley) to tall mixed reeds with gray willows on peaty gleyic soil (MRG-pgley). Furthermore, transitions from compact reedbeds (CRB) to fragmented reedbeds with gray willows (FRBG) and from fragmented reedbeds (FRB) to FRBG were observed.

These changes resulted in a reduction in stem density of *Phragmites australis*, accompanied by an increase in its height and diameter due to the die-back process. These successions, which transpired over a two-decade period at the marsh edges, provide insights into the evolutionary patterns of reed stands in the Danube Delta Biosphere Reserve. The preservation of extensive reed areas, which possess substantial filtration capacity, is of paramount importance for the well-being of wetland ecosystems. However, it is worth noting that floodplain pastures exhibit higher species diversity, with both species richness and the Shannon–Wiener index displaying similar trends: a decrease within reed stands followed by an increase within floodplain pastures. Notably, both reed communities and floodplain pastures are susceptible to invasive species, drought conditions, and grazing along water channels, particularly in the context of hydroengineering activities.

Keywords: vegetation succession; floodplain pastures; Danube delta; heavy metals accumulation; species diversity

RESPONSES OF SMALL MAMMALS TO INTENSITY OF USE AND FARMLAND MANAGEMENT IN SOUTHEASTERN TRANSYLVANIA

Anamaria LAZĂR^{1*}, Alexandra SANDU²,
Ana Maria BENEDEK^{2,3}

¹ "Transylvania" University of Braşov, Faculty of Food and Tourism, Braşov, Romania

² University of Bucharest, Faculty of Biology, Bucharest, Romania

³ "Lucian Blaga" University of Sibiu, Faculty of Science, Applied Ecology Research Center, Sibiu, Romania

* corresponding author: anamaria.gurzau@unitbv.ro

Small mammals are key components of ecosystems, playing vital roles for numerous groups of organisms. We conducted small mammal live-trapping in two areas of the southeastern Transylvania (Romania): Făgăraş Depression in the ROSPA 0098 Piedmontul Făgăraş, and Hârtibaciu Plateau, in the ROSPA0099 Hârtibaciu Plateau, both designated under the European Union Directive on the Conservation of Wild Birds. With a trapping effort of 8591 active trap-nights, 1244 individuals were captured belonging to 16 species, the most abundant and frequent species being *Microtus arvalis*, followed by *Apodemus agrarius* and *Apodemus flavicollis*. We evaluated the responses of small mammals at the population and community levels under different degrees of intensification of farming as well as different categories of management. As response variables, we considered species and community abundance, species composition and species richness. Abandonment of agricultural lands has a positive effect on small mammal abundance and species richness, more obvious in the abandonment of pastures. In addition, low intensity management in agricultural fields is positively related to small mammal abundance and species richness.

Keywords: agricultural management, rodents, shrews, biodiversity, multivariate statistical analysis, community ecology, land-use change, specialist species, generalist species.

EFFECT OF HOST CHARACTERISTICS AND LAND USE INTENSITY ON ECTOPARASITE PREVALENCE AND LOAD IN SMALL MAMMALS

Alexandra SANDU¹, Ana Maria BENEDEK^{1,2*}, Ioana BOERAȘ²,
Anamaria LAZĂR³, Niculina Viorica CIC², Maria Denisa COCÎRLEA⁴,
Maria STĂNCIUGELU²

¹ Department of Systems Ecology and Sustainable Development, Doctoral School in Ecology, Faculty of Biology, University of Bucharest, Romania

² Faculty of Sciences, Lucian Blaga University of Sibiu, Romania

³ Faculty of Food and Tourism, Transylvania University of Brașov, Romania

⁴ Doctoral School of Industrial Engineering, Lucian Blaga University of Sibiu, Romania

* corresponding author: ana-maria.benedek@s.unibuc.ro

Ectoparasites of small mammals have been the focus of numerous studies given their role in regulating of host populations, shaping host communities, and as disease vectors; however, studies on the effect of land use intensity on ectoparasite populations are scarce. Therefore, this study aims to reveal (1) the effect of the host characteristics and land use intensity on the prevalence and (2) the load of ectoparasites, and (3) the co-occurrence patterns of parasite taxa. The field survey was conducted in a rural mosaic landscape in southern Transylvania (Romania) between June and September 2010-2011. We live-trapped small mammals, collected their ticks and fleas, recording them along with the presence of lice and mites. The identity of host species affected the prevalence of all taxa (except for fleas) and the tick load, which was higher in mice than voles. The total abundance of the host community, but not species abundance, affected the parasite prevalence and load. The prevalence of ticks showed a linear decreasing trend from June to September, while mites and fleas displayed a positive trend. Land use intensity had a negative effect on the prevalence of parasites (except for lice) within the whole rodent community and the number of co-occurring taxa.

Keywords: ticks, fleas, lice, mites, host density, co-occurrence, mixed models, parasite infracommunity structure

PRELIMINARY RESULTS REGARDING THE EFFECTS OF ANTIEPILEPTIC DRUGS IN ZEBRAFISH

Raluca-Elena DUȚĂ¹, Alexandra SĂVUCĂ^{1,2}, Alin-Stelian
CIOBÎCĂ^{1,3,4,*}, Radu LEFTER⁴, Mircea-Nicușor NICOARĂ¹

¹ Department of Biology, Faculty of Biology, “Alexandru Ioan Cuza” University, Iasi, Romania

² Doctoral School of Geosciences, Faculty of Geography and Geology, “Alexandru Ioan Cuza” University, Iasi, Romania

³ Academy of Romanian Scientists, Bucharest, Romania

⁴ Center of Biomedical Research, Romanian Academy, Iasi, Romania

* corresponding author: alin.ciobica@uaic.ro

Diagnosis of epilepsy is determined by frequency of convulsions, in an interval of 24 hours, type to changes in due unknown causes through behaviour and level of consciousness. Theses seizures can be seen in both humans and various animals and can affect daily life. Although, can be managed through administration of anticonvulsant active substances. In this zebrafish study, the main objective was on the one hand, to observe the ability of pharmacological antiepileptic drugs to stop these changes in fish treated with the proconvulsant pentylenetetrazol (PTZ) to mimic epilepsy. On the other hand, to observe what toxicological effects might occur compared with the proconvulsant group in case of a randomly intoxication, due to the pharmaceutical residues pollution. The results obtained shown a favourable effect in case of the epileptic groups, but unfavourable ones for the non-epileptic groups, in which only the drug was administered.

ENHANCING SUSTAINABLE TOMATO CROP PRODUCTION IN ECOLOGICAL SYSTEMS THROUGH THE USE OF BIOCHAR AND WOOD VINEGAR

Dan Ioan AVASILOAIEI¹, Mariana CALARA¹, Claudia BĂLĂIȚĂ¹,
Andreea ANTAL-TREMURICI¹

¹ Vegetable Research and Development Station Bacău

* corresponding author: calaramariana@gmail.com

The escalating demands for sustainable agricultural practices have led to the exploration of eco-friendly approaches to improve crop yield and soil health in ecological systems. This study investigates the synergistic effects of biochar and wood vinegar applications on tomato (*Solanum lycopersicum* L.) growth, yield, and ecological sustainability. A field experiment was conducted over 2023 growing season, during which `Unibac` tomato variety was subjected to three treatments, including the application of biochar, wood vinegar, and Cropmax. Results indicated that the application of biochar and wood vinegar significantly enhanced tomato plant growth, as evidenced by greater plant height, number of leaves and fruits per plant, and overall biomass production. In addition to improved vegetative growth, tomato fruit production and quality was notably increased in the biochar and wood vinegar-amended plots. The enhanced fruit yield was attributed to the improved availability of essential nutrients in the root zone, as well as the natural fungicidal properties of wood vinegar that reduced the incidence of soil-borne diseases. These findings highlight the potential use of biochar and wood vinegar as eco-friendly cultivation practices in order to promote ecological sustainability in tomato crop production.

Keywords: Agricultural charcoal, Organic carbon residue, pyrolysis, organic practices, resilience

EFFECTS OF SINGLE AND COMBINED ARSENIC AND AMPICILLIN TREATMENTS ON ZEBRAFISH BEHAVIOR

Viorica RARINCA^{1,2,*}, Alin Stelian CIOBICA^{2,3,4}, Mircea NICOARĂ^{1,2}

¹ Doctoral School of Geosciences, Faculty of Geography and Geology, “Alexandru Ioan Cuza” University of Iași, Romania

² Doctoral School of Biology, Faculty of Biology, “Alexandru Ioan Cuza” University of Iași, Romania

³ Center of Biomedical Research, Romanian Academy, Iasi, Romania

⁴ Academy of Romanian Scientists, Bucharest, Romania

* corresponding author's email: rarinca_viorica@yahoo.com

In the last decade, antibiotic and metal pollution has been a concern with its increasing potential impact on public health and the environment. The dominant sources of antibiotic pollution in the aquatic environment are wastewater from antibiotic manufacturers, large-scale animal husbandry, and aquaculture. On the other hand, the increased consumption of antibiotics is directly responsible for the pollution of the environment. Their presence in ecosystems can lead to the spread and evolution of antibiotic resistance, as well as direct impacts on natural microbial populations, invertebrates, and vertebrates. The combined adverse impact of ampicillin and arsenic on aquatic organisms is underresearched, despite extensive studies on the individual toxic effects of these substances. The objective of the present study was to evaluate the chronic effects of exposure to ampicillin and arsenic on the social behavior of zebrafish (*Danio rerio*). To this end, adult, wild-type, mixed-sex zebrafish were exposed to environmental chemical concentration, the combined presence of ampicillin and arsenic thus observing behavioral disturbances. Effects on the social behavior of zebrafish were observed, both in the case of individual administration of arsenic and ampicillin, and in the case of a mixture of them. The finding highlights that the simultaneous presence of ampicillin and arsenic in the environment can pose a threat to the health of aquatic organisms. Based on the results of this experiment,

we will conduct advanced research to study more about the toxicological impact of the mixture between ampicillin and arsenic.

Keywords: antibiotics, zebrafish, pollution, chronic exposure, ampicillin, arsenic.

NEST BOX OCCUPANCY DYNAMICS BY THE HAZEL DORMOUSE *MUSCARDINUS AVELLANARIUS* IN CENTRAL-WESTERN ROMANIA

Eliana SEVIANU^{1*}, Ionela RĂDAC², Ramona BIVOLARU³,
Alexandru RĂDAC⁴

¹ Babeş-Bolyai University, Faculty of Environmental Science and Engineering, Department of Environmental Science, Cluj-Napoca, Romania

² National Museum of Banat, Department of Archaeology, Timișoara, România

³ West University of Timisoara, Faculty of Chemistry, Biology, Geography, Timișoara, Romania

⁴ University of Bucharest, Faculty of Biology, Bucharest, Romania

* corresponding author: eliana.sevianu@ubbcluj.ro

The Hazel dormouse, *Muscardinus avellanarius* is a vulnerable and protected species that is challenging to study due to its specific way of life. Limited data on its distribution and populations parameters are available for Romania. We collected data regarding species' biology and ecology in the hilly areas of the central-western Romania, within deciduous forests dominated by oak or beech species. We regularly monitored 80 wooden nestboxes, which served as shelter and breeding sites for the species. our findings seasonal and gender-related variations nest boxes usage. The highest occupancy levels were observed during the autumn, with a smaller peak in the spring. More males than females occupied the nest boxes, although the difference was not statistically significant. Most nest boxes were occupied by a single individual at a time. Recapture rates did not differ significantly between males and females, and most individuals were recaptured only once. Hazel dormice showed a high level of site fidelity, often returning to the same nestbox or one nearby. Interestingly, a quarter of the females bred twice a year, which is a lower percentage compared to findings from other studies. Nest box occupancy rates in this region were also lower than those reported in other areas. However, it is important to note that these variations may be attributed to differences in methodology. Nevertheless, even with the lower occupancy rates, they remained higher than in regions where the species had to compete with other mammal or bird species for nest boxes.

Keywords: arboreal rodent, artificial nesting site, breeding, life cycle, nest box sharing, recapture

THE BENEFITS OF USING A MIX OF ESSENTIAL OILS EXTRACTED FROM BASIL (*OCIMUM BASILICUM*) AND THYME (*THYMUS VULGARIS*) LEAVES AS NATURAL PESTICIDES

Răzvan FRANCIUC¹, Anamaria GHIMICI¹, Corina Cristina CIUCU¹

¹ National College "Unirea" Focșani

* corresponding author: anutza0805@gmail.com

Clean agriculture has been the foundation of human civilization, without use of chemical fertilizers or synthetic pesticides, but in the last century the use of such chemicals has skyrocketed, bringing about a huge negative impact to natural ecosystems and human society. Based on this, producing an effective and inexpensive pesticide is today one of the main goals of agricultural and chemical research. Basil and thyme, which are commonly grown near grain and vegetables, have the ability to act as parasite repellents. Thus, in our laboratory, we extracted the essential oils from both plants by steam distillation, making a mixture out of them. After conducting a month-long test on two cultures of beans (*Phaseolus vulgaris*) and wheat (*Triticum aestivum*), we discovered an effective pesticide that was comparable to the chemical pesticides commonly used. The primary terpenic compounds, in conjunction with other organic compounds in the oil structure at lower concentrations, have been observed to have significant neurotoxic and behavioral effects on insects and parasites. Their most significant impact is during the early stages of plant development. It has been thus shown that by combining essential oils from different plants with each other can lead to natural insecticides, effective against pests in plant crops, with applications in the safe and efficient production of organic food, especially in developed countries.

Keywords: agriculture, crops, parasites, essential oils, natural pesticide, organic, chemicals.

ZINC CHLORIDE EXPOSURE CAN INDUCE ALZHEIMER-LIKE SYMPTOMS IN ADULT ZEBRAFISH

Mădălina ENE¹, Alin-Stelian CIOBÎCĂ^{1,5,6}, Alexandra SĂVUCĂ^{2,3*}, Ionuț-Alexandru CHELARU^{2,3}, Roxana STRUNGARU-JIJIE⁴, Gabriel-Ionuț PLAVAN¹, Mircea Nicușor NICOARĂ¹

¹ Department of Biology, Faculty of Biology, “Alexandru Ioan Cuza” University of Iași, Romania

² Doctoral School of Geosciences, Faculty of Geography and Geology, “Alexandru Ioan Cuza” University of Iași, Romania

³ Doctoral School of Biology, Faculty of Biology, “Alexandru Ioan Cuza” University of Iași, Romania

⁴ Department of Exact and Natural Sciences, Institute of Interdisciplinary Research, “Alexandru Ioan Cuza”, University of Iasi, Romania

⁵ Academy of Romanian Scientists, Bucuresti, Romania

⁶ Center of Biomedical Research, Romanian Academy, Iași, Romania

* correspondent author: alexandra.savuca@yahoo.com

Recent studies prove there is a growing association between heavy metals exposure and neurodegeneration. This represents a public health concern because of the increasing prevalence of dementia, the negative consequence of neurodegeneration-related disabilities and increasing environmental pollution. Heavy metals pose a serious threat as they bioaccumulate in the brain where they produce a cascade of negative effects that influence memory, cognitive and motor functions. The model organism *Danio rerio* species so called *zebrafish* has proven to be a reliable tool in the study of neurodegeneration because of its behavioral, neuroanatomical and neurochemical similarities to humans. The main clinical feature of Alzheimer's disease is progressive memory loss caused by massive loss of neurons and deterioration of synaptic processes. In this study, Alzheimer's disease-specific neuromotor behaviors and disorders were induced in zebrafish by 96 h exposure to zinc chloride (ZnCl₂) at 0.5 mg/L and 1.0 mg/L. Behavioral parameters were measured using EthoVision XT software. Memory tests revealed that zinc impaired the

fish's short term and long term memory, while the results of the social test showed that zinc at 0.5 mg/L resulted in a significant decrease in social behavior, while at 1.0 mg/L the behavioral change was not as evident.

Keywords: Zinc Chloride, Zebrafish, Memory, Sociability

PRELIMINARY DATA REGARDING MICROPLASTIC CONTAMINATION IN THE SOUTHERN AREA OF THE ROMANIAN BLACK SEA COAST

Alexandra SAVUCA^{1,2}, Mircea Nicusor NICOARA^{1,3*}

¹ Doctoral School of Geosciences, Faculty of Geography and Geology, “Alexandru Ioan Cuza” University of Iași, Romania

² Doctoral School of Biology, Faculty of Biology, “Alexandru Ioan Cuza” University of Iași, Romania

³ Department of Biology, Faculty of Biology, “Alexandru Ioan Cuza” University of Iași, Romania

* corresponding author: mirmag@uaic.ro

A high concern about microplastics presence in the marine environment raised in the last decade, along with the evaluation of the effects they can have on the environment and implicitly on the human population. In the last decade, the effects of microplastics present in marine environment regarding the environment and human population has gained more interest in the research area. However, a quantification of the amounts of microplastic found in the environment is absolutely necessary to be able to correlate and conclude the effects. In the case of the resorts on the Romanian Black Sea coast, with a focus on the southern region, they are delighted to welcome thousands and thousands of tourists every summer season, their number showing an annual increase. This is of course gratifying for the country's economy, but there are certain negative effects on the level of pollution from year to year, especially if we also take into account the influences of the war that started in 2022, which is why this assessment made at the beginning of it, will represent a starting point for assessing the impact on the environment of post covid pandemics, but also post the current politically crisis. The aim of the study was to quantify the microplastic particles in sediments and classifying them according to their morphological type, color and their size, measured in 10 resorts sampled along the southern area of the

Romanian Black Sea coast. Our results suggest that the most present microplastics are $>1000\ \mu\text{m}$, mainly in fiber forms and blue color.

Keywords: microplastic, pollution, Black Sea

NEW ORGANO-INORGANIC MATRICES FOR WASTE REMEDICATION

Ana-Maria GEORGESCU¹, Ana-Maria ROȘU^{1*}, Gabriela MUNTIANU¹,
Dorel URECHE², Camelia URECHE³, Emilian MOȘNEGUȚU²,
Ileana-Denisa NISTOR¹

¹"Vasile Alecsandri" University of Bacau, Faculty of Engineering, Department of Chemical and Food Engineering, Bacau, Romania

²"Vasile Alecsandri" University of Bacău, Faculty of Engineering, Department of Environmental Engineering and Mechanical Engineering, Bacău, Romania

³"Vasile Alecsandri" University of Bacău, Faculty of Engineering, Department of Biology, Ecology, and Environmental Protection, Bacău, Romania

* corresponding authors: ana.rosu@ub.ro

In biotechnological industries, synthetic dyes have a harmful effect on products for humans. There are certain matrices capable of retaining wastes from these industries (such as polymers through their encapsulation, or other organic substances).

The aim of this research is to highlight the retention efficiency of some dyes from industry such as: Malachite Green (MG), Methylene Blue (MB) and Sunset Yellow FCF (SY), on the organo-inorganic matrix of the gelatin-clay type. The synthesis conditions were adapted from the literature, thus obtaining a material suitable for the retention of dyes. The absorption process was carried out in a batch system. Confirmation of the adsorption mechanism was tested by FTIR and SEM-EDAX analysis. The remarkable result was obtained in the case of retaining the Malachite Green dye, after testing with the UV-Vis spectrophotometer.

Perspectives are thus opened for the utilization of hybrid materials used in other industries with ecological impact on environment.

Keywords: nanomaterials, gelatin, dyes, ecological impact

Alphabetical Index of Participants

Acs Andrei	West University of Timisoara, Centre for Protected Areas and Sustainable Development, Oradea
Alexa Irina-Claudia	"Vasile Alecsandri" University of Bacau
Alexe Vasile	"Danube Delta" National Institute for Research and Development, Tulcea
Alistar (Pelcaru) Cristina Florentina	University of Bucharest
Antal-Tremurici Andreea	Vegetable Research and Development Station Bacau
Aprotosoiaie Ana Clara	"Grigore T. Popa" University of Medicine and Pharmacy, Iasi
Ardelean Diana-Ioana	West University of Timisoara
Aruş Vasilica-Alisa	"Vasile Alecsandri" University of Bacau
Avasiloaiei Dan Ioan	Vegetable Research and Development Station Bacau
Baba Ştefan Cătălin	University of Bucharest, Romanian Academy, "Emil Racoviţă" Institute of Speology, Bucharest
Bagrin Nina	Institute of Zoology, State University of Moldova
Bălăiţă Claudia	Vegetable Research and Development Station Bacau
Băncilă Raluca Ioana	Romanian Academy, "Emil Racoviţă" Institute of Speology, Bucharest
Bănescu Alexandru	"Danube Delta" National Institute for Research and Development, Tulcea
Benedek Ana Maria	"Lucian Blaga" University of Sibiu, University of Bucharest
Bejenaru Luminiţa	"Al. I. Cuza" University of Iasi
Biletschi Lucia	Institute of Zoology, State University of Moldova
Bivolaru Ramona	West University of Timisoara
Boeraş Ioana	"Lucian Blaga" University of Sibiu
Bolboacă Lucian-Eugen	"Danube Delta" National Institute for Research and Development, Tulcea
Botez Florina	University of Bucharest
Bran Elena-Petronela	"Vasile Alecsandri" University of Bacau
Bulat Denis	Institute of Zoology, State University of Moldova
Bulat Dumitru	Institute of Zoology, State University of Moldova
Burada Adrian	"Danube Delta" National Institute for Research and Development, Tulcea
Calara Mariana	Vegetable Research and Development Station Bacau
Caldari Vladislav	Institute of Zoology, State University of Moldova
Caraman Natalia	Institute of Zoology, State University of Moldova

Cavaleriu Romeo	National College Iasi
Cernișencu Irina	"Danube Delta" National Institute for Research and Development, Tulcea
Chelaru Alexandru	"Al. I. Cuza" University of Iasi, Doctoral School of Geosciences
Chirilă Simona Dumitrița	"Danube Delta" National Institute for Research and Development, Tulcea
Chirilă Theodora	West University of Timisoara
Cic Niculina Viorica	"Lucian Blaga" University of Sibiu
Ciobică Alin Stelian	"Al. I. Cuza" University of Iasi, Biomedical Research Centre of the Romanian Academy, Iasi
Ciorpac Mitică	"Grigore T. Popa" University of Medicine and Pharmacy, Iași, CEMEX
Ciorpac-Petraru Ozana-Maria	Romanian Academy, Iasi Branch
Ciubuc Constantin	Sinaia Zoological Research Station, University of Bucharest
Ciucu Corina Cristina	"Unirea" National College, Focsani
Ciurea Tatiana	Bagdasar-Arseni Emergency Clinical Hospital, Bucharest
Cocîrlea Maria Denisa	"Lucian Blaga" University of Sibiu, Doctoral School of Industrial Engineering
Cogălniceanu Dan	"Ovidius" University of Constanța, Chelonia Association, București
Cojocaru Ion	"Al. I. Cuza" University of Iasi
Costache Ionuț-Dănuț	"Al. I. Cuza" University of Iasi, Doctoral School of Geosciences
Covaciu Maria-Claudia	"Al. I. Cuza" University of Iasi
Covaliov Silviu	"Danube Delta" National Institute for Research and Development, Tulcea
Crăciun Anca	"Danube Delta" National Institute for Research and Development, Tulcea
Crețu Mirela	Research-Development Institute for Aquatic Ecology, Fisheries And Aquaculture, Galati
Cristea Tina Oana	Vegetable Research and Development Station Bacau
Cucu George-Valentin	S.C.Topo Miniera S.R.L, Constanta
Daboudet Théo	UMR-T 1158, BioEcoAgro, University of Lille, France
Danilov Cristian	National Institute for Marine Research and Development "Grigore Antipa", Constanta
Danilov Diana	National Institute for Marine Research and Development "Grigore Antipa", Constanta, "Dunărea de Jos" University of Galati
Dediu Lorena	"Dunărea de Jos" University of Galati
Despina Cristina	"Danube Delta" National Institute for Research and Development, Tulcea
Dibolscaia Natalia	Institute of Zoology, State University of Moldova

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Dinu Valentin	University of Bucharest, Doctoral School of Ecology
Dobrescu Codruța Mihaela	National University of Science and Technology Politehnica Bucharest, Pitesti University Center
Docan Angelica	"Dunărea de Jos" University of Galati
Doroftei Mihai	"Danube Delta" National Institute for Research and Development, Tulcea
Doroșencu Alexandru- Cătălin	"Danube Delta" National Institute for Research and Development, Tulcea
Drăgan Ana-Maria	"Ovidius" University of Constanta, Chelonia Association, Bucharest
Drăgan Ovidiu	"Ovidius" University of Constanta, Doctoral School of Applied Sciences (Biology)
Dumbravă Amalia-Raluca	University of Oradea, Doctoral School of Biomedical Sciences
Dușcu Dumitru-Mircea	University of Bucharest, Doctoral School of Ecology
Duță Raluca-Elena	"Al. I. Cuza" University of Iasi
EI-Sabeh Amada	"Al. I. Cuza" University of Iasi, BioActive Research Group
Enache Ioana	University of Bucharest
Ene Liliana	"Danube Delta" National Institute for Research and Development, Tulcea
Ene Mădălina	"Al. I. Cuza" University of Iasi
Făgăraș Marius	"Ovidius" University of Constanta
Fănaru Geanina	"Ovidius" University of Constanta
Fînaru Adriana-Luminița	"Vasile Alecsandri" University of Bacau
Florea Luiza	"Dunărea de Jos" University of Galati
Franciuc Răzvan	"Unirea" National College, Focsani
Fulga Nina	Institute of Zoology, State University of Moldova
Gache Carmen	"Al. I. Cuza" University of Iasi
Gavril Viorel Dumitru	Romanian Academy, Institute of Biology, Bucharest
Gavrilescu Carla	"Ovidius" University of Constanta, Doctoral School of Applied Sciences (Biology)
Georgescu Ana Maria	"Vasile Alecsandri" University of Bacau
Gherghel Iulian	"Al. I. Cuza" University of Iasi, Institute of Interdisciplinary Research, "Ovidius" University, Constanța
Ghimici Anamaria	"Unirea" National College, Focsani
Gorgan Dragoș-Lucian	"Al. I. Cuza" University of Iasi
Greco Iulia	"Dunărea de Jos" University of Galati
Grigoraș Gabriela	"Dunărea de Jos" University of Galati, Museum Complex of Natural Sciences, Galati
Grigoraș Ion	"Danube Delta" National Institute for Research and Development, Tulcea

Grigorescu Florentina	University of Bucharest
Grosu Luminița	"Vasile Alecsandri" University of Bacau
Groza Vasilica-Monica	Romanian Academy, Iasi Branch
Gurău Gabriela	Natural Science Museum Complex "Ion Borcea", Bacau
Gurău Milian	"Vasile Alecsandri" University of Bacau
Hanganu Jenică	"Danube Delta" National Institute for Research and Development, Tulcea
Honț Ștefan	"Danube Delta" National Institute for Research and Development, Tulcea
Hortolomeu Andreea	"Vasile Alecsandri" University of Bacau
Ianău Delia Andreea	"Vasile Alecsandri" University of Bacau
Iani Marian	"Danube Delta" National Institute for Research and Development, Tulcea
Ibram Orhan	"Danube Delta" National Institute for Research and Development, Tulcea
Ignat Andreea Beatrice	Vegetable Research and Development Station Bacau
Ion Mihaela	Romanian Academy, Institute of Biology, Bucharest
Iordănescu Vlad	West University of Timisoara
Iorgu Elena	"Ștefan cel Mare" University of Suceava
Iorgu Ionuț	"Ștefan cel Mare" University of Suceava
Iosob Gabriel-Alin	Vegetable Research and Development Station Bacau
Istrati Sorina	Institute of Zoology, State University of Moldova
Ivănescu Lăcrămioara	"Al. I. Cuza" University of Iasi
Jurminskaia Olga	Institute of Zoology, State University of Moldova
Kiss Botond	"Danube Delta" National Institute for Research and Development, Tulcea
Krier François	UMR-T 1158, BioEcoAgro, University of Lille, France
Larion Alina	Institute of Zoology, State University of Moldova
Laza Antonio	West University of Timisoara, Centre for Protected Areas and Sustainable Development, Oradea
Lazăr Anamaria	Transylvania University of Brasov
Lefter Radu	Center of Biomedical Research, Romanian Academy, Iasi
Leșanu Mihai	State University of Moldova, Chisinau
Lungu Simona	University of Bucharest, Doctoral School of Ecology
Lupu Gabriel	"Danube Delta" National Institute for Research and Development, Tulcea
Lupu Larisa	"Ovidius" University of Constanta

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Maftai Diana Elena	"Vasile Alecsandri" University of Bacau
Manci Cosmin-Ovidiu	"Grigore Antipa" National Museum of Natural History, Bucharest, "Oceanic-Club" Oceanographic Research and Marine Environment Protection Society
Mantea Loredana-Elena	"Al. I. Cuza" University of Iasi, BioActive Research Group
Mare Roșca Oana	Technical University of Cluj-Napoca, North Baia Mare University Center
Marinov Mihai	"Danube Delta" National Institute for Research and Development, Tulcea
Martin Andrada	West University of Timisoara
Martin Ryan Andrew	Case Western Reserve University, Cleveland, Ohio, United States of America
Maxim Roxana	"Al. I. Cuza" University of Iasi, Doctoral School of Geosciences
Măceșanu Daniela	"Ovidius" University of Constanta, Doctoral School of Applied Sciences (Biology)
Melenciu Raluca	"Ovidius" University of Constanta
Memedemin Daniyar	"Ovidius" University of Constanta
Mîrleneanu Andreea	University of Bucharest
Mierlă Marian	"Danube Delta" National Institute for Research and Development, Tulcea
Mihălcescu Ana-Maria	"Ovidius" University of Constanta
Mihășan Marius	"Al. I. Cuza" University of Iasi, BioActive Research Group
Mirila Diana-Carmen	"Vasile Alecsandri" University of Bacau
Miron Anca	"Grigore T. Popa" University of Medicine and Pharmacy, Iasi
Mitroiu Ștefania	National University of Science and Technology Politehnica Bucharest, Pitesti University Center
Moldovan Anna	Institute of Zoology, State University of Moldova
Moșneguțu Emilia	"Vasile Alecsandri" University of Bacau
Muntianu Gabriela	"Vasile Alecsandri" University of Bacau
Munteanu-Molotievskiy Natalia	Institute of Zoology, State University of Moldova
Murariu Dumitru	Romanian Academy, Institute of Biology, Bucharest
Nae Ioana	Romanian Academy, "Emil Racoviță" Institute of Speology, Bucharest
Năstase Aurel	"Danube Delta" National Institute for Research and Development, Tulcea
Nicoară Mircea Nicușor	"Al. I. Cuza" University of Iasi
Nicuță Daniela	"Vasile Alecsandri" University of Bacau
Nistor Ileana-Denisa	"Vasile Alecsandri" University of Bacau
Nistreanu Victoria	Institute of Zoology, State University of Moldova

Niță Darmina	University of Bucharest, Doctoral School of Ecology
Niță Narcis-Teodor	"Vasile Alecsandri" University of Bacau, Doctoral School
Olaru Alexandra	West University of Timisoara
Opran Robert	Romanian Academy, "Emil Racoviță" Institute of Speology, Bucharest
Oprea Adrian	"Anastasiu Fătu" Botanical Garden, Iasi
Paraschiv Gabriela Mihaela	"Ovidius" University of Constanta
Paraschiv Marian	"Danube Delta" National Institute for Research and Development, Tulcea
Patriciu Oana-Irina	"Vasile Alecsandri" University of Bacau
Păduraru Emanuela	"Al. I. Cuza" Iasi University of Iasi, Doctoral School of Geosciences
Pârvulescu Lucian	West University of Timisoara, Environmental Advanced Research Institute, West University of Timisoara
Petreanu Ionuț-Cătălin	"Al. I. Cuza" University of Iasi
Petrovici Milca	West University of Timisoara
Pitic Alina	Centre for Protected Areas and Sustainable Development, Oradea
Platon Nicoleta	"Vasile Alecsandri" University of Bacau
Plavan Gabriel	"Al. I. Cuza" University of Iasi
Plăiașu Rodica	Romanian Academy, "Emil Racoviță" Institute of Speology, Bucharest
Pohonțu Corneliu-Mihăiță	"Ștefan cel Mare" University of Suceava
Popa Alexandra	"Grigore Antipa" National Museum of Natural History, Bucharest
Popa Luis Ovidiu	"Grigore Antipa" National Museum of Natural History, Bucharest
Popa Oana Paula	"Grigore Antipa" National Museum of Natural History, Bucharest
Popa Teodora Ramona	"Mihail Sadoveanu" National College, Pascani, Romania
Popescu Cristina-Maria	University of Bucharest
Popescu (Stegarus) Diana Ionela	National Research and Development Institute for Cryogenics and Isotopic Technologies – ICSI Ramnicu Valcea
Popescul Ovidiu	Praxis Medica, Iasi
Popovici Mariana	Romanian Academy, Iasi Branch
Porea Daniela	"Danube Delta" National Institute for Research and Development, Tulcea
Postolache Carmen	University of Bucharest
Rarinca Viorica	"Al. I. Cuza" University of Iasi, Doctoral School of Geosciences

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Rați Ioan Viorel	"Vasile Alecsandri" University of Bacau
Rădac Alexandru	University of Bucharest
Rădac Ionela	National Museum of Banat, Timisoara
Răducanu Dumitra	"Vasile Alecsandri" University of Bacau
Răileanu Ștefan	"Danube Delta" National Institute for Research and Development, Tulcea
Rîșnoveanu Geta	University of Bucharest
Românu Rareș-Ciprian	West University of Timisoara
Roșu Ana Maria	"Vasile Alecsandri" University of Bacau
Rusu Angelica	"Al. I. Cuza" University of Iasi, Doctoral School of Geosciences
Rusu Lăcrămioara	"Vasile Alecsandri" University of Bacau
Samargiu Manuela Diana	"Ovidius" University of Constanta
Sándor Attila	"Babeș-Bolyai" University, Cluj-Napoca
Sandu Alexandra	University of Bucharest, Doctoral School of Ecology
Sava Daciana	"Ovidius" University of Constanta
Săhlean Tiberiu	"Al. I. Cuza" University of Iasi, Institute of Interdisciplinary Research, Romanian Academy, Institute of Biology, Bucharest
Săvucă Alexandra	"Al. I. Cuza" University of Iași, Doctoral School of Geosciences
Sârbu Culiță	„Ion Ionescu de la Brad” University of Life Sciences, Iași
Severin Denisa	Vegetable Research and Development Station Bacau
Sevianu Eliana	"Babeș-Bolyai" University, Cluj-Napoca
Simionov Ira	"Dunărea de Jos" University of Galati
Simionov Matei	"Danube Delta" National Institute for Research and Development, Tulcea
Sinitean Adrian	West University of Timisoara
Sitar Cristian	"Babeș-Bolyai" University, Cluj-Napoca, Zoological Museum, Romanian Academy, "Emil Racoviță" Speological Institute, Cluj-Napoca
Sitar Geanina-Magdalena	"Babeș-Bolyai" University, Cluj-Napoca, Doctoral School "Education, Reflection, Development", University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca
Sîrbu Ioan	"Lucian Blaga" University of Sibiu
Sîtnic Veaceslav	Institute of Zoology, State University of Moldova
Sîtnic Victor	Institute of Zoology, State University of Moldova
Skolka Marius	"Ovidius" University of Constanta
Soare Cristina	National University of Science and Technology Politehnica Bucharest, Pitesti University Center

Spaseni Petronel	"Al. I. Cuza" University of Iasi, Institute of Interdisciplinary Research
Stănciugelu Maria	"Lucian Blaga" University of Sibiu
Stănescu Florina	"Ovidius" University of Constanta, Doctoral School of Applied Sciences (Biology)
Stoica Ionuț	"Vasile Alecsandri" University of Bacau
Strugariu Alexandru	"Al. I. Cuza" University of Iasi, Institute of Interdisciplinary Research
Strungaru-Jijie Roxana	"Al. I. Cuza" University of Iasi, Institute of Interdisciplinary Research
Suceveanu Elena-Mirela	"Vasile Alecsandri" University of Bacau
Szekely Diana	Universidad Tecnica Particular de Loja, Ecuador
Suliman Iasemin	"Danube Delta" National Institute for Research and Development, Tulcea
Surugiu Victor	"Al. I. Cuza" University of Iasi
Șerban Cecilia	"Dunărea de Jos" University of Galati, Museum Complex of Natural Sciences, Galati
Șoimu Alexandra	Chelonia Association, Bucharest
Ștefan Gabriela Alina	"Ștefan cel Mare" University of Suceava
Ștefan Marius	"Al. I. Cuza" University of Iași, BioActive Research Group
Șuțan Nicoleta Anca	National University of Science and Technology Politehnica Bucharest, Pitesti University Center
Tănase Cătălin	"Al. I. Cuza" University of Iasi
Tănase Teodora	Chelonia Association, Bucharest
Teodorescu Cerasela	"Ștefan cel Mare" University of Suceava
Țiță Daniela	Emergency County Hospital, Bacau
Țiță Diana Ioana	Coltea Clinical Hospital, Bucharest
Tofan Lucica	"Ovidius" University of Constanta
Togor Andrei	Aqua Crisius Assosiation, Oradea
Tošić Katarina	University of Belgrade, Faculty of Biology, Serbia
Trifanov Cristian	"Danube Delta" National Institute for Research and Development, Tulcea
Tudor Marian	"Danube Delta" National Institute for Research and Development, Tulcea
Tudor Marian	"Ovidius" University of Constanta
Tudor Mihaela	"Danube Delta" National Institute for Research and Development, Tulcea
Tudose Cezara	University of Bucharest, Doctoral School of Ecology
Tumanova Daria	Institute of Zoology, State University of Moldova
Ungureanu Grigore	Institute of Zoology, State University of Moldova

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Ungureanu Laurenția	Institute of Zoology, State University of Moldova
Ureche Camelia	"Vasile Alecsandri" University of Bacau
Ureche Dorel	"Vasile Alecsandri" University of Bacau
Uță Georgiana	Regional Research and Development Center for Innovative Materials, Products and Processes from Automotive Industry, Pitesti University Center
Vartolomei Nicoleta	"Vasile Alecsandri" University of Bacau
Vicol Viviana	"Al. I. Cuza" University of Iasi
Vîlcoci Denisa Ștefania	Regional Research and Development Center for Innovative Materials, Products and Processes from Automotive Industry, Pitești University Center
Vlad Sabina	"Ovidius" University of Constanța
Voicu Roxana Elena	"Vasile Alecsandri" University of Bacau
Zamfirache Maria-Magdalena	"Al. I. Cuza" University of Iasi
Zamfirescu Ștefan	"Al. I. Cuza" University of Iasi
Zănoagă Teodora-Roxana	West University of Timisoara