

**ПЛОВДИВСКИ УНИВЕРСИТЕТ „ПАИСИЙ ХИЛЕНДАРСКИ”
БИОЛОГИЧЕСКИ ФАКУЛТЕТ • КАТЕДРА „ЕКОЛОГИЯ И ООС”**

**UNIVERSITY OF PLOVDIV „PAISII HILENDARSKI” • FACULTY OF BIOLOGY
DEPARTMENT OF ECOLOGY AND ENVIRONMENTAL CONSERVATION**



THIRD SCIENTIFIC CONFERENCE ON ECOLOGY

*on the occasion of the 30th anniversary of
Department of Ecology and Environmental Conservation,
Faculty of Biology, University of Plovdiv „Paisii Hilendarski”*

PROGRAM & ABSTRACTS

ТРЕТА НАУЧНА КОНФЕРЕНЦИЯ ПО ЕКОЛОГИЯ

*по повод 30 години от създаването на катедра
„Екология и опазване на околната среда”,
Биологически факултет, ПУ „Паисий Хилендарски”*

ПРОГРАМА & РЕЗЮМЕТА

2-3 ноември 2018 г., гр. Пловдив
November 2nd-3rd 2018, Plovdiv

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Organizing committee:

Prof. Iliana Velcheva, PhD
Assoc. Prof. Dilian Georgiev, DSc
Assoc. Prof. Gana Gecheva, PhD
Ch. Assist. Prof. Ivelin Mollov, PhD
Ch. Assist. Prof. Slaveya Petrova, PhD
Ch. Assist. Prof. Vesela Yancheva, PhD
Ch. Assist. Prof. Atanas Irikov, PhD
Ch. Assist. Prof. Stela Stoyanova, PhD
Borislava Todorova
Bogdan Nikolov



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FOREWORD

The Third Scientific Conference on Ecology is organized to commemorate the 30th anniversary of the Department of Ecology and Environmental Conservation, Faculty of Biology, University of Plovdiv „Paisii Hilendarski“. The conference will be held in Plovdiv (Bulgaria) on November 2nd-3rd 2018. On November 1st 2018 will be held the Tenth Student's Scientific Conference „Ecology – A Way of Thinking“ 10 (for Bulgarian students and PhD students only).

The conference aims to provide an ideal platform for people to share research ideas and experiences in the fields of Ecology, Environmental Conservation and related areas. Traditionally the conference will be held in three thematic sections:

- *Biodiversity and conservation biology*
- *Applied ecology*
- *Ecological education and management*

Topics of interest include, but are not limited to: ecology and conservation of microorganisms, plants, aquatic and terrestrial animals, physiological ecology, behavioral ecology, population ecology, population genetics, community ecology, plant-animal interactions, ecosystem ecology, parasitology, animal evolution, ecological monitoring and bioindication, landscape and urban ecology, conservation ecology, ecotoxicology, marine biology, ecological education and legislation, as well as new methodical contributions in ecology.

Organizing committee

ВЪВЕДЕНИЕ

Третата юбилейна конференция по екология по повод 30 години от основаването на Катедра „Екология и ООС“ към Биологически факултет, ПУ „Паисий Хилендарски“, ще се проведе в гр. Пловдив на 2-3 ноември 2018 г. На 1 ноември 2018 г. ще се състои Десета студентска научна конференция „Екологията – начин на мислене“ 10 (само за български студенти и докторанти).

Целта на конференцията е да осигури възможност за обмен на идеи и постижения в областта на Екологията, Опазването на околната среда, Консервационната екология и други близки науки. Конференцията се провежда в три тематични секции:

- Биоразнообразие и консервационна биология;
- Приложна екология;
- Екологично образование и мениджмънт.

Област на изследванията: екология на животните, екология на растенията, екология на микроорганизмите, екология на екосистемите, физиологична екология, поведенческа екология, еволюционна екология, морска екология, екотоксикология, ландшафтна и градска екология, консервационна екология, паразитология, популационна екология, екологичен мониторинг и биоиндикация, както и нови методически приноси в екологията.

Организационен комитет

INTRODUCTION

The Department of Ecology and Environmental Conservation is a specialized structural link at the Faculty of Biology, University of Plovdiv „Paisii Hilendarski“. Its main task is to organize and carry out educational, scientific and applicable activities in the field of ecology and environmental conservation.

The department has significant role in the teaching courses for obtaining the educational-qualification degree „Bachelor of science“ of „Ecology and Environmental Conservation“, „Ecological biotechnologies“, „Applied and industrial ecology“, „Biology“, „Medicinal Biology“, „Biology & Chemistry“, „Biology & English“, „Bioinformatics“ and „Pharmaceutical biotechnologies“; „Master of science“ of „Ecology and ecosystems conservation“ and „Ecology, Management and Control of the Environment“ and also PhD on „Ecology and ecosystems conservation“. The scientific production of the department is rich, various and purposeful by its content.

ПРЕДСТАВЯНЕ

Катедра „Екология и опазване на околната среда“ е специализирано структурно звено към Биологическия факултет на ПУ „Паисий Хилендарски“. Основната ѝ задача е да организира и провежда учебна, научно-изследователска и приложна дейност в областта на екологията и опазването на природата.

Катедрата участва активно в провеждането обучение за придобиване на бакалавърска степен по „Екология и опазване на околната среда“, „Екология на биотехнологичните производства“, „Приложна и индустриална екология“, „Биология“, „Медицинска биология“, „Биология и химия“, „Биология и английски език“, „Биоинформатика“ и „Фармацевтични биотехнологии“; магистърска степен по „Екология и опазване на екосистемите“ и „Екология, управление и контрол на околната среда“; както и научната и образователна степен доктор по „Екология и опазване на екосистемите“. Научната продукция на катедрата е богата, разнообразна по форма и целенасочена по съдържание.



PROGRAM

Day 1 (November 2nd 2018)

9:00-10:30 – Registration and preparation for the Poster session

10:30-10:45 – Opening („Trakia“ Hall, Trimontium Hotel)

10:45-11:00 – Greetings

11:00-11:30 – Plenary presentation: Prof. Nesho Chipev, PhD - „Globalization of ecology and ecology of globalization“

11:30-12:00 – Plenary presentation: Prof. Yordan Uzunov, PhD - „Bio-monitoring or monitoring of biodiversity?“

12:00-13:00 - Poster session

13:00-14:00 – Lunch break (the restaurant on the first floor, next to the reception)

14:00-16:00 – Oral presentations

16:00-16:30 – Coffee break

16:30-18:15 – Oral presentations

19:00 – Official Dinner („Ambassador“ Restaurant)

Day 2 (November 3rd 2018)

Visit to the Regional Natural History Museum - Plovdiv.

СЕКЦИЯ „БИОРАЗНООБРАЗИЕ И КОНСЕРВАЦИОННА БИОЛОГИЯ”
SECTION „BIODIVERSITY AND CONSERVATION BIOLOGY”

Председател: Доц. дбн Д. Георгиев / Chairman: Assoc. Prof. D. Georgiev, DSc
Секретар: Гл. ас. д-р И. Моллов / Secretary: Ch. Assist. Prof. I. Mollov, PhD

Доклади / Oral presentations

- 14:00-14:15** **Author(s):** Dimitar Stoykov
Title: Lichenized fungi (Ascomycota) from Central Rilski Reserve (Rila Mts.)
- 14:15-14:30** **Author(s):** Mila Ihtimanska, Julia Ilkova, Paraskeva Michailova
Title: Biodiversity of family Chironomidae (Diptera) in Srebarna Lake (North-East Bulgaria) and genome instability of some species from genus *Chironomus* Meigen, 1803
- 14:30-14:45** **Author(s):** George Manolev, Lilia Philipova, Alexander Pulev, Lidia Sakelarieva
Title: A Checklist of the Herpetofauna in the Bulgarian Part of Hadzhidimovo Gorge (South-Western Bulgaria)
- 14:45-15:00** **Author(s):** Gradimir Gradev, Stilyana Yaneva, Tatyana Bileva
Title: Review of Colour Ring Schemes Applied for Individual Marking of Birds in Bulgaria
- 15:00-15:15** **Author(s):** Kostadinka Todorova
Title: A new Habitat of *Adiantum Raddianum* (*Adiantum capillus-veneris*) near Kardzhali

Постерна сесия (12:00-13:00 ч.) / Poster session (12:00-13:00 pm)

Председател: Проф. д-р И. Велчева / Chairman: Prof. I. Velcheva, PhD
Секретар: Гл. ас. д-р С. Петрова / Secretary: Ch. Assist. Prof. S. Petrova, PhD
Секретар: Гл. ас. д-р С. Стоянова / Secretary: Ch. Assist. Prof. S. Stoyanova, PhD

- 1** **Author(s):** Dimitar Stoykov, Zornitsa Stoyanova
Title: New finds of *Cladobotryum*, *Mycogone* and *Sepedonium* (Hypocreaceae, Hypocreales) in Bulgaria
- 2** **Author(s):** Krasimir Todorov, Iliya Cheshmedzhiev, Plamen Stoyanov, Tsvetelina Mladenova, Ivanka Dimitrova-Dyulgerova
Title: Taxonomic structure of the genus *Carduus* L. in Bulgaria
- 3** **Author(s):** Plamen Stoyanov, Krasimir Todorov, Ivanka Teneva, Tsvetelina Mladenova
Title: Medicinal Plants on the Territory of the Waterfall Canyon Eco-Trail (Soskovcheto Reserve, The Western Rhodopes)

- Author(s):** Ivelin Mollov
Title: Assessment of the conservation significance and the threats of the amphibians and reptiles from three wetlands with different degree of anthropogenic influence (South Bulgaria)
- Author(s):** Tzenka Radoukova, Maria Lacheva, Miroslava Ivanova, Lilko Dospatliev
Title: Determination of the total nitrogen content and anatomical study of the leaves epidermal cells from plant species in urban and mountainous environments
- Author(s):** Lilko Dospatliev, Maria Lacheva, Miroslava Ivanova, Tzenka Radoukova
Title: Determination of the total Phosphorus content and anatomical study on stomata of plant species in urban and mountainous environments
- Author(s):** Tzenka Radoukova, Ivanka Dimitrova-Dyulgerova, Rumen Mladenov, Plamen Stoyanov
Title: Phytoecological Study of Selected Wetlands in Southern Bulgaria
- Author(s):** Plamen Stoyanov, Ivanka Dimitrova-Dyulgerova, Tzenka Radoukova, Rumen Mladenov
Title: Floristic Diversity of Certain Wetlands in Southern Bulgaria
- Author(s):** Ivanka Teneva, Diyana Basheva, Tsvetelina Mladenova, Plamen Stoyanov, Detelina Belkinova, Rumen Mladenov
Title: Species composition and toxic potential of Cyanobacteria in some Western Rhodopes dams
- Author(s):** Monika Subeva, Vesela Evtimova, Lyubomir Kenderov, Dimitriy Dashinov, Teodora Teofilova, Desislava Stoianova, Galia Georgieva, Yordan Uzunov, Yanka Vidinova
Title: Ecological potential and benthic macroinvertebrate composition of eight Reservoirs, Bulgaria
- Author(s):** Ina Aneva, Petar Zhelev, Stoyan Stoyanov, Milena Nikolova, Ivan Evtimov, Todor Karakiev, Julian Marinov, Kristina Georgieva
Title: Survey on the distribution and diversity of genus *Thymus* in Bulgaria
- Author(s):** Ina Aneva, Peter Zhelev
Title: The Ecological and Floristic Characteristics of Populations of *Sideritis scardica* Griseb. in Olympus Mts.
- Author(s):** Anelia Stojanova
Title: Vertical distribution, seasonal activity and zoogeographical characteristics of Eurytomids (Hymenoptera: Eurytomidae) of Rhodope Mts., Bulgaria
- Author(s):** Stilyana Yaneva, Gradimir Gradev, Simeon Marin, Tatyana Bileva
Title: Implementation a Scheme for Individual Tracking with Colour PVC Ring in the Course of the Lesser Kestrel (*Falco naumanni*) Recovery as Breeder in Bulgaria

- 15** **Author(s):** Stanislava Peeva
Title: On the activity of Edible dormouse (*Glis glis* Linnaeus, 1766) in the central part of Stara Planina Mts. (Bulgaria)
- 16** **Author(s):** Yanko Yankov, Dian Georgiev
Title: Terrestrial snails (Molluska: Gastropoda) as Intermediate Hosts of Protostrongylid Nematodes in balkan chamois in the regions of Western Rodopi Mts and Pirin Mts., Bulgaria: Preliminary data
- 17** **Author(s):** Jovana Pantovic, Aneta Sabovljevic, Marko Sabovljevic
Title: Conservation of bryophytes: case study on nationally rare and threatened moss *Rhodobryum ontariense*
- 18** **Author(s):** Jovana Pantovic, Marko S. Sabovljevic
Title: The phenomenon of rarity amongst bryophytes in Serbia

СЕКЦИЯ „ПРИЛОЖНА ЕКОЛОГИЯ” SECTION „APPLIED ECOLOGY”

Председател: доц. д-р Г. Гечева / Chairman: Assoc. Prof. G. Gecheva, PhD
Секретар: гл. ас. д-р В. Янчева / Secretary: Ch. Assist. Prof. V. Yancheva, PhD

Доклади / Oral presentations

- 15:15-15:30** **Author(s):** Biljana Rimcheska, Yanka Vidinova
Title: Ecological status assessment of mountainous and semi-mountainous streams of Belasitsa and Ograzhden Mts. via different biotic indices based on benthic macroinvertebrates - the case study on Macedonian territory
- 15:30-15:45** **Author(s):** Rabia Soufi, Violeta Tyufekchieva, Vesela Evtimova, Maria Kerakova-Geleva, Galia Georgieva, Desislava Stoianova, Stefan Stoichev, Ivailo Dedov, Yanka Vidinova
Title: An „INTERCALIBRATION EXERCISE” of different river types in Bulgaria using benthic macroinvertebrates
- 15:45-16:00** **Author(s):** Veska Georgieva, Nadezhda Shopova, Valentin Kazandjiev, Petya Malasheva
Title: Temperature conditions of the soil in the region of the southeastern part of Thracian Plain and the development of the spring crops
- 16:30-16:45** **Author(s):** S. Dzhoglov, V. Mitkovska, D. Boyadzhiev, E. N. Ivanova
Title: Complex study on dependence between some sperm quality parameters and denaturation of DNA in spermatozoa in accordance with environmental and lifestyle factors
- 16:45-17:00** **Author(s):** E. N. Ivanova, A. Alexandrova-Karamanova, S. Ivanov, S. Grozeva, M. Georgieva, T. Dimitrova, T. Hayverova
Title: Characteristics of personality in people with musical talent and other talents
- 17:00-17:15** **Author(s):** E. N. Ivanova, A. Alexandrova-Karamanova, D. Lazarova, B. Bozhinova, E. Karadzhova
Title: Some health problems and their relationship to the basic characteristics of personality
- 17:15-17:30** **Author(s):** S. Dzhoglov, D. Boyadzhiev, E. N. Ivanova
Title: Environment and lifestyle factors in association with some male semen quality parameters
- 17:30-17:45** **Author(s):** Bogdan Nikolov, Iliana Velcheva, Elena Zheleva, Slaveya Petrova
Title: Content of heavy metals and toxic elements in soils from the park zone of the Natural Monument Bunardzhik
- 17:45-18:00** **Author(s):** Vesela Mitkovska, Elena Kirilova, Hristo Dimitrov, Tsenka Chassovnikarova
Title: Nuclear abnormalities in erythrocytes of marsh frog (*Pelophylax ridibundus* Pallas, 1771) from rice fields

Постерна сесия (12:00-13:00 ч.) / Poster session (12:00-13:00 pm)

Председател: Проф. д-р И. Велчева / Chairman: Prof. I. Velcheva, PhD

Секретар: Гл. ас. д-р С. Петрова / Secretary: Ch. Assist. Prof. S. Petrova, PhD

Секретар: Гл. ас. д-р С. Стоянова / Secretary: Ch. Assist. Prof. S. Stoyanova, PhD

- 19 **Author(s):** V. Yancheva, V. Tsvetanova, P. Dimitrova, S. Stoyanova, E. Georgieva, I. Velcheva
Title: Cd and PAHs alter the gill histological structure and enzymatic activity (GPx, GRx, CAT and ACHE) in the digestive gland of zebra mussel (*Dreissena polymorpha* Pallas, 1771)
- 20 **Author(s):** Georgi Markov, Atidzhe Ahmed
Title: European roe deer (*Capreolus capreolus*) as a biomonitor for contemporary heavy metal pollution of the environment in forest mountain regions in Rhodope Mountains, Bulgaria
- 21 **Author(s):** Gana Gecheva, Yordanka Hristeva
Title: Hydromorphological pressure in mountain and semi-mountain rivers: response of macrophyte communities
- 22 **Author(s):** Poli Chonova, Gana Gecheva, Nikolina Gribacheva
Title: Air pollution biomonitoring in urban ecosystems
- 23 **Author(s):** Ivan Stoyanov, Penka Vasileva, Teodora Popova, Betina Slavova
Title: The effects of lead and cadmium on cell division and chromosomal structure in *Allium cepa* test system *in vivo*
- 24 **Author(s):** Y. Stefanov, I. Iliev, M. Marhova, B. Stefanova, S. Kostadinova
Title: Isolation and purification of proteolytic enzymes, produced from strains of genus *Bacillus*
- 25 **Author(s):** Marin Smilyanov, Emilia Varadinova, Galia Georgieva
Title: Application of experimental metrics based on macrozoobenthos for ecological status assessment of Bulgarian standing water bodies
- 26 **Author(s):** Emilia Varadinova, Slaviniya Kotsakova, Radka Fikova
Title: Current ecological status of the Chetirka (Logodashka) River and tributaries classified by macrozoobenthos
- 27 **Author(s):** Bistra Dikova, Milena Nikolova, Anatoli Dzhurmanski
Title: Preliminary study for inhibition of plant viruses by ecologically pure product – extract of *Leuzea carthamoides*
- 28 **Author(s):** Milena Nikolova, Strahil Berkov
Title: Use of essential oils as natural herbicides
- 29 **Author(s):** Sonya Damyanova, Emilia Varadinova
Title: Ecological State Assessment of Batova River

- 30** **Author(s):** Gorica Djelic, Milica Novakovic, Snezana Brankovic, Sinisa Timotijevic, Zoran Simic
Title: Comparative analysis of metal bioaccumulation et species *Petroselinum crispum* Mill., *Seseli rigidum* W. et K. , *Daucus carota* L., *Conium maculatum* L.
- 31** **Author(s):** Veska Georgieva, Nadezhda Shopova, Valentin Kazandjiev
Title: Assessment of some agro-meteorological service products
- 32** **Author(s):** Ivan Iliev, Marinela Tsankova, Sonya Kostadinova, Natalia Iovova, Mariana Marhova
Title: Community Level Physiological Profiles of Natural and Constructed Wetland Soils along the Maritsa River, Southern Bulgaria
- 33** **Author(s):** Mariana Marhova, Marinela Tsankova, Sonya Kostadinova, Ivan Iliev
Title: Microbial community structure and its biofilm forming capacity in wetland soils, Southern Bulgaria
- 34** **Author(s):** E. Valcheva, V. Popov, P. Marinov-Serafimov, I. Golubinova, B. Nikolov, I. Velcheva, S. Petrova
Title: A case study of allelopathic effect of parsley, dill, onion and carrots on the germination and initial development of tomato plants
- 35** **Author(s):** R. Stoyanova, S. Tomov, N. Nedeva, I. Velcheva, V. Yancheva, E. Georgieva, S. Stoyanova
Title: Effects of exogenous environmental factors and their correlation with sperm parameters in sub/infertile men after treatment with PAPA® nutritional supplement
- 36** **Author(s):** E. Georgieva, V. Yancheva, I. Velcheva, S. Stoyanova
Title: Histochemical and histological changes in liver of rodents and amphibians from Tsalapitsa rice-fields, Bulgaria
- 37** **Author(s):** Vesela Mitkovska, Hristo Dimitrov, Tsenka Chassovnikarova
Title: Induction of erythrocytic nuclear abnormalities by allowable concentration of cadmium in Common carp (*Cyprinus carpio* L.)
- 38** **Author(s):** Velizar Gochev, Zdravka Velkova, Gergana Kirova, Sonia Kostadinova, Jordan Stefanov, Kostadinka Todorova
Title: Biosorption of lead (II), cadmium (II) and mercury (II) from aqueous solutions by immobilized biosorbent of *Bacillus thuringiensis*

СЕКЦИЯ „ЕКОЛОГИЧНО ОБРАЗОВАНИЕ И МЕНИДЖМЪНТ” SECTION „ECOLOGICAL EDUCATION AND MANAGEMENT”

Председател: доц. д-р Г. Гечева / Chairman: Assoc. Prof. G. Gecheva, PhD
Секретар: гл. ас. д-р В. Янчева / Secretary: Ch. Assist. Prof. V. Yancheva, PhD

Доклади / Oral presentations

18:00-18:15 **Author(s):** Hristina Bancheva-Preslavska, Dilyanka Bezlova
Title: Efficiency of Long- and Short-term Educational Activities for Environmental Protection in Nature Park „Vrachansky Balkan”

Постерна сесия (12:00-13:00 ч.) / Poster session (12:00-13:00 pm)

Председател: Проф. д-р И. Велчева / Chairman: Prof. I. Velcheva, PhD
Секретар: Гл. ас. д-р С. Петрова / Secretary: Ch. Assist. Prof. S. Petrova, PhD
Секретар: Гл. ас. д-р С. Стоянова / Secretary: Ch. Assist. Prof. S. Stoyanova, PhD

39 **Author(s):** Borislava Todorova, Iliana Velcheva
Title: The attitude of adolescents towards the management of food wastes

PE3IOMETA

ABSTRACTS

ПЛЕНАРНИ ДОКЛАДИ

PLENARY PRESENTATIONS

Globalization of ecology and ecology of globalization

Nesho Chipev

Institute of Biodiversity & Ecosystem Research (IBER-BASc), Sofia, BULGARIA

Abstract. Ecology begins with a simple definition - a science about the relationships between organisms and the surrounding environment. In its development, however, ecology is constantly confronted with a number of challenges: the complex hierarchical organization and the environmental properties of ecological systems, the functional role of biodiversity, the behavior of self-organized complex systems and, last but not least, the management of complex ecological and social systems. These and other challenges of the globalizing world, which shape modern concepts of nature organization and transform ecology into an integral science, will be discussed briefly.



Bio-monitoring or monitoring of biodiversity?

Yordan Uzunov

Department «Aquatic Ecosystems», Institute of Biodiversity & Ecosystem Research (IBER-BASc),
Sofia, BULGARIA

Abstract. The position and role of the monitoring as a substantial element within the process of management, including of the environment, is discussed in this report. The basic steps/activities include: forecasting and planning; regulating; provisioning (financial, material, technical, staffing); controlling, monitoring and reporting. The importance of the monitoring as an independent and objective activity which provides feedback in managerial process is underlined. Differences between „control” and „monitoring” are under discussion in comparison with other assessment activities such as study, investigation, survey, surveillance, observation and other specific measurements/evaluations designed for operational purposes.

Biological monitoring represents the systematic registration of the biotic responses of living systems to external impacts. Further discrimination between anthropogenic and natural fluctuations of the environmental variables is possible in biological monitoring. The purpose of the biomonitoring is to provide regular data with the intent to use this information in quality control programs when comparing the results obtained with reference and/or standard values, for instance, biological assessment, of the state of the environment and its components. These biotic responses can be expressed at all levels of organization of life - from the molecular level to ecosystems and biomes. It is evident that the possible biotic responses even at supra-organismal levels (biocenoses, ecosystems, biomes) could outnumber the possible impacts, which may differ mostly in their intensity. The knowledge on this overwhelming diversity of possible biotic responses from molecular to ecosystem levels is still insufficient and poorly applied for monitoring observations.

As each monitoring system, this one of the bio-monitoring is built up also on several common fundamentals: massive and complex of observations (networking of representative sites); complexity and coherence with analogous systems; unification and standardization of the methods and metrics; unification of measurement methods and parameters/metrics to be monitored; centralization of data obtained for further processing, storage, and forecasting for management purposes. Thus, the system of environmental biomonitoring represents a comprehensive, national-wide system for collection, processing, storage and reporting information about biophysical and/or ecological state of the objects.

There are several methods and techniques using the physiological or behavioral responses of the organisms for detection and measurement of the state of the environment. Such biotic responses have found practical implementation for bioindication while they send signals for further analysis to be undertaken. In this case such organisms could be defined as *biosensors* or *biomonitors*, rather than bioindicators. Another concept associated with the term ‘bioindicator’ is that of an organism that accumulates substances in its tissues, which, after chemical analysis, could estimate prevailing environmental concentrations. Such organisms are *bio-accumulators* of these. On the other hand, the biological indicator or *bioindicator* seems to be an organism (species) known to have particular requirements with regard to some range of environmental variables. Once these are defined, the presence of a particular species in a habitat or the expression of some biotic response indicates that the given determinand or parameter is within the ecological tolerance limits of that species.

For the purpose of biomonitoring, two groups of evaluations are most applicable: 1. Parameters or indices expressed by an *integral* in time, for instance, reporting the results of some dynamic processes at the moment of their measurement, and 2. Parameters or indices expressed by a derivative in time (*differential*), for instance, rates of some dynamic processes. There is another, third group of evaluations that does not measure quantities but that have general importance in

measuring, recording, or evidence of events such as phenological observations (first appearance of migrating birds or flowering of plants, etc.).

Three main groups of methods are commonly used for biomonitoring and bioassessment; they are mainly used for monitoring water and ambient air quality. These are: species-related methods; community-related methods; and habitat-related methods.

In terms of *monitoring the biodiversity*, the relation is likely between an object and a subject: it depends on the aims of monitoring - assessing the state of the environment by means of biological responses or the state/health of the species/populations and/or habitats.



СЕКЦИЯ „БИОРАЗНООБРАЗИЕ И КОНСЕРВАЦИОННА БИОЛОГИЯ”

SECTION „BIODIVERSITY AND CONSERVATION BIOLOGY”

Lichenized fungi (Ascomycota) from Central Rilski Reserve (Rila Mts)

Dimitar Stoykov

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Abstract. The Central Rilski reserve (Southwestern Bulgaria, Rila Mts, Rila National Park) is the most largest one in the Balkan Peninsula. The higher parts of the subalpine belt are occupied by communities of old-aged *Pinus mugo*, coniferous forests of *Pinus peuce* and *Picea abies* prevail. During a field work in July 2015 in the study areas of Central Rilski reserve (Zhultoezeren circus and along the track in direction from Sitnyakovo lift station towards Soleniya Dol stream-Musalenska Bistritsa river) additional data on the lichen diversity are collected. *Nephromopsis chlorophylla*, rare species, an indicator of unpolluted areas, was observed on apical branch of *Pinus mugo* (above the Sarugyol chalet) and on twig of *Picea abies* (near Soleniya Dol stream). Numerous thalli of *Calicium viride* (rare species, an indicator of mature forest community) were examined on bark of old coniferous trees by the Musalenska Bistritsa river. A member of genus *Clauzadea* is recorded on rocks on the track to Zhultoezeren circus. Other typical inhabitants in the studied areas are *Alectoria* spp., *Bryoria capillaris*, *B. fuscescens*, *Bryoria* spp., *Evernia divaricata*, *Usnea* spp. (all key forest indicators) along with *Baeomyces rufus*, *Cetraria islandica*, *Chaenotheca chrysocephala*, *Chaenotheca* sp., *Cladonia coniocraea*, *C. rangiferina*, *Diploschistes scruposus*, *Hypogymnia physodes*, *H. tubulosa*, *Lepraria incana*, *Parmelia sulcata*, *Pertusaria albescens*, *Platismatia glauca*, *Protoparmeliopsis muralis*, *Pseudevernia furfuracea*, *Rhizocarpon geographicum*, *Umbilicaria cylindrica*, *U. deusta*, *Thamnolia vermicularis*, *Vulpicida pinastri*. Among rarely recorded ones are *Cladonia macilenta*, *Lecanora polytropa*, *Peltigera aphthosa*, *P. venosa*, *Pertusaria lactea*, *Polychidium muscicola*, *Rinodina milvina*. Known published data on the lichen diversity from the reserve area are summarized and briefly discussed. The present work was held within the frame of the project „Update of Rila National Park Management Plan (2015-2016)“.



New finds of *Cladobotryum*, *Mycogone* and *Sepedonium* (Hypocreaceae, Hypocreales) in Bulgaria

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Abstract. Members of genus *Hypomyces* (Hypocreaceae) often cause destruction or decaying of fruit bodies from various agarics and boletes. The present study represents recently established asexual morphs of *Hypomyces chlorinigenus*, *H. chrysospermus*, *H. ochraceus* and *H. perniciosus*, aiming to contribute to the diversity, substrata and distribution of the fungicolous fungi in Bulgaria. During July 2017-August 2018 newly finds of genera *Cladobotryum* (*C. verticillatum*) - on fruit bodies of *Russula* sp. and *Lactifluus volemus* (Forebalkan) and on *Lactarius* spp. (Vitosha region) and *Sepedonium* (*S. chlorinum*) - on *Boletus aestivalis* (Forebalkan), *Scleroderma bovista*, *Scleroderma* sp. (Sofia region) and on *Xerocomus* spp. (Stara Planina Mts) are reported for the first time in Bulgaria. *Mycogone perniciosa* is recorded in the Eastern Forebalkan. Unrecorded substrata and new cholorogy information about *Sepedonium chrysospermum* in Bulgaria is presented. Foreign materials of *M. perniciosus* on cultivated *Agaricus bisporus*, taken from public market, and *S. chrysospermum* on *Alessioporus ischnusanus*, from natural environment, were examined. The initial isolations of the studied species were made from infected fruit bodies on water agar (BA). Single spores were cultivated on potato dextrose agar (PDA) for the examination of the morphologic features of the fungal colonies at the Institute of Plant Physiology and Genetics, BAS. Cultures were grown at room temperature (about 23°C) and diffuse daylight. Micromorphology of conidia and aleuriospores was observed from semipermanent microscope slides under LM, and under oil immersion. All specimens were documented from living or dried materials in natural conditions (*Cladobotryum verticillatum*, *M. perniciosus*, *Sepedonium chlorinum*, *S. chrysospermum*) or examined from aleuriospores, originated from cultures on PDA (*C. verticillatum*, *S. chlorinum*). The metric data about conidia and aleuriospores are presented in the descriptions in the form: (min-) mean $\pm$ 1 standard deviation (-max), length/width ratio.

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Biodiversity of family Chironomidae (Diptera) in Srebarna Lake (North-East Bulgaria) and genome instability of some species from genus *Chironomus* Meigen, 1803

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Abstract. The biodiversity of the family Chironomidae, Diptera in Lake Srebarna - a lake of natural origin, a Biosphere Reserve and a Ramsar Site of International Importance was studied. The conducted study revealed high concentrations of phosphates and some heavy metals (Cu, Pb, Zn Mn, Fe) in the water. High concentrations of heavy metals (Cd, Cu, Pb, Mn) in the sediment were also found. Through the detailed analysis of the external morphology of the larvae and the species-specific cytogenetic markers of the polytene chromosomes of the larvae, we established a total of 16 genera and 11 species. Ten genera and eight species were new to the fauna of the lake. For the first time, we reported malformations in the larvae of some genera *Endochironomus*, *Chironomus* and *Glyptotendipes* (0.84÷2.04%) and species (*Endochironomus tendens* - 0.29%). Genomic instability realized through somatic structural chromosomal aberrations in the polytene chromosomes of the four species of the genus *Chironomus* was found. Based on these aberrations, the Somatic index (S) was calculated (*C. nuditasis*, S-3.25; *C. annularius*, S-5.75; *C. balatonicus*, S-7.5 *C.pallidivittatus*, S-4.50). In addition, inherited chromosome aberrations have been observed, which were important for the adaptation of species to specific living conditions. The reasons of genomic instability and the importance of *Chironomus* species for determining the degree of pollution of aquatic ecosystems were discussed.

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Taxonomic structure of the genus *Carduus* L. in Bulgaria

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Abstract. A key table for species determination of the Bulgarian representatives from the genus *Carduus* was modified, basing on the findings from the biosystematical study. Taxonomic classification of *C. nutans* and *C. thoermeri* was assumed, and new floristic regions of distribution were found for six species. The species *C. uncinatus* was not confirmed for the Bulgarian flora.



Plants on the Territory of the Waterfall Canyon Eco-Trail (Soskovcheto Reserve, The Western Rhodopes)

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Abstract. The study presents data on the species diversity of medicinal plants on the territory of the Waterfall Canyon Eco-trail, part of a Soskovcheto Reserve (Western Rhodopes). 96 species are described, grouped in 42 families - Apiaceae, Aristolochiaceae, Aspidiaceae, Aspleniaceae, Asteraceae, Athyriaceae, Balsaminaceae, Betulaceae, Boraginaceae, Brassicaceae, Campanulaceae, Caprifoliaceae, Caryophyllaceae, Crassulaceae, Cupressaceae, Ericaceae, Euphorbiaceae, Fabaceae, Fagaceae, Geraniaceae, Hypericaceae, Hypolepidaceae, Lamiaceae, Liliaceae, Orchidaceae, Oxalidaceae, Pinaceae, Plantaginaceae, Poaceae, Polygonaceae, Polypodiaceae, Primulaceae, Pyrolaceae, Ranunculaceae, Rosaceae, Rubiaceae, Salicaceae, Saxifragaceae, Scrophulariaceae, Thymelaeaceae, Urticaceae, Violaceae. There are 18 medicinal plant species of conservation significance, including endemic, rare and protected species.



Assessment of the conservation significance and the threats of the amphibians and reptiles from three wetlands with different degree of anthropogenic influence (South Bulgaria)

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Abstract. The species composition and conservation significance of the amphibians and reptiles from three wetlands in South Bulgaria, with different degree of anthropogenic influence - Protected Area „Zlato pole”, rice-fields „Tsalapitsa” and rice-fields „Plovdiv” is presented in the current study. The registered contemporary threats for the herpetofauna in the studied wetlands are listed and discussed.

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Determination of the total nitrogen content and anatomical study of the leaves epidermal cells from plant species in urban and mountainous environments

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Abstract. The comparative anatomical analysis of the major epidermal cells and the total nitrogen content in the leaves of four plant species (*Juglans regia* L., *Amorpha fruticosa* L., *Laburnum anagyroides* Medic., *Syringa vulgaris* L.) growing in urban and mountainous environments is accomplished. The determinate correlation dependence between two indexes is positive. The highest ecological plasticity, from the four studied species, was reported for *Amorpha fruticosa* L., in which the number and size of major epidermal cells in urban environmental conditions is biggest (2090 for upper and 2635.1 for lower epidermis). For that same species was reported maximal contents and the minimal variation in total N mg/kg values. On the same indexes, as the least plastic concerning, is determinate *Juglans regia* L. The medium level of plasticity sowed *Laburnum anagyroides* Medic. and *Syringa vulgaris* L.



Determination of the total Phosphorus content and anatomical study on stomata of plant species in urban and mountainous environments

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Abstract. The comparative anatomical analysis of the stomata and the total phosphorus content in the leaves of four plant species (*Juglans regia* L., *Amorpha fruticosa* L., *Laburnum anagyroides* Medic., *Syringa vulgaris* L.) is accomplished. The experimental variants included two locations – the urban area (Plovdiv city) and the mountainous area (Beklemeto region, Balkan mountains). UV/VIS DR 6705 spectrophotometer (JENWAY) was used for determining the phosphorus content in the samples, the wave length for P being 410 nm (BDS ISO 11263:2002). The method of comparative anatomy was applied for the analysis of the epidermis. The highest level of resistance and the highest ecological plasticity according to the results about stomatal characteristics was reported for *Amorpha fruticosa* L. The maximal values of total phosphorus in mg/kg were reported for that same species, along with a deviation from the tendency of a decrease of the phosphorus content in mountainous environment. Although poor, the reported tendency of inverse correlation of stomatal size and the positive one of the number of stomata determines the increased content of total phosphorus in the leaves as an indicator of xeromorphy.



Phytoecological Study of Selected Wetlands in Southern Bulgaria

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Abstract. The floristic composition of vascular plants of three moisture zones, along the river Maritsa - „Rice-field Plovdiv”, protected zone (PZ) „Rice-field Tsalapitsa” and protected area (PA) „Martvitsata Zlato Pole“, was described in terms of phytogeographic elements, biological spectrum, conservation value and anthropogenic impact. The predominant floristic elements in the three areas were European-Asiatic (Eur-As) and European-Mediterranean (Eur-Med). The biological spectrum was limited to 3 life forms: predominant Therophytes (Th), followed by Hemicryptophytes (H) and a small percentage – Phanerophytes (Ph). Fifteen of the identified species have conservation status and they are included in the „IUCN Red List of Threatened Species“ with the category „least concern“. The anthropogenic impact on the floristic composition of the three areas was expressed in the presence of a large number of weed, ruderal, alien and invasive species.

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Floristic Diversity of Certain Wetlands in Southern Bulgaria

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Abstract. The two-year study on the species composition of higher plants was conducted in three moisture zones in the Maritsa river valley, Bulgaria: „Rice-field Plovdiv”, protected zone (PZ) „Rice-field Tsalapitsa” and protected area (PA) „Martvitsata Zlato Pole“. The analysis was done, using the floristic methods. There were 154 species of vascular plants identified, which belong to 125 genera and 43 families. The highest floristic diversity was found for PA „Martvitsata Zlato Pole“ – 74% of the total number of species found, followed by „Rice-field Plovdiv” (47%) and PZ „Rice-field Tsalapitsa” (36%). The families: Asteraceae, Poaceae, Fabaceae and Lamiaceae have the largest number of representatives. The total floristic composition of the three tested areas showed the predominance of dicotyledonous taxa. The comparative analysis of the biological types showed the prevalence of the perennial herbaceous plants, followed by the annual plants.

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Species composition and toxic potential of Cyanobacteria in some Western Rhodopes dams

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Abstract. Cyanobacteria are photosynthetic prokaryotes with cosmopolitan distribution. They are major producers of primary biomass and free oxygen in most of the freshwater and marine biomes on the planet. Under certain conditions of the environment, these organisms can evolve massively and cause the so-called „water blooms”. Very often these blooms are toxic due to the ability of some cyanobacteria to produce dangerous toxins (cyanotoxins) with hepatotoxic, neurotoxic or dermatotoxic effects. This determines the cyanobacteria as an ecological risk for the aquatic ecosystems as well as a threat for the health of animals and humans. Climate changes also lead to an increase in the percentage of cyanobacterial blooms. Therefore, the investigation of the species composition of this group organisms in the Bulgarian ponds, the tracking of the blooms frequencies as well as the assessment of their toxic potential is of great importance. Unfortunately, such data at this stage are scarce. This study presents data on the species composition and toxic potential of Cyanobacteria during the summer months of 2017 in five ponds (Batak, Dospat, Shiroka polyana, Golyam Beglik and Krichim dams) in the Western Rhodope Mountain. During the investigation period, except the representatives of Cyanobacteria, five algal phyla (Chlorophyta, Zygnemaphyta, Bacillariophyta, Euglenophyta and Dinoflagellata) were also found in the ponds. Only in the Krichim dam we were not able to find representatives of the phylum Zygnemaphyta. The frequency and percentage of cyanobacteria were reported. A taxonomic list of the determined cyanobacterial species is given for each water basin. In addition, a quantitative characteristic for each species (density and biomass) was performed. By using ELISA tests for cyanotoxins we have analyzed the presence of microcystins/nodularins (MCs/Nod) and saxitoxins (STXs). Cyanotoxins were found in four of the studied water basins - Dospat Dam, Batak Dam, Shiroka polyana Dam and Krichim Dam

Ecological potential and benthic macroinvertebrate composition of eight reservoirs, Bulgaria

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Abstract. Hydrobiological monitoring of eight Bulgarian reservoirs was carried out in 2015-2016. The water bodies are located in both Ecoregion 7 and 12 in the Danube River catchment (Bebresh, Telish, Godni Dabnik and Sopot Reservoirs), the West Aegean catchment area (Pchelina Reservoir) and the East Aegean catchment area (Chetirideset izvora, Konush and Sinyata reka Reservoirs). Some hydrochemical parameters of surface waters have been measured. Based on the bioindicator potential of the macrozoobenthos, a set of biotic indices and metrics was used to estimate the ecological potential of the studied reservoirs. More than 100 macroinvertebrate taxa were identified, including some alien and potentially invasive species, such as *Branchiura sowerbyi* Beddard, 1892 (Oligochaeta); *Dikerogammarus villosus* (Sowinsky, 1894) (Amphipoda), *Dreissena polymorpha* (Pallas, 1771), *Corbicula fluminea* (O.F. Muller, 1774) (Bivalvia). Three new for Bulgaria chironomids, Diptera: *Stenochironomus* sp. *Cladotanytarsus* (Cl.) *lepidocalcar* Krueger, 1938), *Cryptochironomus* (Cr.) *supplicans* (Meigen, 1830) were registered. Some of macroinvertebrate assessment tools and metrics are not applicable to every lake types for the determination of ecological potential. Further research is needed to improve and use benthic macroinvertebrate for basic element to ecological quality.

A Checklist of the Herpetofauna in the Bulgarian Part of Hadzhidimovo Gorge (South-Western Bulgaria)

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Abstract. The Bulgarian part of Hadzhidimovo Gorge (the Mesta River basin, South-Western Bulgaria) was studied in March–September 2018 in order to collect data about the local herpetofauna. A preliminary checklist of the amphibians and reptiles is presented, based on bibliographic records and the field research. The list includes 25 species. The representatives of the class Amphibia are 8 (the half of them are new for the area), and the reptiles are 17 (5 of them are new for the area). The field records for all new species (except *Pelophylax ridibundus*) as well as for the most of the known species interesting from zoogeographic point of view are specified. It is of particular interest the discovery of *Triturus ivanbureschi*, *Podarcis muralis*, and *Ablepharus kitaibelii* in the Gorge.



Survey on the distribution and diversity of genus *Thymus* in Bulgaria

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Abstract. The species of genus *Thymus* are important medicinal and aromatic plants. They provoke substantial interest worldwide from phytochemical point of view, due to their diverse biological activities with potential for application in pharmaceutical, cosmetic and food industries. The present study reports results of a survey on the distribution and diversity of the species in Bulgaria. Both field investigations and literature data were used in the study. The 20 species distributed naturally in Bulgaria differ in their natural range. The rarest species are *Thymus perinicus* (Balkan endemic) and *T. bracteosus* (its taxonomic status is under reassessment), each distributed in only one floristic region. *T. leucotrichus* and *T. stojanovii* occur in two floristic regions each, *T. longedentatus* – in four and the other species are distributed in five or more floristic regions. There are four Balkan endemics. Most widely distributed are *T. pannonicus*, *T. pulegioides* and *T. sibthorpii*, with natural localities in all 20 floristic regions in Bulgaria. Three species are of conservation importance. The richest in species floristic region was Rhodopes with 16 species followed by Pirin – 15, Stara planina – 13, and the least number of species was recorded in the Danubian plain (5). The information is being currently updated with new data and most probably, the species number will increase in most floristic regions. Still, there are many taxonomic uncertainties requiring further investigations that could result either in change of species number, or in change of status of some taxa. Field studies have shown that the species of genus *Thymus* occur in many different habitat types, ranging from sea shores, through forest and grassland habitats to the alpine zone and rock fissures and screes.

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The Ecological and Floristic Characteristics of Populations of *Sideritis scardica* Griseb. in Olympus Mts.

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Abstract. *Sideritis scardica* Griseb. (Section Empedoclia, Lamiaceae) is a valuable medicinal perennial plant and a species of high conservation value. It is a Balkan endemic and it is distributed only in Albania, Bulgaria, Greece and Macedonia. The natural localities are threatened with extremely vulnerable populations. However the species status in Greece is considered the most conserved. The current study provides information about the population state and structure, vegetation dynamics and the place of the species in habitats in Olympus Mts. Three localities (Karya, Kokkinopilos and Sparnos) of the species are investigated. Anthropogenic pressure is recorded in all three localities – flowering stems of most plants were harvested by the end of August. The localities near Karya and Sparmos are easily accessible due to well-developed road network. A list of diversity of vascular plants is made for each locality. The taxonomic structure of the flora and the ecological and biological characteristics are defined. The main geographical elements are those with Mediterranean origin.

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Vertical distribution, seasonal activity and zoogeographical characteristics of Eurytomids (Hymenoptera: Eurytomidae) of Rhodope Mts., Bulgaria

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Abstract. The analyses are based on published data of 113 Eurytomid species from 9 genera recorded from Rhodope Mountains, Bulgaria. Results of vertical distribution shows that with increasing altitude the species diversity decreases: 93 spp. (82.3%) occur in xerothermic oak belt, 75 spp. (66.4%) in mesophyllous beech belt and 65 spp. (57.5%) – in coniferous belt. Fifty species are recorded in all three belts, 24 spp. – in two and 39 spp. – only in one belt. Imaginal activity is highest in May, June and July. Established species are arranged in 10 chorotypes and the most numerous is European group with 35 spp. (30.9%), followed by Centralasiatic-European and Southeast European with 16 spp. (14.2%) each, Turano-European (14 spp., 12.4%) and Asiatic-European (13 spp., 11.5%). The Palearctic and Holarctic chorotypes include 4 spp. (3.5%) and 5 spp. (4.4%) respectively. Palearctic-Oriental (1 sp., 0.9%) and Subcosmopolitan (7 spp., 6.2%) chorotypes are due to anthropogenic impact. Two species are characterized as endemic.



Implementation a Scheme for Individual Tracking with Colour Pvc Ring in the Course of the Lesser Kestrel (*Falco naumanni*) Recovery as Breeder in Bugaria

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Abstract. For decades, it is considered that the Lesser Kestrel (*Falco naumanni*, Fleischer, 1818), which is one of the smallest species of falcons found in Europe, has disappeared from Bulgaria as a nesting species. In this connection, Green Balkans has launched a program to strengthen the population and restore as nesting the species in our country. The method of adaptation and release in nature of translocated small chicks from Spain was applied. According to the IUCN requirements, the reintroduction of species requires the monitoring of the process and its results. For the purpose each of the individuals released in nature is marked with a standard (metal) ornithological ring on one leg and specialized color PVC ring on the other leg. Considering the international schemes for the marking of Lesser Kestrel indicated by European colour-ring Birding, the team sets a unique color scheme for Bulgaria – orange PVC ring with black inscriptions, a combination of letters and / or numbers. In 2013 the first release of small chicks was made in the area of special protected area SAKAR BG0002021 which is a part of European network NATURA 2000. For the period 2013 - 2018, a total of 669 were tagged under this scheme. A similar scheme for marking with colored rings on Lesser Kestrel was applied for the first time in our country in the surveys of this rare and protected species. Marking with colored rings allows individual tracking of each bird from a close distance without their capture being necessary. Due to the fact, the behavior of birds, the process of adaptation and stay in the colony area, their migration and the formation of pairs, occupation of artificial nests and other ecological features is tracked. All this, is of key importance in the implementation of direct conservation measures in the process of restoring the species as nesting in the country and the success of the Program.

Review of Colour Ring Schemes Applied for Individual Marking of Birds in Bulgaria

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Abstract. The article presents overview of applied in Bulgaria schemes for individual marking and tracking of birds using colour rings. Use of colour rings for marking of birds allows observation and individual identification to be made from distance without catching or disturbing them. This approach increasing its implementation in the recent years – with over 20 different schemes. Data are collected on the field, throe review of literature sources, web pages and media publications. The aim was to summarized and present to the professionals and nature lovers existing different schemes and combinations of colours and codes (numbers or/and letters) used for marking, tracking and research of birds. Summarizing and presenting this data will contribute identification of bird origin. In the course of research data are collected for used colour ring schemes implemented in Bulgaria both for rare and endangered bird species such as Lesser Kestrel (*Falco naumanni*), Eastern Imperial Eagle (*Aquila heliaca*), Saker Falcon (*Falco cherrug*), Egyptian Vulture (*Neophron percnopterus*) etc., as well as for more common species such as Yellow-legged Gull (*Larus michahellis*), Raven (*Corvus corax*) etc. These schemes for tracking are used by different experts, groups and organizations as part of reintroduction or reinforcement programs, specialized researches and other scientific works.

A new Habitat of *Adiantum Raddianum* (*Adiantum capillus-veneris*) near Kardzhali

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Abstract. In the present report we announce a new habitat of the kind of fern, rare in this country, *Adiantum capillus-veneris* in the environs of the city of Kardzhali. The plant is one of the few species surviving after the last ice age. The species is protected under the Law of Biologic Diversity and is included in Bulgaria's Red Book as critically threatened. Two of the habitats in the country are in the District of Kardzhali and in the category of protected area. In the register of the Executive Agency of the Environment of protected areas and the protected zones in Bulgaria, they are indicated as a „Habitat of *Adiantum Raddianum*” at the city of Kardzhali and Oreshari. The newly found habitat is not present in the register of the Executive Agency of the Environment, is not mentioned as known and protected by the Regional Inspectorate of the Environment and Waters, Haskovo, or by the Protection of the Environment department of Kardzhali Municipality. The report aims at starting an initiative for the proclamation of a second protected area of this kind of fern next to the city and taking all the subsequent measures for protecting the population of *Adiantum capillus-veneris* in this natural habitat and also its inclusion in the Ecologic Map of Kardzhali Municipality of rare and protected species of plants.



On the activity of Edible dormouse (*Glis glis* Linnaeus, 1766) in the central part of Stara Planina Mts (Bulgaria)

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Abstract. The activity of Edible dormouse (*Glis glis* Linnaeus, 1766) in the region of National Park „Bulgarka” (Stara Planina Mts, Bulgaria) was studied using camera traps. The results showed nonstop full night activity of this species in the region (1266 m a.s.l.). It became active in the beginning of May and minimized its movements above the ground in the end of October. Some decrease in its activity was observed in August.



Terrestrial snails (Molluska: Gastropoda) as Intermediate Hosts of Protostrongylid Nematodes in balkan chamois in the regions of Western Rodopi Mts. and Pirin Mts., Bulgaria

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Abstract. The nematodes from Family Protostrongylidae Leiper, 1926 parasitize in the lungs of wild and domestic ruminants and rabbits. Adult species and larvae with invasion ability form nodules and pneumonic foci on the lungs, causing respiratory failure and secondary bacterial infection. Numerous terrestrial and freshwater snails have been registered as intermediate hosts of those parasites. Five pastures from the region of Western Rodopi Mts and Pirin Mts used from the balkan chamois (*Rupicapra rupicapra balcanica*) were studied, during the spring and summer of 2018. A total of 28 specimens of species: *Helicigona haberhaueri*, *Helicella macedonica* and *Helix pomatia* from the Pirin Mts. and 161 specimens of species: *Zebrina detrita*, *Chondrus zebra tantalus*, *Cerņuella virgata*, *Helicigona trizona rumelica*, *Cepaea vindobonensis* and *Euomphalia strigella* from the Western Rodopi Mts. were collected. The highest levels of infestation with protostrongylids were detected in *Helicella macedonica* and *Cerņuella virgata* for the pastures of Pirin Mts. and Western Rodopi Mts., respectively.

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Conservation of bryophytes: case study on nationally rare and threatened moss *Rhodobryum ontariense*

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Abstract. The moss *Rhodobryum ontariense* has been recently discovered in Serbia, as a second national member of the genus *Rhodobryum*. The population is scattered to many small patches and the main distributional area is Deliblatska sands in northeastern part of the country. It is a candidate species for the new red list of Serbian bryophytes. Compared to previously known *R. roseum*, the new species has rather specific ecology and it is able to cope with harsh environmental conditions like extreme cold, hot and drought. With aim to conserve this species we established the *in vitro* culture and propagated it. We studied it from various points of view like phylogeography, chemical content, medicinal properties, biochemistry and eco-physiology to get more idea on its biological and genetical features. Although it is present in various patches in the native stands far away one from another, it was never seen in sexual phases (i.e. sex organ or sporophyte production), neither it is clear what vegetative features can serve as propagules. Also the potential vector is unknown. We could propagate it *in vitro* from the stoloniferous stems, and produce rather good biomass. However, more investigation is needed with aim to get fully developed gametophores in *ex situ* condition. Optimization with exogenously added various plant growth regulators or sugars did not bring expected results. The species is urgently needed to be actively protected since it also has interesting features for application in industry like production of trisaccharides kestose, or effect of their extracts to blood hypertension. Thus, additional pressure to the native population is expected, and the production *in vitro* can be a solution. Here we present the first achievements in active conservation of *Rhodobryum ontariense* and discuss the novelties we have learned during protection process on the biology of this species.



The phenomenon of rarity amongst bryophytes in Serbia

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Abstract. Flora of Serbia counts 830 bryophyte taxa (1 hornwort, 142 liverworts and 687 mosses). The country has been unevenly bryologically investigated since the beginning of exploration in 1843., and even with the total of 26.559 records made, many areas are still not researched at all. During the last two decades many species have been newly recorded for the country. Analysing the occurrence and distribution of bryoflora in the 10x10km UTM quadrates, it is concluded that 70% of all quadrates in Serbia have no single bryophyte record. In total 135 bryophytes (29 liverworts and 106 mosses) were recorded in only one quadrate, while 245 taxa (49 liverworts and 196 mosses) were recorded in 2-5 quadrates. These are regarded as rare taxa in Serbia, but the phenomenon of rarity should be taken cautiously since this is partly results of under-recorded or newly recorded taxa in opposite to rarity as natural phenomenon. This should be considered with the aim to avoid extensive use of D2 IUCN criterion in forthcoming preparation of bryophyte red-lists of Serbia. Prediction of appearance of certain taxa is made taking into account species preferences (i.e. ecological indices) together with the parameters of climate types in Serbia (precipitation, temperatures and altitude). This could also be used to predict the potential occurrence of selected bryophyte areal types, or even taxonomical groups. The results obtained in prediction analysis brought new data on areas where the species should be looked for, and helped defining priority areas for the future field research. This will allow to overpass the insufficiently documented and under-recorded bryophyte flora of Serbia as well as to provide rather reliable red list.



СЕКЦИЯ „ПРИЛОЖНА ЕКОЛОГИЯ”

SECTION „APPLIED ECOLOGY”

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European roe deer (*Capreolus capreolus*) as a biomonitor for contemporary heavy metal pollution of the environment in forest mountain regions in Rhodope Mountains, Bulgaria

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Abstract. The aim of the study was to check the current loaded of liver and kidney tissues of European roe deer (*Capreolus capreolus*) inhabiting typical forest mountain region in Bulgaria by priority pollutants of the heavy metal group (Pb, Cd, Cu and Zn). The roe deer's liver and kidneys were used as test systems for determination of analytic concentrations of the studied heavy metals by an inductively coupled plasma atomic emission spectrometry (ICP-AES) using a Perkin Elmer Optima 7000 DV. The concentrations [mg/kg dry tissues] of the tested metals, specific for each organ show the limits of their variability. In the liver, the limits of the variability of element concentration are: for Cu from 29.65 to 348.86; for Zn from 13.6 to 166.57; for Pb from 0.75 to 4.78 and for Cd from 0.025 to 3.22. Respectively in the kidneys they are: for Cu from 35.66 to 61.70; for Zn from 81.41 to 224.47; for Pb from 0.35 to 9.22 and for Cd from 8.87 to 35.82. The results of this study show that the roe deer in the mountainous regions of the Rhodope Mountains is suitable for use as a biomonitor for contemporary heavy metal environmental pollution in the trophic area of the big game in the forest mountain regions of Bulgaria. Established results create a baseline for the estimation of current heavy metal accumulation in roe deer. They offer an opportunity for it to be used as a bioindicator of future potential anthropogenic negative impact on the environment in forest regions of the country, under the conditions of modern anthropogenic activities therein.

Acknowledgements. This study was supported by the project №ДФНП-17-50/26.07.2017 „Study of the roe deer (*Capreolus capreolus* L.) in Bulgaria as accumulation bioindicator of heavy metals in the environment” developed in the „Program to support young scientists and doctoral students of BAS-2017”.

Hydromorphological pressure in mountain and semi-mountain rivers: response of macrophyte communities

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Abstract. Mountain and semi-mountain river sites (n=14) were subject to monitoring in 2016-2017. Sampling sites were selected in order to study the effects of small hydropower plants on the aquatic plant assemblages within local lotic habitats. Aquatic plant diversity and Reference index were applied as metrics to assess the response to physical disturbance. The results of the assessment revealed differences in ecological status upstream and downstream of the hydropower plants, indicating macrophyte communities as a reliable indicator of the hydromorphological degradation.



Air pollution biomonitoring in urban ecosystems

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Abstract. Several phytomonitoring surveys in urban ecosystems have been undertaken during the last years. Still, are open the questions about the role of natural variables in conditions of increased anthropogenic pressure, as well as the background levels of pollutants in the background sites in urban areas. Our study was focused on bioaccumulation of heavy metals and toxic elements in leaves of *Aesculus hippocastanum* L. from two air quality station types: background and traffic. Consequently the pollutant levels in 3 Bulgarian cities with different geographical characteristics were compared.



The effects of lead and cadmium on cell division and chromosomal structure in *Allium cepa* test system *in vivo*

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Abstract. The present work focuses on the study of the potential mito-inhibiting and genotoxic effect of lead and cadmium in the root meristem of *Allium cepa* L. *in vivo*. A cytotoxic effect of Pb and Cd was registered, as evidenced by the lower mitotic index values in all test concentrations compared to the control. The analysis of the microscopic preparations for the experimental variants of the two heavy metals showed a significant genotoxic effect. All analyzed samples of Pb and Cd demonstrate an increased frequency of chromosomal aberrations compared to the control, as a positive dependence was established between the frequencies reported and the concentration of the studied metals. Lead and cadmium solutions cause a wide range of chromosomal aberrations, varying with the dose of the metal. The most common observed disorders are: acentric fragments, lagging and “vagrant” chromosomes, micronuclei, chromosome bridges, and asynchronous mitosis, demonstrating the genotoxic potential of the studied heavy metals. For both metals a maximum frequency of aberrations for the concentration limit is established. By comparing the two heavy metals, it has been found that lead has a greater cytostatic potential than cadmium by more effectively inhibiting cell division. The results obtained regarding the frequency of chromosomal aberrations show a higher genotoxic effect of cadmium compared to lead.

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Ecological status assessment of mountainous and semi-mountainous streams of Belasitsa and Ograzhden Mts. via different biotic indices based on benthic macroinvertebrates - the case study on Macedonian territory

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Abstract. The aim of this study was to provide indicative ecological status assessment of mountainous and semi-mountainous streams of Belasitsa and Ograzhden Mts. of the Macedonian territory, based on benthic macroinvertebrates indices according to the requirements of the EU Water Framework Directive (WFD). The sampling was conducted in October 2017 and April 2018 at 5 sites, respectively, from mountainous and semi-mountainous streams of the river Strumica/Strumeshnitsa Watershed. The bottom macroinvertebrate specimens were collected with hydrobiological hand net (mesh size 500 µm) applying kick & sweep multihabitat procedure. For indicative ecological status assessment the following metrics were used: Biological Monitoring Working Party (BMWP), Average Score Per Taxon (ASPT), Irish Biotic Index (IBI) and EPT (Ephemeroptera, Plecoptera, Trichoptera) taxa richness. Furthermore, the water quality of the examined sites was assessed from excellent to moderate (I - III class). Most of the studied rivers do not achieve a good ecological status due to hydromorphological/habitat degradation (damming stations - Station 5) and/or organic/anthropogenic pollution (Station 2, 3 and 4). Predicting that presence of any kind of habitat degradation/or pollutants at any level causes observable changes over benthic community in the studied sites from the Strumica/Strumeshnitsa River Watershed, the obtained faunistic data were compared with those from non-affected natural site (Station 1). Furthermore, the diversity and abundance of Ephemeroptera, Plecoptera and Trichoptera as the most sensitive groups are discussed along with the taxonomic composition in order to select indicator taxa among the endemic ones as they present in the studied area. Our results contributed to enrich the knowledge on the current ecological state of some mountainous and semi-mountainous rivers in Belasitsa and Ograzhden Mts. and assisted the selection of appropriate metrics for water quality assessment based on macroinvertebrates as BQE.

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Isolation and purification of proteolytic enzymes, produced from strains of genus *Bacillus*

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Abstract. Proteases are a class of enzymes, which catalyze the hydrolysis of the peptide bonds between the amino acids in the proteins, producing single amino acids or peptides with varying length. These hydrolytic enzymes are used effectively in the production of foods for increase of their nutritive value, digestibility, taste properties and aroma, for reduction of the number of allergens and for the utilization of domestic and industrial waste. Additionally, they are used for the synthesis and purification of proteins and peptides. A vast variety of organisms can produce proteolytic enzymes, but bacteria are the most attractive source because they can be cultivated in artificial conditions and in large quantities for a relatively short time by established fermentation methods. The aim of this study was to find a good producer of proteolytic enzymes and to determine the optimal conditions for achieving high activity and high production yields in laboratory conditions. We have examined 166 bacterial isolates from genus *Bacillus* of which 148 had any proteolytic activity. Using a quantitative method for determination of protease activity, we have selected *Bacillus cereus* No14 as good producer of proteolytic enzymes. It was determined that highest yields were achieved after inoculation of the medium with 5% inoculum (6.0 McF), followed by 16 hours of cultivation in liquid medium containing 0.5% glucose, Bacto Peptone, 50mM phosphate buffer and magnesium ions. The proteolytic enzymes were partly purified (5.62 fold) using two step scheme, and the molecular weight of the enzymes was determined using SDS-PAGE electrophoresis. The protease activity of the purified proteins has been proven using gelatin zymography.

Key words: *Bacillus*, protease, enzyme production, SDS-PAGE, zymography



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Abstract. Bulgaria has joined the official intercalibration (IC) round in order to complete the state commitments for participation in the IC process of the categorisation of rivers using the methods based on Biological Quality Elements (BQE). The objective of this paper was to verify whether the present Bulgarian classification method for ecological status of large lowland (national type R7) and medium-sized lowland (national type R8) rivers based on macroinvertebrates is compliant with the WFD normative definitions. Thus, a two-year study (2014 - 2015) on macroinvertebrates communities was conducted at selected 64 sites (31 from R7 and 33 from R8). The differences in qualitative and quantitative composition in the above-mentioned river types, as well as the indicative potential of BQE in relation to different types of anthropogenic pressure were analysed. Based on alternative benchmark sites (identified using the criteria defined by the EU), the High/Good boundary and a reference value for the Biotic index were defined. Class boundaries were in line with the results of the completed intercalibration exercise. We found a significant association between the biotic index and all three groups of pressures (land use, chemistry and hydro-morphology) and can be used for the assessment of the ecological status. The national assessment method (based on our data) was in good agreement with the accepted methods from other member states in the region.



Application of experimental metrics based on macrozoobenthos for ecological status assessment of Bulgarian standing water bodies

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Abstract. Surveys on benthic macroinvertebrate communities in ten standing water bodies (Bezbog, Kalin, Chuklyovo marsh, Bistraka, Dospat, Stoykovtsi, Drenov dol, Pchelina, Dolna Dikanya, Dyakovo) located in the West Aegean Basin district in the period July-August 2018 was conducted. Among them are natural (lakes) including such that are characterized with reference conditions as well as artificial and heavily modified water bodies (dams). To the current data were associated earlier for another three dams (Studena, Pyasachnik, Ovchi kladenets), last two of which fall under the East Aegean Basin district. All analyzed standing waters were located in Ecoregion 7 Eastern Balkans. Studied lakes and dams belong to all types of water bodies identified according Bulgarian typology, situated in the Ecoregion 7 (L1-Glacial high-mountain lakes/Alpine lakes, L3-Mountain lake, L4- Lowland and semi-mountain lakes and swamps, L6-Riverside wetlands, L11-Large deep reservoir, L13-Medium-size and small semi-mountain reservoirs, L15 Large lowland reservoir up to middle depth, L17-Small and medium size reservoirs). A current evaluation based on the values of the measured physicochemical parameters, which are regulated by the national water legislation was made. Four biological metrics - Total number of taxa, Biotic index for slow-flowing river stretches, % Oligochetes and PETI were applied for the assessment of the ecological status of the studied water bodies. The results obtained are preliminary based on one-off studies of selected ponds. Three-year seasonal (spring, summer, autumn) surveys are going to be conducted to help gather the data needed to develop a relevant methodology for assessing the ecological status of standing water by biological element for macrozoobenthos quality.

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Current ecological status of the Chetirka (Logodashka) River and tributaries classified by macrozoobenthos

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Abstract. The study aims to classify the current ecological status of the Chetirka (Logodashka) River, its tributaries – Gabrovska and Leshtinska River and the section of the Struma River, after the Chetirka inflow. Benthological samples were taken and measurements of the basic physicochemical parameters of the waters (temperature, oxygen content, oxygen saturation, electrical conductivity) were conducted in the summer of 2016 at 6 selected representative sites affected to varying degree and by different type of anthropogenic impacts. The analysis of supporting physicochemical parameters shows a good - very good status for all studied rivers. The taxonomic composition of the macrozoobenthos at the Gabrovska River is predominantly presented by stenobiotic taxa, typical for clean, unpolluted waters. The study on Gabrovska River, which passes the protected zone „Oranovski prolom-Leshko” (Natura 2000, code BG0001022), gives for the first time information on macrozoobenthos communities in this area. The rest of the studied water bodies affected by various human pressures (habitat change, over-exploitation, contamination with nutrients, etc.) are characterized by the presence of more tolerant benthic taxa. According to the leading Biotic index, the Gabrovska River is determined in a good – very good status, whereas the Leshtinska, Chetirka and the section of the Struma River after the Chetirka inflow are characterized by moderate ecological status. The results obtained for affected river stretches, can be utilized in decision-making process to prevention the anthropogenic pressure, improvement the conditions of the aquatic environment and achievement the targeted „good ecological status” of the superficial water bodies.

Preliminary study for inhibition of plant viruses by ecologically pure product – extract of *Leuzea carthamoides*

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Abstract. The virus diseases cause yearly losses in the quantity and quality of the production of pepper. Ecologically clean means that can inhibit plant viruses are necessary for keeping of clean environments and healthy people. Such means are extracts from medicinal plants, essential oils and others. The object of present study is leuzea - maral root [*Leuzea carthamoides* (Willd) DC or *Rhaponticum carthamoides* (Willd) Iljin], medicinal plant species, used as a stimulant of the immune system and vitality. Roots of the plant were collected from the cultivated area. Dried powdered material was extracted with 80% methanol by maceration. After evaporation of the solvent the crude extract was subjected to subsequent analysis. The inhibiting effect of the extract of *L. carthamoides* was studied on two wide spread on pepper and economically important viruses: (*Tomato spotted wilt virus* – TSWV and *Tomato mosaic virus* - ToMV). The tests were carried out in concentration of the extract 5000 ppm, 10000 ppm, 15000 ppm и 20000 ppm by using immune enzyme method ELISA, variant DAS-ELISA. Optical density (OD) was determined by reading on ELISA- reader spectrophotometer SUMAL PE Carl Zeiss, Jena of the extinction values for the TSWV and ToMV in infected and treated pepper plants in different concentrations of dilution of the extract. The data were compared with the extinction values for the controls – healthy and diseased by TSWV and ToMV pepper plants. The results showed, that the dilution of the *L. carthamoides* extract in concentration 20000 ppm in the trials „in vitro“ is suitable for the next researches, because the extinctions values for both viruses were negative i.e. inhibiting effect against TSWV and ToMV was established. Metabolic profile of studied extract was analyzed by GC-MS. A variety of fatty, organic and phenolic acids, alkanes, fatty alcohols and carbohydrates were identified. Among fatty acids palmitic acid (C16:0) and linoleic acid (C18:2) were the most abundant. Chlorogenic, syringic, quinic and caffeic acids were found as free phenolic acids. Additionally after alkaline hydrolysis of methanolic extract vanilic, protocatechuic and (p)hydroxycinnamic acids were established. The phenolic acids are known to have antiviral properties. Further research would show whether they are responsible for the inhibitory effect of the extract on studied virus.



Use of essential oils as natural herbicides

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Abstract. The use of synthetic herbicides in weed control results in a negative impact on the environment and human health. Moreover weeds develop resistance to applied herbicides and the need for new molecules with new mechanisms of herbicidal action is of great importance. Recently there are many reports that essential oils are promising natural product for pest control. Essential oils represent are complex mixtures of volatile compounds, mainly terpenes and phenylpropanoids, particularly abundant in aromatic plants. An initial step to assess the potential herbicidal activity of essential oils is to determine their effect on seed germination and seedling growth. The present review summarizes the methods for assess the effects of essential oils on seed germination and seedling growth. The advantages and disadvantages of using essential oils for weed control are discussed. Also important conclusions regarding the application of essential oils as bioherbicides are noted. Essential oils obtained from plant species of the families Myrtaceae, Pinaceae, Lauraceae, Poaceae, Lamiaceae, Arteaceae Cupressaceae, Apiaceae and etc. are determined as promising source for weed control. Based on some essential oils derived from lemongrass, cloves and cinnamon, commercial weed control products have already been developed. The studies in Bulgaria are mainly focused on the effect of extracts on seed germination. Recently, it was found that essential oils of Bulgarian species *Origanum vulgare* subsp. *hirtum* (Link) Ietsw, *Thymus longidentatus* (Degen & Urum.) Ronniger., *Thymus moesiacus* Velen, *Micromeria dalmatica* Benth. exhibit strong inhibitory activity on seed germination of weed. The main components of essential oil identified for each species were respectively carvacrol for *O. heracleoticum*, citral isomers: neral and geranial of *T. longedentatus*, α -terpinyl acetate of *T. moesiacus*, piperitone oxide, β -pinene, carvacrol of *M. dalmatica*. The data presented in this review show that essential oils have strong inhibitory effects on germination and seedling growth of weeds and can be used manufacturing of products for weed control.

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Ecological State Assessment of Batova River

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Abstract. The Batova Valley is protected in the sense of the requirements of the Habitats and Birds Directives and the Biodiversity Act. A European environmental agency developed in the 2000 year an Directive 2000/60/EC for a mutual strategy of European Council countries, for prevention and protection of waters. Quantitative criteria for assessment of surface water bodies based on hydromorphological, physico-chemical and biological characteristics had adopted for characterizing of ecological state. In this study, two points of water collection of Batova River was chosen: before and after Batovo village. Physico-chemical parameters (pH, conductivity, dissolved oxygen, biochemical oxygen demand, ammonium, nitrate phosphate ions) were measured and biological/benthological samples were taken. No direct damage influence of the village was found. Physico-chemical elements of quality was classified Batova River as moderate status and „not achieved good” state because of high concentration of ammonium and nitrate ions. The ecological assessment based on the leading for the lotic ecosystem biological macro element macrozoobenthos shows an excellent status according index Total Number of Taxa and good status on the Biotic Index. Taking into account that physico-chemical elements of quality are supporting and by another side they are considerably dynamical, we can concluded that results demonstrated that there was no direct damage influence of the village. The registered less favourable values of the studied nutrients can be attributed to the active processes of decomposition of riparian vegetation fall and mineralization of organic matter. Impacts may also due to local interference caused by unauthorized discharges, landfills and diffuse sources of pollution.



Comparative analysis of metal bioaccumulation et species *Petroselinum crispum* Mill., *Seseli rigidum* W. et K., *Daucus carota* L., *Conium maculatum* L.

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Abstract. The paper analyzes heavy metals (Mn, Ni, Fe, Cu, Zn, Ca, Mg) in plant species *Petroselinum crispum* Mill., *Seseli rigidum* W. et K., *Daucus carota* L., *Conium maculatum* L. and in the land on which they grow. The aim of the research is to determine the differences in the acceptance, distribution and accumulation of metals between the investigated species, based on the content of metals in the plant organs (root, tree, leaf and fruit), based on bioaccumulation coefficient, bioconcentration and translocation factor. The atomic absorption spectrophotometer determines the amount of metal in the soil and plant material. Results showed that in the investigated soil there were the highest Fe levels, but in quantities not exceeding the maximum permitted concentrations. The content of Mn, Fe, Cu in all analyzed plants is elevated. The order of heavy metals on the basis of the total quantity in the species *P. crispum* Mill. and *S. rigidum* W. et K. is $Ca > Mg > Fe > Mn > Zn > Cu > Ni$, and for the species *D. carota* L., *C. maculatum* L., $Ca > Mg > Fe > Zn > Mn > Cu > Ni$. There is a significant intraspecific difference in the distribution of the examined elements.

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Assessment of some agro-meteorological service products

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Abstract. Research on the meteorological elements in the second half of the last century on the territory of Bulgaria show trends of significant changes, which cause changes in the conditions for growth and development of the basic crops. They are not unique to the individual regions of the country: for Northern Bulgaria there have been established trends of an increase of the average annual air temperature in the last century. The sums of precipitations over the last century show a trend of decrease of the summer rainfall especially in the plains parts of Bulgaria and the winter - in southern Bulgaria. Now the focus is on climate change in the last 15 years of the last century and the beginning of the present. In view of the drought nature of the agricultural areas and the increased frequency of extreme weather phenomena, agricultural production in the region is risky. In this sense, information and specialized forecasting is essential to obtain optimal yields. In our country this type of data is a priority of the Department of Agro meteorology at NIMH. The data collected in NIMH have both a scientific and application meaning. Farmers and citizens are the main data user. Not so often students from the Institute of Bulgarian Academy of Sciences, Agricultural Academy, Agricultural University, Sofia University, Plovdiv University and others use the sources of information of the Department of Agro meteorology in the development of their projects and diploma tasks. The report aims to present the core activities of the section as well as what data are available, what they contain, how to request specialized data, etc. A questionnaire was prepared for the evaluation of the products and a part of the results were processed, visualized and presented in the report.



Community Level Physiological Profiles of Natural and Constructed Wetland Soils along the Maritsa River, Southern Bulgaria

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Abstract. The aim of this study was to characterize the physiological diversity and activity of soil microbial communities in natural and constructed wetlands, playing a crucial role in the environmental pollution control and as regulators of the aquatic regime. A kinetic approach using Biolog EcoPlate™ was applied for the analysis of the ability of soil communities in sediments and dry soil samples from Zlato pole wetland and Tzalapitza rice fields to metabolize different carbon sources. The functional diversity (catabolic potential) was assessed using Average Well Color Development (AWCD) index. The community level physiological profiles (CLPP) were site-specific and demonstrated high rates of carbohydrate utilization in the Tzalapitza rice field samples. The CLPP for the Zlato pole sediments suggested intensive catabolic activity regarding difficult for utilization polyols, phenolic acids, and amines indicating higher functional diversity in the heterotrophic community. Principal component analysis based on the CLPP separated the samples from the Tzalapitza rice fields and the Zlato pole wetlands and demonstrated that the extent of carbon uptake is determined by the habitat but also reflects the anthropogenic impact. The results are evident for the good ecological potential of the Zlato pole wetlands.

Key words: wetlands, Biolog EcoPlates, AWCD, community level physiological profile, principal component analysis

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Microbial community structure and its biofilm forming capacity in wetland soils, Southern Bulgaria

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Abstract. The aim of this study is to determine the momentary microbiological status of microbial communities and their ability to form biofilms in three protected by Natura 2000 wetlands, Southern Bulgaria. The numbers of heterotrophic bacteria (TVC22 and TVC37), actinomycetes, fungi and sanitary state indicators were determined for dry soil samples and sediments collected from Zlato pole wetland and Tzalapitza rice fields. The biofilm formation capability of the soil microbial communities was tested in vitro using crystal violet assay for biofilm quantification. The number of heterotrophic microorganisms (TVC22 and TVC37) and indicators of sanitary status (FS, FC and *Escherichia coli*) at the two stations situated in Tzalapitza rice fields is higher in comparison to the control zone Zlato pole ($p>0.05$). In the studied samples, the bacterial complex takes a dominant position and it exceeded the number of both fungi and actinomycetes over 1.5 times. The high number of heterotrophic bacteria and fungi in dry soils at all stations is indicative of a better state of these territories. The cluster analysis (CA) based on the microbiological indicators generated two clusters characterized by high cluster distance. CA1 include dry soils from all stations and the sediment samples from Tzalapitza rice field, while the CA2 include only the sediments from Zlato pole. The development of the biofilm was recorder for seven days in four different mediums. Results showed best biofilm growth on low nutrient medium R-2B for all stations. Our data showed a good correlation between the structure of microbial communities and biofilm-forming capacity. The retention of fecal coliforms, fecal streptococci and *E. coli* in sediment samples from rice paddies indicate fecal pollution within the river system and confirm the role of wetlands in the control of environmental pollution in the proximity to urban areas.

Key words: wetland, TVC, FC, FS, biofilm, microbial community.

Acknowledgements. The research was funded under Project № FP17-BF-001 by the „Scientific research” Fund, Plovdiv University "Paisii Hilendarski". Special thanks to Dr. Ivelin Molloy, who provided the soil samples for the analysis!

Environment and lifestyle factors in association with some male semen quality parameters

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Abstract. Possible associations between some environment and lifestyle factors such as cigarette smoking, alcohol, drugs, anabolic steroids, medications, occupational hazards and stress, and semen quality parameters – semen volume, spermatozoa concentration and motility – on men in reproductive age from Bulgaria was the objective of this study. Among the studied 1540 men 18.8% were with a reduced semen volume, 23.1% – with a decreased spermatozoa concentration and 54.4% with spermatozoa motility lower than normal. There was found that 13% of participants in the study were undergoing occupational hazards, 21% were smokers, 21% – alcohol consumers, 5.9% – drug users, 3.9% taking anabolic steroids, 16% – medications and 5.2% work or live under stress. Significant negative impact on the sperm volume has been observed with regard to cigarette and alcohol consumption, as well as to work or stressful life. Regarding the spermatozoa concentration decreasing, there has been found statistically significant relation with smoking cigarettes, use of medicines and stress conditions. Decreased spermatozoa motility was statistically significant related to the use of medications and less influenced by occupational hazards and alcohol consumption.



Characteristics of personality in people with musical talent and other talents

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Abstract. The five basic characteristics of personality were analyzed in relation to the expression of musical talent or other talents in 945 persons aged 16-90, 29.1% of whom were women and 70.9% of whom were men. The methods used include Goldberg's "Markers of the Big Five Factors" questionnaire, adapted to Bulgarian culture, as well as self-reported data about musical talent or other talents (proven manifestations and achievements in the field of music, and as regards other talents - in the sphere of art, writing, or sports). The results showed that 24.6% of the participants had a musical talent, manifested as composing, singing, or playing a musical instrument, and 35.3% of the participants had other talents, including fine arts, literature and poetry, dancing, and sports. The mean values of the five personality traits showed that Agreeableness was most pronounced, followed by Consciousness and Intellect / Imagination. The lowest values had Emotional stability (i.e. high Neuroticism was observed). Regarding groups of persons with high and somewhat high expression of the respective personality traits, 45.2% were agreeable (or somewhat agreeable); 64.1% were conscious (or somewhat conscious); 44.3% had high or somewhat high intellect / imagination; 21.4% were (somewhat) extraverted and 33.0% were (somewhat) emotionally stable. The analysis of the relationships between the basic characteristics of personality and talents found that people with musical talent had higher levels of Agreeableness and Intellect / Imagination. The high Agreeableness of participants appearing in the field of music may reflect their desire to connect with people through music, and to give joy, harmony, etc. to others by creating music. High Intellect / Imagination probably reflect the high creativity and creative potential of the persons with musical talent and their ability to master / improve their musical skills. Participants with other talents had higher values of Extraversion and Intellect / Imagination. The association with Intellect / Imagination is analogous to that of musical talent. The relationship with Extraversion is likely to indicate the desire for public appearances / an audience, which is characteristic of performers, authors, athletes.

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Some health problems and their relationship to the basic characteristics of personality

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Abstract. The present study aimed to analyze the relationships between the five basic characteristics of personality (Extraversion, Agreeableness, Conscientiousness, Emotional stability and Intellect/Imagination) and the presence of some health problems such as astigmatism, myopia, high blood pressure, migraine and allergies. The sample included 945 persons aged 16-90 (average age 32.3 years), of whom 29.1% were women and 70.9% were men. The basic characteristics of personality as per the 5-factor model were studied through the Goldberg's "Markers of the Big Five Factors" questionnaire, adapted for the Bulgarian culture. The presence or absence of these health problems was established through a self-reported questionnaire, with participants indicating if they had the particular medical problem diagnosed by a doctor. The incidences of astigmatism, myopia, high blood pressure, migraine and allergies in the current sample were as follows: 22.4%; 29%, 9.9%, 10.4% and 21.1%, respectively. The mean values of the five personality traits showed that Agreeableness was most pronounced, followed by Conscientiousness and Intellect/Imagination. The lowest values had Emotional stability (i.e. high Neuroticism was observed). Regarding groups of persons with high and somewhat high expression of the respective personality traits, 45.2% were agreeable (or somewhat agreeable); 64.1% were conscientious (or somewhat conscientious); 44.3% had high or somewhat high intellect/imagination; 21.4% were (somewhat) extraverted and 33.0% were (somewhat) emotionally stable. The analysis of the relationships between the two groups of characteristics found some statistically significant associations. Higher levels of Neuroticism (or lower levels of Emotional stability) were found in people with migraine, which illustrates the psychosomatic nature of the condition (more common headaches in more neurotic individuals). Lower levels of Conscientiousness were found in people with astigmatism. It is possible for those who do not wear glasses or lenses, low conscientiousness to show insufficient care for their own health or difficulties in organizing everyday activities and in managing arising tasks due to impaired vision.

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Content of heavy metals and toxic elements in soils from the park zone of the Natural Monument Bunardzhik

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Abstract. Natural Monument Bunardzhik is one of the famous seven hills on the territory of the city of Plovdiv. It is located in the real city center and since 1995 it is protected by the Bulgarian legislation. The lower part of the hill is a part of the urban green system as a city park for wide public use. Aim of this study is to analyze the content of some heavy metals and toxic elements in the park soils and to assess the potential hazardous risks for the protected area.

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A case study of allelopathic effect of parsley, dill, onion and carrots on the germination and initial development of tomato plants

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Abstract. The present study focuses on the allelopathic relationships in agrophytocenoses in order to assess the possibilities of mixed crop cultivation of tomatoes plants with other vegetable crops and spices. Vegetable species may have a negative, neutral or positive effect when grown in mixed agrophytocenoses. To test the extent of this impact, test plants from tomatoes have been treated directly with plant extracts from other vegetable plants - parsley, dill, onion and carrots. Even in a relatively early phase (seedlings ready to be brought to the field), some tendencies have been noted, which may be characteristic of the more mature phases of development (fruiting).



Effects of exogenous environmental factors and their correlation with sperm parameters in sub/infertile men after treatment with PAPA® nutritional supplement

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Abstract. Many factors lead to changes in spermatogenesis and fertility in men, which are considered as anatomical, genetic, surgery, hormonal imbalance, but also they are a result of unhealthy diet. Smoking, alcohol and drug abuse, excessive physical labor, overheating and exposure to radiation are the leading exogenous factors for the male sub/infertility. The aim of the present study is to establish the correlation of the sperm parameters to exogenous environmental factors after treatment with a nutritional supplement, available in the pharmacies under a trade name „PAPA”. It contains l-carnitine: 469 mg, l-arginine: 280 mg, coenzyme Q10: 16 mg, vitamin E: 112.8 mg alpha TE, folic acid: 800 µg, glutathione reductase: 80 µg, selenium: 26.4 µg, taurine: 20 mg and fructose: 50 mg. A group of men (n = 35) with reproductive problems and a pronounced sub/infertility was studied. The sperm counts that were closely followed were: sperm concentration, progressive sperm motility and morphology, as well as the amount of normokinetic spermatozoa in the ejaculate. As a result, all of the sperm parameters were positively affected after the treatment. Overall, limiting the exogenous environmental factors, including the nutrient intake, reduces the free radicals in the organism and improving the sperm survival.



Histochemical and histological changes in liver of rodents and amphibians from Tsalapitsa rice-fields, Bulgaria

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Abstract. The Tsalapitsa rice-fields are a complex of flooded plots used for growing rice, surrounded by low dykes and canals, including the surrounding wet meadows. They are located in an area close to Plovdiv City, heavily influenced by human activities such as intensive agricultural activities, mainly for the production of rice. The main objective of the present experiment is to study the histochemical changes such as glycogen accumulation and liver fat deposits of sexually mature rodents (*Apodemus agrarius*, *Mus macedonicus* and *Microtus arvalis*) and amphibians (*Pelophylax ridibundus*) from Tsalapitsa rice-fields. Cryostat (Leica CM 1520) and a rotary microtome (Leica RM 2125) was used to cut the liver samples. Multiple sections of each specimen (n=40) were prepared and they were used for observation the intensity of PAS-reaction, Sudan Black B staining and histopathological changes in the liver. Liver histochemical changes were appraised semi-quantitatively by using the grading system of Mishra and Mohanty (2008). The histopathological alterations were determined semi-quantitatively by using the grading system of Pierce et al. (1978) and Zimmerli et al. (2007), which we combined and modified. Histopathological lesions which we observed in the liver parenchyma were degenerative and necrotic. In addition, we detected changes in the amount of glycogen, as well as, changes in the fat deposits in the hepatocytes. The obtained methods could be used as a sensitive tool for determining cell and tissue alterations in organisms due to anthropogenic impact on the environment.

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Nuclear abnormalities in erythrocytes of marsh frog (*Pelophylax ridibundus* Pallas, 1771) from rice fields

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Abstract. Amphibians have big potential as bio-indicators based on their combined life cycle as aquatic and terrestrial form. They can play the role of prey or predator, making them a key element in toxic substances transfer between aquatic and terrestrial habitats. The nuclear abnormalities (NAs) in amphibians' erythrocytes in recent years have been used as a successful biomarker for anthropogenic pollution of agricultural origin. The NAs in erythrocytes of the marsh frog (*P. ridibundus*) have been studied to assess the cytotoxic and genotoxic effect in rice fields in situ. Peripheral blood smears have been dyed with acridine orange. NAs of the following types: notched nuclei, nuclear buds and blebbed nuclei have shown highest frequency. There is no sexual dependence in the formation of different types of NAs. The significant differences ($P \leq 0.0001$) in the mean total NAs (%) in erythrocytes of marsh frogs from rice fields (Total NAs = 37.67 ± 29.68) compared to the total NAs from the background region NP "Strandzha" (Total NAs = 5.72 ± 3.92), demonstrate the presence of in vivo active cytotoxic and genotoxic agents in the impacted area. The obtained results for NAs in erythrocytes of *P. ridibundus* are evidence for successful application of NAs as a biomarker in amphibians for the purpose of biomonitoring.

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Induction of erythrocytic nuclear abnormalities by allowable concentration of cadmium in Common carp (*Cyprinus carpio* L.)

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Abstract. The induction of micronuclei and other nuclear abnormalities (NAs) (nuclear buds, notched, blebbed, lobed and eight-shaped nuclei, nucleoplasmic bridges and binucleated cells), was analyzed in the erythrocytes of peripheral blood of Common carp (*Cyprinus carpio* L.), treated with allowable concentration of cadmium, considered safe by the regulatory agencies. Young specimens of the common carp (*Cyprinus carpio* L.) were exposed for 72 h and 144 h in laboratory condition to concentration of Cd, considered as maximum allowable concentration in surface waters according to Directive 2008/105/EC. The blood smears stained with acridine orange were tested for the presence of micronuclei and other nuclear abnormalities. Increased levels of micronuclei and nuclear buds were not observed in carp erythrocytes. Significant elevated levels of other nuclear abnormalities – blebbed, lobed ($P < 0.0001$) and eight-shaped nuclei ($P = 0.0003$), as well the total NAs frequency ($P < 0.0001$) were observed after exposure of 72 h, while the increase in cells with notched nuclei ($P = 0.0003$), nucleoplasmic bridges ($P = 0.0039$) and binucleated cells ($P < 0.0001$) was noted after the exposure of 144 h. This demonstrated the evident cytotoxic and genotoxic effect of Cd, even at low permissible levels and confirmed the use of nuclear abnormalities as an effective biomarker. The obtained results, showing considerable elevated levels of NAs like nucleoplasmic bridges and binucleated cells after 144 hours of acute exposure, indicate the need for further research. Once confirmed, changes in national and EU legislation of allowed Cd concentrations in surface waters might be needed.

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СЕКЦИЯ „ЕКОЛОГИЧНО ОБРАЗОВАНИЕ И МЕНИДЖМЪНТ”

SECTION „ECOLOGICAL EDUCATION AND MANAGEMENT”

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Abstract. For saving world's biodiversity, networks of protected areas were established, conventions, agreements, political and strategic documents for conservation of nature that all highlight the importance of the environmental context of the education for sustainable development were prepared. Nature and national park administrations in Bulgaria which are legally obliged to conduct educational activities have a significant role for building environmental awareness and behavior in visitors. The aim of this research is to develop and implement modern approaches and mechanisms to organize educational activities in the field of ecology and nature conservation in protected areas in Bulgaria after the example of Nature park „Vrachansky Balkan”. For achieving this aim, instruments for carrying out quality long- and short-term educational activities in Nature park „Vrachansky Balkan” were elaborated, verified and implemented in practice. Such comprehensive systematic approach, is organized for the first time in “Vrachansky Balkan” and it fulfills one of the objectives set in its Management Plan (2011-2021). The verification of one week activities in the nature park shows better cognitive results and higher motivation for environmental protection among the participants in comparison to the one-day stay. Based on this survey was confirmed, that the application of non-formal learning methods, where visitors are actively involved in the process, is the most effective approach to conducting educational activities in protected areas in the field of biodiversity conservation and environmentally friendly use of natural resources.



The attitude of adolescents towards the management of food wastes

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Abstract. Efficiency in managing different types of waste is more important than ever. High urbanization and industrialization alter food production and consumption. Resources taken from nature are used in the production of goods that are consumed or disposed of and treated as waste. Consumers can be considered as the most important group in total waste production, resource consumption and the creation of different environmental impacts. One of the means to achieving sustainable environmental development is to choose the right and appropriate mechanisms of school and family education, intertwined with effective technologies in the different spheres of life. Through proper education, you can create a base for the construction of a new life-style, value orientations, and readiness for the conservation of natural resources. Conducting adequate studies can present problems for environmental treatment of adolescents with food and to propose specific recommendations for enhancing the training in different aspects, with the aim of forming a proper environmental culture and consciousness. The material aims to trace the environmental attitude towards food and nutritional resources in adolescents of different age groups and social strata, and to find solutions to reduce food waste through responsible environmental considerations. It monitors trends in family-friendly, school-friendly and circular behavioral. Good intentions are not always reflected in everyday practices. Among the main factors are food perception and consumer efficiency knowledge, level of education, as well as general beliefs and concerns about the environment. For the purposes of this study, questionnaires have been developed and applied for selected groups of participants. 224 adolescents aged 12 to 18 were interviewed. With the help of 19 questions we were looking for in-depth analysis, flowing through the specific views of adolescents on educating them on the issue and events than in their day-to-day life. The results obtained are processed by SPSS using quantitative methods for analysing the respondents' answers to the given environmental problem.



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