Excellence Centre of Animal and Human Ecology,
University in Presov, Slovak Republic

NEW TRENDS IN THE BIOLOGICAL AND ECOLOGICAL RESEARCH

Scientific conference with international participation on the occasion of the 15th anniversary of University in Presov, Slovak Republic

Book of Abstracts

November 8 – 10, 2012
Grand Hotel Kempinski
High Tatras, Slovak Republic

Co-organizer:

Faculty of Humanities and Natural Sciences,
Presov University in Presov, Slovak Republic

The scientific event is financially supported by Structural Funds of European Union as a part of the project *„Completion of Excellence Centre of animal and human ecology with emphasis on improving the quality of scientific research – the 2nd stage“* (ITMS 26220120041)

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University of Presov

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Editors:
RNDr. Marta Blaščáková
RNDr. Dana Gabriková, PhD.
Mgr. Peter Manko, PhD.
RNDr. Pavol Labun, PhD.

University of Presov in Presov, Excellence Centre of Animal and Human Ecology,
Faculty of Humanities and Natural Sciences

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FOREWORD
FROM THE DIRECTOR OF THE EXCELLENCE CENTRE

Dear colleagues, dear ladies and gentlemen,

Scientific conference with international participation: "New trends in the Biological and Ecological Research" is part of the activity 2.3 "Dissemination of research and development centre for professional public" within the project: "Completion of Excellence Centre of Animal and Human Ecology with emphasis on improving the quality of scientific research – the 2nd stage“ (ITMS 26220120041)

University of Prešov, which celebrates the 15th Anniversary of its founding this year, significantly affects the provision and conditions of education, research and development in eastern Slovakia. Today, it is a modern dynamically developing research and educational institution equipped with modern information-communication systems.

Regional development is an important condition for economic and social stability of the country. In Slovakia, great imbalance of individual regions constitutes a problem. I do not intend to present socio-economic profile of the Prešov region. My goal is rather to think about the status of science and research in relation to the strategy of the region.

Expenditure on research and development in the Prešov region in 2010 amounted to 11,588,983 €, which is almost 4,5 times less than in the Košice region, and about 18 times less than in the Bratislava region. The situation is similar in all sectors of science: In the Prešov region there is no institute of the Slovak Academy of Sciences except for Astronomical Institute.

One way of addressing these disparities is the utilization of resources from Operational Programme Research and Development of EU Structural Funds. In May 2009, the Excellence Centre of Animal and Human Ecology was established under Priority axis: 2. Support to research and development, measure: 2.1 Support of networks of excellence in research and development as the pillars of regional development and support to international cooperation, with nonrepayable financial contribution 1,312,233.69 €.

In October 2009, the project of University of Presov "*The use of research and development for breeding new cultivars (prototypes) of medicinal plants and their varietal registration*" was approved under Priority axis: 2. Support to research and development, measure: 2.2 Transfer of knowledge and technology from research and development into practice, with nonrepayable financial contribution 428,508.22 €.

In 2010, the implementation of the project "Completion of Excellence Centre of Animal and Human Ecology with emphasis on improving the quality of scientific research – the 2nd stage" started under Priority axis: 2. Support to research and development, measure: 2.1 Support of networks of excellence in research and development as the pillars of regional development and support to international cooperation, with nonrepayable financial contribution 2,773,548.52 €, which is up to twice of the budget of stage I of building the centre. The aim of this project is the creation of new laboratories - Laboratory of Sequencing Analysis I and II, Environmental Biotechnology Laboratory I and II, Laboratory of Animal Biodiversity and Laboratory of ICT.

Official opening of the new laboratories of the Excellence Centre is planned in January 2013. A part of the project is also today's presentation of the scientific results obtained using the cutting-edge technology of Excellence Centre of Animal and Human Ecology - 2nd Stage.

On behalf of the organizers I cordially invite you to the scientific conference with international participation "New trends in the Biological and Ecological Research" and wish you many pleasant scientific and social experiences in the beautiful environment of Grand Hotel Kempinski. I believe that in addition to obtaining scientific information and to experience exchange you can find the time to discover the beauty of the High Tatras.

Prof. Dr. Ivan Bernasovský
Director of the Excellence Centre of Animal and Human Ecology

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Scientific Conference „New Trends in the Biological and Ecological Research“and the 2012 Organizing Committee would like to thank the following **Sponsors** for their support in making this a truly successful international conference.

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GENERAL INFORMATIONS

Date: November 8 – 10, 2012
Venue: **Grand Hotel Kempinski High Tatras**
Registration: At registration desk on November 8th, 9.00-11.00 a.m.

The aim of the conference

The conference will bring together experts engaged in research and development of science in the fields of biology and ecology. Scientific results of the project „Completion of Excellence Centre of animal and human ecology with emphasis on improving the quality of scientific research – the 2nd stage" (ITMS 26220120041) will also be presented.

Oral presentations

Plenary lectures and presentations of special guests will be 30 minutes in duration. Short oral presentations will be organized in two parallel sections (Ecology and Biology) with time limited to 15 min.

Poster

Posters can be put up at the time of registration. Please remove the poster until 17.00 on Friday.

The cultural program and excursions

Thursday, 8.11.2012 at 19.00: Rout with cultural program in Grand Hotal Kempinski High Tatras.

Saturday, 10.11.2012: Vocational excursion - participants will visit Agrokarpaty Plavnica Ltd. - company, which deals with growing, harvesting and post-harvesting processing of medicinal plants and herbal tea production. Excursion will continue with visit to monastery Červený Kláštor. The excursion program includes a lunch with degustation of Slovak food specialities. The fee is 25€ (does not apply to invited guests).

Coffee breaks and meals

Breakfast are included in price for guests staying at the Grand Hotel Kempinski, Lunch and refreshments during breaks on 8.11. and 9.11. are provided in the Grand Hotel Kempinski for all conference participants, Dinner will be provided on 8.11. for all participants at the rout.

Conference languages

The official languages of the conference are: Slovak, Czech and English.

Scientific committee

Prof. Dr. Ivan Bernasovsky –
Director of Excellence Centre
Prof. Dr. Jarmila Bernasovska
Prof. Ing. Jozef Vilcek.
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Assoc. Prof. Dr. Janka Poracova
Assoc. Prof. Dr. Jan Kosco
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Dr. Martin Kello
Dr. Sona Macekova
Dr. Marta Blascakova
Dr. Pavol Labun
Mgr. Jan Sevc
Mgr. Jana Carnogurska

PROGRAMME

Thursday, 8.11.2012

9.00-11.00 **Registration**

11.00-11.30 **Official opening**

René Matlovič, rector, University of Prešov in Prešov, Slovak Republic
Nadežda Krajčová, dean, Faculty of Humanities and Natural Sciences, University of Prešov in Prešov, Slovak Republic
Ivan Bernasovský, director, Excellence Center of Animal Human Ecology, University of Prešov in Prešov, Slovak Republic

11.30-14.00 **Plenary session** *Chair: Šalamon*

Molecular markers of cells, organisms and ecosystems
Ivan Lefkovits (University Hospital Basel, Switzerland)

Nature's Contribution to Pharmacy and Ecological Balance
Ilkay Erdogan Orhan (Eastern Mediterranean University, Turkey)

Biodiversity and Ethnobotany and the Search for New Drugs
Vincenzo De Feo (Universita degli Studi di Salerno, Italy)

A procession of Lemmings: why ecology in Central Europe is (generally) unsuccessful?
Piotr Tryjanowski (Poznan University of Life Science, Poland)

14.00-15.00 **Lunch**

	Ecology	**Biology**
15.00-16.30	**Presentations**	
	Chair: Orhan, Poráčová	*Chair: Lefkowits, Bernasovská*
	Ecological Factors Affecting Secondary Metabolite Content and Composition in Medicinal and Aromatic Plants *Nazim Sekeroglu (Kilis 7 Aralik University, Turecko)*	**Sequencing by Oligonucleotide Ligation and Detection (SOLiD)** *Lucia Kuliková (University of Presov, SR)*
	Antokyány - prírodné látky a ich význam pre rastliny a človeka *Ivan Šalamon (University of Presov, SR)*	**Application of SOLiD sequencing technology in research** *Martin Kello (University of Presov, SR)*
	Extraction and isolation of anthocyanins from ecologically pure plant materials of Carpathian region *Ruslan Mariychuk (Uzhgorod National University, Ukrajina)*	**The importance of mtDNA derived from ancient samples** *Melinda Nagy (J. Selye University, SR)*
	Ecological conditions and a fruit yield in different varieties of blueberry (Vaccinium corymbosum L.) *Jozef Fejer (University of Presov, SR)*	**Comparison of methods of Y-haplogroup determination in the Slovak Romany population** *Eva Petrejčíková (University of Presov, SR)*

16.30-17.00	**Coffee break with poster presentation**	
17.00-18.30	**Presentations**	
	Chair: Tryjanowski, Hromada	*Chair: Voráček, Boroňová*
	Behavioural ecology of ecologists and other animals – implications for future fitness of our science *Martin Hromada (University of Presov, SR)*	**Utilization of Real-time PCR in prediction of the risk of osteoporosis** *Iveta Boroňová (University of Presov, SR)*
	Coexistence of natural clones and biotypes of hybrid complex of genus Cobitis in selective processes *Ján Koščo (University of Presov, SR)*	**Effect of androgen-deprivation therapy on the change of bone density in patients with prostate cancer** *Liliana Fitusová (Comenius University, SR)*
	Autecology of stoneflies (Plecoptera) in Eastern Carpathian stream *Peter Manko (University of Presov, SR)*	**Inherited rare diseases in Roma population** *Dana Gabriková (University of Presov, SR)*
	Waste dumps as hotspots of epigeal macrofauna functional diversity *Beáta Baranová (University of Presov, SR)*	**Molecular studies done with Leucojum vernum (Amaryllidaceae)** *Mária Tulenková (University of Presov, SR)*
19.00	**Rout**	

Friday, 9.11.2012

10.00-11.30	**Presentations**	
	Chair: Monaghan, Tkáčiková	*Chair: Bernasovský, Pavúk*
	Optimalizácia lyofilizačných procesov pri izolácii prírodných látok *Jan Tomasch (Medicproduct, a.s. Lipany, SR)*	**Effect of occupationally phthalate exposure on pulmonary functions in slovakian plastic industry** *Tomáš Pilka (Constantine the Philosopher University of Nitra, SR)*
	Antimicrobial properties of anthocyanin extract prepared from berries by ethanol and acetone extraction *Ľudmila Tkáčiková (University of Veterinary Medicine and Pharmacy, SR)*	**Case report: Atypical cranial finding of individual from St. Emmeram Cathedral, Nitra, Slovakia (14th – 18th century AD)** *(Constantine the Philosopher University of Nitra, SR)*
	Antioxidant properties of blueberry extracts and juice (*Vaccinium corymbosum* L.) *Janka Poráčová (University of Presov, SR)*	**Birth weight of Romany and non – Romany newborns depending on the age of mother from Kežmarok district** *Silvia Duranková (University of Presov, SR)*
	LC/MS-IT-TOF Determination of Anthocyanins in Selected Plant Species *Daniela Gruľová (University of Presov, SR)*	**Monitoring changes in anthropometric dimensions of Slovak patients' heads with diagnosed craniostenosis before and after surgery** *Eva Valachovičová (Comenius University, SR)*
11.30-12.00	**Coffee break with poster presentation**	

12.00-13.45	**Presentations**	
	Chair: De Feo, Koščo	*Chair: Sekeroglu, Gabriková*
	Niche overlap of fish species in Bačkovský Brook *Ján Ševc (University of Presov, SR)*	**The usage of HRM method for molecular genetic analysis of "sports gene" ACTN3** *Danica Hronská (University of Presov, SR)*
	Effect of habitat conditions for vegetative growth of horsetail (*Equisetum arvense* L.) *Pavol Labun (University of Presov, SR)*	**Selected biochemical markers of bone remodeling in postmenopausal women** *Marta Blaščáková (University of Presov, SR)*
	The effect of hydrodistillation specifics on the yield of essential oil from German Chamomile (*Matricaria recutita* L.) *Petra Bujňáková (University of Presov, SR)*	**Sequence analysis of candidate genes in patients with isolated (non-syndromic) hypodontia** *Daniela Grejtáková (University of Presov, SR)*
	Possibilities of Using Entomopathogenic Fungus in Biological Control of Insects *Silvia Mudrončeková (University of Presov, SR)*	**Risk factors of obesity** *Ivana Sudimáková (University of Presov, SR)*
	Biodiversity of quill mites, a little explored group of parasitic mites – from taxonomy to ecology *Miroslava Klimovičová (University of Presov, SR)*	**Detection of C677T polymorphism in the MTHFR gene and its association with fetal loss** *Zuzana Dragunová (University of Presov, SR)*
13.45-14.45	**Lunch**	
14.45-16.30	**Special guests**	*Chair: Šalamon*
	Reflections on digit ratio (2D:4D) research: current knowledge and progress, animal and human studies *Martin Voracek (Unversität Wien, Austria)*	
	Using next-generation sequencing to study freshwater biodiversity *Michael T Monaghan (Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Nemecko)*	
	Introduction of Medicinal and Aromatic Plants-Experiments and Experience *Kišgeci J. (Agricultural Faculty, University of Novi Sad, Serbia)*	
16.30-16.45	**Closing speech**	
	Ivan Bernasovský, director, Excellence Center of Animal Human Ecology, University of Prešov in Prešov, Slovak Republic	

Saturday, 10.11.2012

Excursion: Visit to Agrokarpaty Plavnica Ltd. Company. Visit to camaldulian monastery - Červený Kláštor. Lunch.

Note: The excursion fee is 25€ and includes transportation, entries and lunch

Plenary Sessions

Biodiversity and Ethnobotany and the Search for New Drugs

De Feo V.

Dipartimento di Scienze Farmaceutiche e Biomediche
Università degli Studi di Salerno, Via Ponte Don Melillo, 84084, Fisciano, Salerno, Italy; defeo@unisa.it

Abstract

Biodiversity is today recognized as a true treasure in the search for new active substances. The conservation of biodiversity is considered a primary goal for the conservation of the environment. Ethnobotany consists in the study of the uses of indigenous plants by the indigenous people or in the interactions between man and plants. Biological ethnobotany, concerning the studies of economic plants used in native cultures, can offer phytochemical and therapeutical material for the development of new drugs. In most of the pre-literate traditions, medicinal plants assume sacred and/or magical along with therapeutic roles, because of their potency in altering the state of mind. The study of these plants can help in the research of metabolites active on central nervous system. Ethnobotanical, phytochemical and pharmacological studies have been carried out on some plants (*Brugmansia arborea* L., *Valeriana adscendens* Trel. and *Iresine herbstii* Hook.), used in the traditional practices in the shamanism of the Northern Peruvian Andes. The pharmacological assays considered to evaluate the central nervous system activity were locomotor activity, motor coordination, pentobarbital-induced sleep, stereotyped behaviour, catalepsy, nociceptive assays and transmurally stimulated guinea-pig ileum. Moreover, three pure alkaloids isolated from *B. arborea* were tested for their effects on the morphine withdrawal *in vitro*. Furthermore, the effects of *V. adscendens* extracts on GABA uptake and amino acids neurotransmitters, content in mice synaptosomes, were also evaluated. The results of these experiments indicate that all the above tested plants were able to reduce significantly the central nervous system activity of the animals. In addition, the chemical study performed for *B. arborea* indicated the possible constituents responsible for the central activity. The reduction of motor coordination and stereotyped behaviour together with induced locomotor activity support the possibility that all the studied plants act as psychotropic agents, thus confirming their ritual use.

Introduction of Medicinal and Aromatic Plants- Experiments and Experience

Kišgeci J.

Agricultural Faculty, University of Novi Sad, Serbia, jan.kisgeci@gmail.com

Abstract

Most of medicinal plants in Serbia are collected from wild. Commercial exploitation of these plants has resulted in reduction of the population of many species in their natural habitat. The botanical survey of Serbia has prepared a provisional list of threatened plants which includes a large number of medicinal and aromatic plants. Many of these plants are rare and endemic and found only in wild sources. There is, however, now an urgent need to have a sound strategy for the management and conservation of these plants on a long term basis. An understanding of the biological and ecological back ground of the species in their normal habitat is also essential to understand their conservation biology as well as to predict their behavior under artificial cultivation. Under domestication outside their normal ecological range, wild medicinal and aromatic plants tend to behave differently.

Systematic cultivation of medicinal plants in order to conserve biodiversity and protect endangered species was initiated in Agricultural Institute in Novi Sad, respectively in his Department for Medicinal Plants in Bački Petrovac, in seventies of last century. Cultivation of this type of plants could only be promoted if there is a continuous demand for the raw materials. There are at least 20 major medicinal plants that can be cultivated in Serbia and have established demand for their raw material or active principles in the international trade. It was also necessary to develop seed production and genetically superior planting material for assured uniformity and desired quality of raw material for organized cultivation. Research and development work has to be done to formulate Good Agricultural Practices (GAP) which should include proper cultivation techniques, harvesting methods, safe use of fertilizers and pesticides and waste disposal. Systematic conservation and large scale cultivation of the concerned medicinal plants resulted in suggesting appropriate cropping patterns for the incorporation of these plants into the conventional agricultural systems. Developing countries, which have cheap labor and unpolluted land, can opt for organic cultivation. The trend for green products is also increasing and it is expected that the industrialized countries will insist on their production.

Key words: *medicinal and aromatic plants, cultivation, biodiversity, Serbia*

Molecular markers of cells, organisms and ecosystems

Lefkovits I.

Department of Biomedicine, University Hospital Basel, Switzerland

Abstract

Multicellular organisms are made up of a variety of cell populations. Not only cells of one tissue differ from cells of another one (heart, skin, thymus, mucosa, etc.), but also every tissue is composed of a multitude of cell populations. We turn our attention to the general picture of heterogeneity that emerges across the entire field of biology. The first question is what makes individual cells different biochemically, physiologically and functionally? And the follow-up second question is what environmental context allows proper functioning of organisms and entire populations?

That what we know about interactions in the immune system we wish to apply for higher level interactions. Not all cells of the immune system are equipped with "right receptors", and cells failing to respond do so because their molecular pattern is inadequate to the conditions of the response milieu. The heterogeneity of cells has its counterpart in heterogeneity of organisms and of entire populations. Such heterogeneity ensures that whatever physiological conditions prevail, some life-units (cells, individuals, populations) will likely to be ready to be selected for survival.

We suggest that molecular markers exist not only in the interactions within the immune system, but also as a wide spectrum of markers that defines a selective match to a variety of environmental conditions.

Using next-generation sequencing to study freshwater biodiversity

Monaghan, M. T.

Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Müggelseedamm 301, 12587 Berlin, Germany; monaghan@igb-berlin.de

Abstract

Most fields of biology have benefited from advances in sequencing technologies. Biodiversity research is no exception, although some logistical and methodological challenges must be overcome when studying natural ecosystems and communities. Here I present three ongoing projects in my research group where we apply next-generation sequencing to the study of freshwater communities. First, an inventory of fungal diversity in a clear, nutrient-poor boreal lake in northern Germany revealed surprising diversity and higher than expected habitat fidelity of aquatic fungi. Second, an analysis of the diet of a predatory insect (Hemiptera, Naucoridae) shed light on the unknown ecology of a potentially important disease vector in West Africa. Third, combined analysis of environmental samples of insects revealed show that sample processing time can be greatly reduced compared to traditional methods of morphological analysis and can shed light on the degree of habitat-specificity of aquatic insects in large rivers. Taken together, the studies highlight some important applications of next-generation sequencing to the environmental and ecological sciences, and raise some new questions while providing solutions to some old problems.

Key words: *454, aquatic biodiversity, ecology, Mycobacterium*

Nature's Contribution to Pharmacy and Ecological Balance

Orhan I. E.[1,2]

[1]*Department of Pharmacognosy, Faculty of Pharmacy, Gazi University, 06330 Ankara, Turkey (E-mail addresses:* iorhan@gazi.edu.tr*;* ilkay.orhan@emu.edu.tr*)*
[2]*Pharmacognosy and Pharmaceutical Botany Unit, Faculty of Pharmacy, Eastern Mediterranean University, Gazimagosa (Famagusta), The Northern Cyprus*

Abstract

Since ecology is a science that deals with all relations between organisms and environment, the relationship between plants, animals and environment is also ecologically very important. Our country (Turkey) is one of the luckiest countries in the world thanks to its quite high number of species number and endemism rate in terms of flora. The flora is important for environmental life as well as human being, because the natural sources such as plants, animals, insects, and marine organisms have been utilized in treatment of many diseases and have been a popular target in drug research and discovery. Turkey is rather rich in terms of medicinal plants, however, these plants have not been valued and evaluated as much as they deserve. In the world, an augmentation is being observed in demand for herbal therapy and this trend is named as "back to the nature" or "green trend". On the other hand, naturally-growing plant species seems to impossible to meet this demand and these species are gradually exterminated by several factors such as excess demand, environmental pollution, urbanization and other environmental factors. The same situation is also valid for many animal species and, unfortunately, the data is not glorious about ecological balance for the plant and animal species. Therefore, many species that contribute to drug discovery studies are facing to die out. From this point of view, a permanent solution should be found by biologists, agriculturalists, forest engineers, botanicians, pharmacists, environmental engineers, and urban planners.

In this presentation, examples of the plant and animal species that are used in traditional and modern medicine preparations will be given and attention will be attracted to problems relevant to their importance in ecology.

Key words: *Ecology, nature, plant, animal, therapy, drug*

A procession of Lemmings: why ecology in Central Europe is (generally) unsuccessful?

Tryjanowski P.

Poznań University of Life Sciences, Institute of Zoology, Wojska Polskiego 71C, 60-625 Poznań, Poland; piotr.tryjanowski@gmail.com

Abstract

Ecology in Central Europe does not provide brilliant discoveries, at least not when evaluated by classical scientometric methods. But our reaction is dramatic sometimes and we are simply fighting with methodology, instead of reflection and diagnosis of bad situation. In medicine, an approach called evidence based medicine is popular nowadays, similar thing is suggested to conservation, but I suggest that simply as a copy of old scholastic philosophy it should be popular nearly in all parts of science, including ecology.

But reflection and even changes in scientometric methodology do not change the situation. To achieve that it is necessary to take an action. What can we do? Is it possible to achieve a success of ecology in Central Europe?

I provide a few examples of successful ecological stories. I try to understand why they are so well known and to explain it in more general context of academic life over the world. Moreover, I present personal ideas based on co-operation between scientists, using citizen science. Last but not least I offer general solution to stop copy Western solutions all the time, simple because we are different.

Key words: *ecology, based evidence methods, success, new ideas*

Reflections on digit ratio (2D:4D) research: current knowledge and progress, animal and human studies

Voracek M.

University of Vienna, School of Psychology, Department of Basic Psychological Research and Research Methods, Liebiggasse 5/3, Raum 03-46, A-1010 Wien, Austria; e-mail: martin.voracek@univie.ac.at

Abstract

Digit ratio (2D:4D) is a now widely researched, putative retrospective biomarker for the organizational effects of prenatal androgen exposure (Zheng & Cohn, 2011, PNAS; Voracek, 2011, PAID). Apart from a multitude of human observational-correlational studies on the 2D:4D biomarker, recent years have seen an emerging animal literature on the topic, which in addition features informative experimental work and validation studies that are not feasible within human 2D:4D research, taking on the form of manipulating those early sex hormone levels which are thought to be reflected by the 2D:4D ratio. This talk sets out to provide a brief overview of the expanding animal 2D:4D research literature, including summaries of its key questions and key findings so far, along with an outlook to research desiderata and possible fruitful future research directions in this area of inquiry. Special consideration is given to highlight some problems and pitfalls of researching the 2D:4D marker across species as well as to illustrate some peculiarities of this research field (foremost, publication bias and related phenomena of evidence distortion) which may hamper its progress.

Key words: *animals, digit ratio, prenatal androgens, humans, cross-species comparisons, publication bias, research synthesis, research program evaluation*

Oral Sessions

Waste dumps as hotspots of epigeal macrofauna functional diversity

Baranová B., Fazekašová D.

University of Prešov in Prešov, Faculty of Humanities and Natural Sciences, Department of Ecology, ul. 17 novembra č.1, 081 16 Prešov, Slovakia-SVK; bbaranova@gmail.com

Abstract

The waste dumps are considered to be threat of environment as the source of the air, soil and water pollution, spread of parasites, germs of diseases or invasive plants. As the human civilization became more expanded, there arise a number of legal and illegal waste dumps in the landscape. Concurrently, the urban ecology and so research of such a man-made sites as potential hotspots of local biodiversity gains ground. Within the study of anthropogenically differently utilized and loaded biotopes, during the seasons 2010 and 2011, epigeal macrofauna was collected using pitfall traps on totally 17 sites of arable land, grass fields, woody vegetation of agricultural landscape and illegal, active and reclaimed municipal waste dumps in urban and suburban zones of Prešov and surrounding towns in Eastern Slovakia. The epigeal macrofauna community of waste dumps showed the highest diversity and equitability within the studied habitats on both, order and functional group level determined on the base of orders food preferences, the lowest measure of diversity and equitability was characteristic for arable land community. The waste dumps community was characteristic also by significant increase of detritophagous compound portion, what was probably caused by higher diversified waste dumps environment with lots of microhabitats and food sources and lower measure of anthropogenic soil environment disturbances in comparing to other study habitats, which are detritophagous groups in general known to be highly sensitive to. As the portion of the other than zoo and polyphagous groups which dominate the arable land increase, the community became more functionally diversified and with the higher equitability. The study confirmed waste dumps as the precious natural territories supporting rising of epigeal macrofauna community functional diversity, promoting survival of stenotopic, mainly detritophagous soil faunal groups and so playing important role as local diversity hotspots within anthropogenically intensively used cultural landscape.

Key words: *epigeal macrofauna, waste dumps, functional diversity*

Selected biochemical markers of bone remodeling in postmenopausal women

Blaščáková M.[1], Poráčová J.[1], Blaščáková Ľ[2], Boroňová I.[1], Bernasovská J. [1] Bernasovský I. [1], Tomková Z.[3], Smik R[3].

[1]Presov University in Presov, Excellence Center of Human and Animal Ecology,Department of Biology, Faculty of Humanities and Natural Sciences, 17 November Street 1,081 16, Presov, Slovak Republic; martablascakova@gmail.com
2 Pavol Jozef Safarik University in Kosice, Faculty of Science, Department of Biophysic, Jesenna 5, 041 54 Kosice, Slovak Republic
3 Osteocentre s.r.o., Konštantínova 17, 080 01 Prešov, Slovakia

Abstract

Osteoporosis is a multifactorial disease, which in recent years has become a serious epidemiological, social, economic and medical problem. The highest risk group for osteoporosis are considered to be post-menopausal women, when the production of estrogen is decreased, which leads to situations of osteoresorption and a high activity level of osteoclasts. Regarding bone metabolism a number of biochemical markers have been investigated in recent years. In particular the enzymes and products of bone metabolism, which are located in different concentrations in the blood and urine.

In our work we divided postmenopausal women into two groups (control group (CG) n= 104; osteoporotic group (OS) n=105) based on densitometry measurements (DXA Hologic Discovery W) provided the chosen osteoformation (ALP - alkaline phosphatase, OC - osteocalcin, PINP - propeptid aminoterminal procollagen type I), markers of osteoresorption (CTx - carboxyterminal telopeptide of collagen type I) and mineral elements (Ca - calcium, P - phosphorus, VITD-T - total vitamin D) in the blood serum (Roche Cobas Integra 400, Roche Elecsys) .

Based on the Student's T-test, we found important differences that were significant between the control group and the osteoporotic group concerning the majority of the population in biochemical markers called osteocalcin ($p<0,05$) and PINP ($p<0,01$). The mineral elements in the control group were measured and and regarding calcium it was higher than average (CG - 2.52 ± 0.14 mmol/l, OS - 2.48 ± 0.39 mmol/l).

***Key words**: bone metabolism, biochemical markers, mineral elements, densitometry*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Utilization of Real-time PCR in prediction of the risk of osteoporosis

Boroňová I.[1], Bernasovská J.[1], Bernasovský I.[2], Mačeková S.[1], Kľoc J.[3], Tomková Z.[3], Poráčová J. [1], Blaščáková M. [1], Petrejčíková E.[1]

[1]University of Prešov, Faculty of Humanities and Natural Science, Department of Biology, Excellence Centre of Animal and Human Ecology, 17. November 1, 080 01Prešov, Slovakia; boronova@unipo.sk
[2]Institute of Romany studies, University of Prešov, 17. November 1, 080 01Prešov, Slovakia
[3] Osteocentre s.r.o., Konštantínova 17, 080 01 Prešov, Slovakia

Abstract

Osteoporosis is a common multifactorial disease with a strong genetic component characterized by reduced bone mass and increased risk of fractures. Genetic factors play an importatnt role in the pathogenesis of osteoporosis. Current research in genetics of osteoporosis is focused on identification of responsible genes and polymorphisms. Osteoprotegerin (OPG) gene is considered as an important candidate gene of osteoporosis playing a key role in the biological characteristics of bone. A total of 160 unrelated postmenopausal women with diagnosed osteoporosis and 160 normal controls were genotyped for 163A/G and 245T/G polymorphisms. Genomic DNA was isolated from peripheral blood leukocytes using standard methodology. Real-time PCR allelic discrimination TaqMan assay was used for genotyping analyses. Hardy-Weinberg equilibrium was tested for each SNP in groups of participants using the chi-square test. The distribution of investigated genotypes in the survey of patients with osteoporosis were as follows: AA (68,1%), AG (31,3%), GG (0,6%) for A163G polymorphism; TT (86,3%), TG (12,5%), GG (1,3%) for T245G polymorphism. In A163G polymorphism the variant G allele was more common among patients with osteoporosis: 16% versus 14% in normal controls. In T245G polymorphism the phenomenon of more frequent occurence of G allele in the group of patients with osteoporosis was not observed. Genotype distribution in the studied populations was in Hardy-Weinberg equilibrium. Genotypes and alleles frequencies showed no significant differences. Our results represents an initial study, futher studies on larger numbers of samples and associations studies will be carried out. Knowing the distribution of genotypes is important for assessing the impact of these polymorphisms on various parameters associated with osteoporosis. Screening for the identification of "at-risk" women likely to develop osteoporosis and initiating subsequent early intervention appears to be most effective strategy to substantially reduce the risks of osteoporosis.

Key words: *osteoporosis**,** A163G polymorphism**,** T245G polymorphism, Real-time PCR method*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

The effect of hydrodistillation specifics on the yield of essential oil from German Chamomile (*Matricaria recutita L.*)

Bujňáková P.[1], Kocourková B.[2], Šalamon I.[3]

[1]*University of Presov in Presov, Faculty of Humanity and Natural Sciences, Department of Ecology, 01, 17th November St., 080 16, Presov, Slovakia; petra.bujnakova@smail.unipo.sk*
[2]*Mendel University in Brno, Faculty of Agronomy, Department of Crop Science, Breeding and Plant Medicine, 01, Zemedelska St.,613 00, Brno, Czech*
[3]*Universityof Presov in Presov, Excellence Centre of Human and Animal Ecology, 01, 17th November St., 080 16, Presov, Slovakia*

Abstract

The most common method for detection of German chamomile essential oil yield is hydrodistillation. We tried to make a study about the residual amount of oil which remained in the hydrodistillation apparatus after collecting of oil, and weighting differences of dried samples. Hydrodistillation was performed according to the method recommended in the European Pharmacopoeia. The essential oils from 30 samples of German chamomile air dried flowers were hydrodistilled for 2 h using a Clevenger apparatus. Subsequently the oils were collected in the phase separation. As the residual amount of essential oil was low, we gathered hydrodistillation aparature and dissloved residual oil in *n*-hexane. Our study confirmed that from 6.73 to 11.44% of oil remained in apparatus after the collecting of oil. Yield of oil was calculated on dry weight basis and dried over the 12 h and subsequently 24 h in desiccator. The quantitative differences of dried and not dried samples are from 0.63 to 2.48% after the 12 h and from 0.02 to 0.25% after the 24 h. The precision performance of this method has a major effect on the essential oil yield, confirming therapeutical quality and the chromatographic determination of its composition.

Key words: *drying, essential oils, hydrodistillation, Matricaria recutita* L.*, oil yield*

Acknowledgement: This research has been performed within the grant program SPP HLAVICKA 2011/2012 sponsored by the SPP Foundation.

Detection of C677T polymorphism in the MTHFR gene and its association with fetal loss

Dragunová Z., Bôžiková A., Škovranová K. , Bernasovská J.

Department of Biology, Faculty of Humanities and Natural Sciences, University of Presov, 17. Novembra 1**,** 08116 Prešov, Slovakia. zuzka.dragunova@gmail.com

Abstract

Thrombophilia represents a heterogeneous group of inherited or acquired disorders of haemostasis, which are pathophysiologically associated with an increased tendency to coagulation and predispose the patient to the occurrence or recurrence of thrombosis. They are one of the causes of thromboembolic disease during gestation, significantly contributing to the pathogenesis of preeclampsia, intrauterine death and fetal growth restriction, placental abruption and recurrent pregnancy loss. Inherited forms of thrombophilia are often caused by the mutations of genes encoding factor V, prothrombin, protein C, protein S and antithrombin. Supposedly, there is an association of certain pregnancy complications and C677T polymorphism in the MTHFR gene The risk of pregnancy complications including fetal loss can be caused by elevated levels of plasma homocysteine (hyperhomocysteinemia), which is in association with studied polymorphism. We used TaqMan SNP Genotyping analysis using real-time PCR method for detection of mutation C677T in the MTHFR gene. Studied group consisted of 115 women, including 39 women who have undergone at least one fetal loss during pregnancy, the remaining 76 women had no pregnancy complications and no fetal loss. We have not found a statistically significant increase in the incidence of a genetic predisposition to thrombophilia caused by C677T mutation in the group of women with a history of abortions when compared to women with no record of abortion.

Key words: *Trombophlia; Hyperhomocysteinemia; Pregnancy complications; Fetal loss; MTHFR C677T*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Birth weight of Romany and non – Romany newborns depending on the age of mother from Kežmarok district

Duranková S.[1], Čarnogurská J.[2], Bernasovská J.[2], Boroňová I.[2], Bernasovský I.[2]

[1]*Department of biology, Prešov university in Prešov, Faculty of Humanities and Natural Sciences, 17. novembra, 081 16 Prešov, E-mail:* silvia.durankova@gmail.com
[2]*Excellence Centre of Animal and Human Ecology, Prešov university in Prešov, Faculty of Humanities and Natural Sciences, 17. novembra, 081 16 Prešov*

Abstract

In our research, we aimed to compare the birth weight of Romany and non-Romany newborns according to mother's age. Statistically, we processed 578 Romany fullterm newborns - 280 girls and 298 boys. The studied group consisted of 574 non-Romany fullterm newborns - 297 girls and 277 boys. All infants were born in the department of paediatrics of Dr. Vojtech Alexander´s Hospital in Kežmarok, between 2008 - 2009 in 37 to 42 weeks of gestation. The results show that with increasing mother's age increase also the body weight of newborns and Romany newborns have lower average values of birth weight according to mother's age than non-Romany newborns.

Key words*: Romany newborns, non-Romany newborns, body weight, mother's age*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Effect of androgen-deprivation therapy on the change of bone density in patients with prostate cancer.

Fitusová L.

Comenius University in Bratislava, Faculty of Medicine, 2nd Department of Pediatrics, Limbová I, 83340, Bratislava, Slovakia; liliana.fitusova@gmail.com

Abstract

Androgen-deprivation therapy (ADT) is used as the standard treatment for advanced prostate cancer. Its use is associated with several adverse effects. One of the most serious longterm adverse effects is reduction of "bone mass" (bone mineral density – BMD). The aim of this study was to determine the reduction of BMD during ADT, to evaluate the effect of ADT on bone metabolism, to determine the number of complications (fractures) and possibilities for prevention. Study group consisted of 108 patients in an average age of 63.97 years. The BMD of the femoral neck and vertebrae L1-L4 was examined in patients with prostate cancer by X-ray absorptiometry. There were evaluated changes in BMD, the number and type of fracture. Patients with osteoporosis were treated in cooperation with orthopedic. The same test were performed on 447 patients in control measurements (average age 66.96 years). In the analyzed group of 108 patients we have found the incidence of osteoporosis in 31 % and osteopenia in 37 % of patients. In the control measurement was found a significant decrease in BMD ($p=0.003$). We confirmed the significant dependence of bone density by age ($p=0.005$). The fractures were found in 38.3 % of study group.

Key words: *osteoporosis, osteopenia, BMD, absorptiometry, fractures*

Inherited rare diseases in Roma population

Gabriková D. [1], Bernasovská J[1]., Mistrík M. [2], Tóthová I. [1], Bôžiková A. [1], Kisková J. [1], Mačeková S. [1]

[1] *University of Presov in Presov, Faculty of Humanities and Natural Sciences, Department of Biology, ul. 17. Novembra 1, 08116 Prešov, Slovakia, dana.gabrikova@yahoo.com*
[2] *General Hospital Spišská Nova Ves, Dept. of Medical Genetics, Jánskeho 1, 052 01 Spišská Nova Ves, Slovakia*

Abstract

Like other isolated populations with a founder effect, Roma are a valuable resource for research on rare genetic diseases, and the discovery of genes and mutations. Recently, several rare diseases were identified to be caused by a specific mutation of a common origin. Roma often suffer from diseases that are common in the surrounding populations, but in Roma they are caused by a different mutation. Moreover, there are several diseases in this ethnics, that are rare or completely absent in the majority population. Application of this knowledge into medical practice is often difficult. At first sight different gene pool of Roma complicates the diagnosis of patients. But knowledge of diseases and particular mutations specific to certain ethnic group can actually greatly simplify and speed up the diagnostic process. In this study, we review our experience in molecular diagnostics of rare diseases among Roma in Eastern Slovakia. Most telling example is Charcot-Marie-Tooth disease. The most common type of this disease in Slovakia is an autosomal dominant CMT1A caused by PMP22 gene duplication, however, this subtype of disease is not present in Roma population. After excluding of PMP22 gene mutation these conditions often remain without proper diagnosis. Here we present successful diagnostics of specific subtype of this disease in four out of five families using simple protocol based on knowledge of mutations specific for Roma.

Key words: *Roma, Gypsy, autosomal recessive disease, founder effect, Charcot-Marie-Tooth*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Sequence analysis of candidate genes in patients with isolated (non-syndromic) hypodontia

Grejtáková D.[1], Gabriková D.[1], Kyjovská L.[2], Eötvösová M.[2], Boroňová I.[1], Bernasovská J.[1]

[1]*Department of Biology, Faculty of Humanities and Natural Sciences, University of Prešov, 17. Novembra 1, 08116 Prešov, Slovakia; daniela.grejtakova@gmail.com*
[2]*Trident Ltd.-Comprehensive Dental Clinic and Orthodontics, Rastislavova 786/45 St., 04001 Košice, Slovakia*

Abstract

Hypodontia is agenesis of one to six teeth, and it represents the most common orofacial deformity in humans. The tooth development (odontogenesis) is very complicated and complex process. Research of the molecular basis of hypodontia is based on the detection of mutations in genes that affect the process of odontogenesis. Several candidate genes associated with isolated hypodontia have been described. The most common causes of hypodontia are mutations in transcription factors, such as the homeobox gene MSX1 and paired box gene PAX9. In this study, DNA samples of 16 patients, aged 8 to 24, with different types of tooth agenesis were analyzed. The agenesis of lateral incisors in the first and second quadrant has occurred more frequently (81.25%) than agenesis of second premolars present in the third and fourth quadrant (31.25%). Genomic DNA was isolated from buccal swabs. DNA sequence analysis was performed by the 24-capillary 3500xL Genetic Analyzer (Life Technologies). Exons, exon/intron junctions and UTRs of MSX1 gene were sequenced. Sequences were evaluated by SeqScape®Software and Sequencing Analysis Software (Life Technologies) and compared with reference sequences. The detected variants have been described in relation to the pathogenesis of hypodontia.

Key words: *dental agenesis, isolated hypodontia, MSX1, sequence analysis*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

LC/MS-IT-TOF Determination of Anthocyanins in Selected Plant Species

Gruľová D.[1], Semančíková M.[2], Šalamon I.[3]

[1]*Department of Ecology, The Faculty of Humanities and Natural Sciences, University of Presov in Presov, 17th November Street No. 1, SK - 08001 Presov, Slovak Republic. E-mail:* dgrulova@gmail.com
2MEDICPRODUCT a.s., kpt. Nalepku 2, 082 71 Lipany, Slovakia.
[3]*Excellence Centre of Animal and Human Ecology, University of Presov in Presov, 17th November Street No. 1, SK - 08001 Presov, Slovak Republic*

Abstract

Anthocyanins are secondary metabolites produced by different plants species and belong to the polyphenolic flavonoids group. This chemical constituents are responsible for the highest content of red and blue colour in fruits, berries and flowers. The base structure of all anthocyanins is formed by flavylium cation. Anthocyanins occur in plants as glycosides and the aglycones (non-saccharide part) are called anthocyanidines. The aglycones are in their nature glycosylated by one or more types of saccharides. A difference among individual types of aglycones depends on number of bounded hydroxylated groups and on the level of their methylation. Analysis of anthocyanins included 5 steps: 1. homogenisation of frozen berries – lyofilisation, 2. extraction of anthocyanins, 3. concentration 4. identification and 5. quantification of anthocyanins. LC/MS-IT-TOF (liquid chromatography on reverse phase coupling atmospheric pressure ionization with Ion-Trap (IT) and Time-of-Flight (TOF) technologies connected with mass detection) was used in the fourth and fifth steps. There were evaluated anthocyanins in three plant species *Vaccinium corymbosum*, *Vitis vinifera* and *Aronia melanocarpa*. C18 column (150 x 3 mm, 5 μm) with 0,3 ml/min flow rate of mobile phase was used for analysis. As mobile phase A in gradient elution was used acetonitrile and as B mobile phase was used 0,12 M formic acid. Mass spectra include abundant signals as molecule ion (M+), ion of corresponding anthocyanidine and ions of gradual breakdowns units of monosaccharide. Quantitative analysis was performed using an external standard containing mixed of seven kinds of anthocyanins.

Key words*: anthocyanins, Vaccinium corymbosum, Vitis vinifera, Aronia melanocarpa, LC/MS-IT-TOF*

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Behavioural ecology of ecologists and another animals – implications for our future fitness

Hromada M.[1], Tryjanowski P.[2]

[1]*University of Presov in Presov, Faculty of Humanities and Natural Sciences, Department of Ecology, ul. 17. Novembra 1, 08116 Prešov, Slovakia, e-mail: hromada.martin@gmail.com;*
[2]*Poznań University of Life Sciences, Institute of Zoology, Wojska Polskiego 71C, 60-625 Poznań, Poland, e-mail: piotr.tryjanowski@gmail.com*

Abstract

Behavioural ecology, by definition, is the study of the ecological and evolutionary fundamentals of animal behaviour and the role of behaviour in enabling animals to adapt to their environment (both intrinsic and extrinsic). Success of such studies is strongly related to simple scientific rigour, lot of experimental studies, but primarily to quite simple questions and hypotheses. Recently, behavioural ecology tends to explain not only behaviour of its study organisms, animals, but it also more focus on an observer – *Homo sapiens*. We provide here some examples explaining life of ecologists in broader context, in our academic environment. We shortly present most popular ecological theories often used for explaining behaviour in evolutionary context; they are very useful for understanding of human relationships, for example red queen hypothesis, handicap selection, sex-ratio, public information theory, trade-off, ecological traps, cargo cult etc. We suggest to incorporate these ideas into academic practice, but we also provide some limitations of these concepts**.**

Key words: *academy, behavioural ecology, effective research, scientists, scientometry*

The usage of HRM method for molecular genetic analysis of "sports gene" ACTN3

Hronská D., Gabriková D., Mačeková S., Bôžiková S., Bernasovská J., Jurčo T.

University of Presov, Faculty of Humanities and Natural Sciences, Department of Biology, 17. Novembra 1, 08116 Prešov, Slovakia; danicahronska@yahoo.com

Abstract

The aim of the research was to test suitability of real-time PCR High-Resolution Melting for molecular genetic analysis of the "sports gene" ACTN3. ACTN3 gene is the gene encoding the protein alpha-actinin-3. Polymorphism R577X found in this gene leads to two versions of the ACTN3 protein in humans. Allele 577R is functional allele of the gene, where the presence of alpha-actinin-3 predisposes individuals to speed-power sports, while 577X is dysfunctional allele, protein is absent, which is predisposing to endurance sports. The real-time PCR High-Resolution Melting method was used for polymorphism detection of ACTN3 gene. It's a simple post-PCR method for mutation screening and genotyping. The principle of the HRM method is the thermal dissociation of PCR amplicon in the presence of fluorescent dye to allow effective monitoring of dissociation behaviour. Genotypes were determined by melting curves which software automatically normalized. Software allows creating reports of any analysis, where information of the specific analysis, normalized and differential graphs and information about the samples are shown. Our analysis confirmed suitability of this method. It is quick, easy, affordable and in the future could be used to determine the predispositions of each athlete.

Key words: *ACTN3 gene, polymorphism R577X, alpha-actinin-3, High-Resolution Melting*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Application of SOLiD sequencing technology in research

Kello M., Kuliková L.

University of Prešov in Prešov, Faculty of Humanities and Natural Sciences, Department of Biology, Ul. 17. novembra 1, 08116, Prešov, Slovakia, kellomartin@yahoo.com

Abstract

Next generation sequencing (NGS) technologies are revolutionising genomics and their effects are becoming increasingly widespread. NGS technologies have an impressive range of applications, and more are being developed. NGS technologies are being used to characterize the evolutionary relationships of ancient genomes and to elucidate the role of noncoding RNAs in health and disease. In the near future, it is foreseeable that NGS technologies could be used to obtain high-quality sequence data from a genome isolated from a single cell, which would be a substantial breakthrough, particularly for cancer genomics.

The field of NGS development and applications is a fast-moving area of research, which includes whole genome and targeted resequencing, transcriptome research (including gene expression profiling, small RNA and whole transcriptome analysis), and epigenome (like ChIP-Seq and methylation). Beyond conventional sampling of genome content, wide-ranging applications are rapidly evolving for next-generation sequencing. Sequence census methods such as ChIP-Seq and RNA-Seq are becoming powerful and quantitative approaches to analyse the structures and functions of both genomes and transcriptomes at maximal resolution.

Key words: *Next generation sequencing, genome, transcriptome, applications*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Biodiversity of quill mites, a little explored group of parasitic mites – from taxonomy to ecology

Klimovičová M., Hromada M.

University of Prešov, Faculty of Humanities and Natural Sciences,17th November St. 1., 081 16 Prešov, Slovakia; e-mail: mklimovicova@gmail.com

Abstract

Knowing how many species there are on Earth is one of the most important questions in science. Without this knowledge, we cannot answer very basic questions such as how much biodiversity and ecosystem services that humanity depends upon we can lose. Most recent estimates of number of eukaryotic species on our planet are approximately 10 million. Among the most diverse and successful invertebrate groups in means of number of species and in the ecological sense are mites (Acari). Till now, there are recognised 45 000 known species, but their diversity probably exceeds one million taxa, including ecto- as well as endoparasitic forms. With regard to the great diversity of forms, peculiar adaptations and abundance, bird parasites are extremely interesting group. Currently, there was described approximately 2 500 species of mites belonging to 40 families, which are permanently connected with birds. Mites from family Syringophilidae are parasites living within the bird quills. The world fauna of syringophilids currently comprises of about 275 known species; 138 species was described from Palaearctic region. Finally, in Slovakia, 23 quill mite species were recorded until now. However, it is possible to expect that this single mite group consists of as much as 5 000 species. Of course, such lack of good taxonomic studies caused that quill mites were mostly ignored by ecologists, despite of their extremely interesting way of life and potentially high ecological impact. Therefore, we supose that a thorough research investigating biodiversity, taxonomy and ecology of syringophilid mites in Slovakia is urgently needed and we propose such project.

Key words: *Acari, biodiversity, birds, ecology, quill mites, Slovakia, Syringophilidae, taxonomy*

Coexistence of natural clones and biotypes of hybrid complex of genus Cobitis in selective processes

Koščo J. [1], Manko P. [1], Pekárik L. [2], Košuthová L. [3], Škovranová L. [1]

[1]*Department of Ecology, Faculty of Humanity and Natural Sciences, University of Prešov, ul. 17. novembra 1, Prešov, 080 16, Slovakia, jan.kosco@unipo.sk*
[2]*Institute of Zoology, Slovak Academy of Sciences, Dúbravská cesta 9, Bratislava, 845 06, Slovakia*
[3] *Institute for breeding and diseases of animals and fishes, University of veterinary medicine and pharmacy, Komenského 73, 041 81 Košice, Slovakia*

Abstract

The immediate advantages of increased copies of alleles to the establishment of a polyploid fish are not well known. Unisexual hybrid forms, contrary to bisexual species, are capable of rapidly extending their range. This is related to their high fecundity and gynogenetic reproduction, which permits them to use diploid males of related species without "spending their energy" on their own male individuals, as a result of which unisexual biotypes rapidly occupy a dominant position in communities of loaches. There is evidence that spined loaches with polyploid biotypes are more viable and fertile than their diploid ancestors. Consequently, they have settled along the rivers of Eastern Europe and have oppressed the local diploid species. Triploid individuals should grow faster than diploids, because their genes are numerous, and their cells and nuclei are larger. Triploids rarely grow faster than diploids before sexual maturity and then grow faster and more efficiently process food. For a polyploid fish species to become established, it must gain some advantage from an increase in chromosome numbers, through increased survival or ability to adapt to a new environment, and ultimately through increased reproductive success. Despite the dramatic change in chromosome number, polyploid fishes are often phenotypically very similar to their diploid relatives. Consequently, there has been much speculation about what the evolutionary advantages of polyploidy in the fishes may be.

Key words: *Cobitis sp., diploid-polyploid complex, ecological valency, competitions*

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Sequencing by Oligonucleotide Ligation and Detection (SOLiD)

Kuliková L., Kello M.

University of Prešov in Prešov, Faculty of Humanities and Natural Sciences, Department of Biology, Ul. 17. novembra 1, 08116, Prešov, Slovakia; lucia.kulikova@unipo.sk

Abstract

The Sequencing by Oligonucleotide Ligation and Detection (SOLiD) is one of the new generation sequencing technologies developed by Life Technologies based on a massive parallel sequencing. SOLiD is used for a wide range of applications e.g. in genomics, epigenomics and transcriptomics. In addition, this technology significantly reduces costs and increases the accuracy up to 99.99% through the two-base encoding system - Exact Call Chemistry Module (ECC). The sequencing of DNA is performed on four types of fragment libraries according to the type of analysis: fragment, paired-end, mate-paired and barcoded library. In general, the library construction is based on the connection of adapter sequences to the both ends of DNA fragments. This enables the complementary attachment of fragment library to the adaptors located on the magnetic beads and subsequent emulsion PCR in oily phase clonally amplifies DNA fragments resulting in clonal bead populations. After the enrichement, the modification of 3' prime ends is the final step of sample preparation which allows covalent binding the flow chip. Each bead has its own position on the slide recorded by camera. The principle of sequencing is based on sequential ligation of fluorescently labeled probes characterized by one of 16 dinucleotides and the detection of fluoresce. This next-generation sequencing technology allows *de novo* sequencing, targeted and whole genome resequencing, chromatin immunoprecipitation (ChIP-Seq), methylation analysis, gene expression profiling, small RNA and whole transcriptome analysis. Thanks to this, researchers have an opportunity to gain new knowledge about not only the human genome and thus contribute to a better understanding of genetically determined disease.

Key words: *next generation sequencing, gene, fragment library, dinucleotide*

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Effect of habitat conditions for vegetative growth of horsetail (*Equisetum arvense* L.)

Labun P.[1], Šalamon I.[2]

[1]*Department of Ecology, Faculty of Humanities and Natural Sciences, Presov University in Presov, 01, 17th November St., SK-08116 Presov, Slovak Republic, email: pavollabun@yahoo.com*
[2]*Centre of Excellence for Animal and Human Ecology, Presov University in Presov, 01, 17th November St., SK-08116 Presov, Slovak Republic*

Abstract

Horsetail (*Equisetum arvense* L.) grows in sandy and clay substrates with a high level of ground water. During the lifecycle the plant produces spring and summer stems. Summer stalks are 0.10 to 0.40 m high, green, ribbed, branched and barren. The plant is collected for production of dried medicinal known as a *Herba equiseti*. Each plant species has its specific areas of distribution or habitats. Monitoring of selected species and populations was conducted during the period of 2009 to 2011 on three different natural locations (L1, L2, L3) in Laborecká vrchovina in eastern Slovakia. The highest quantity of biomass was collected in 2009 and the lowest in 2011. The largest amount of the total biomass (131 ± 25 $g.m^{-2}$) was obtained from the third collection from a total of six collections for the locality L2 in 2009. The lowest amount of biomass (33 ± 1 $g.m^{-2}$) was obtained in the same locality in 2011. In 2009, the largest amount of collected biomass was obtained from the first three harvests. However, in 2010 and 2011 the largest amount of harvested biomass was obtained from the fifth and sixth collections. The locality L3 has the lowest amount of biomass, which ranged from 5 ± 1 $g.m^{-2}$ to 42 ± 5 $g.m^{-2}$ during the three experimental years. The main factors for statistical variability in the underground and aboveground biomass of horsetail (*Equisetum arvense* L.) were locality, year and collection. Location had the highest impact on underground and aboveground biomass.

Key words: *biomass, Equisetum arvense, growth conditions, variability*

Acknowledgments: The work was supported by the Agency of Ministry of Education, science, research and sport of the Slovak Republic, the project: 00162 – 0001 (MS SR-3634/2010 – 11).

Autecology of stoneflies (Plecoptera) in Eastern Carpathian stream

Manko P.

University of Presov in Presov, Faculty of Humanities and Natural Sciences, Department of Ecology, 17. novembra 1, SK-08116, Presov, Slovakia

Abstract

The main objective of this study was to provide information on the ecology of Plecoptera nymphs in the Udava River. We studied microhabitat distribution of most abundant stonefly species in this stream and analysed the most important environmental variables governing the microdistribution. We also provided the species response curves analysis and created Generalised linear models (GLM) indicating the distribution in relation to environmental variables. These models were partly in correspondence with published autecological notes of analysed species, but there were exceptions in some cases.

Next part of the study was focused on the diet composition of the most abundant predatory stonefly in the Udava River (*Perla marginata*). We studied the feeding ecology of this species using macroscopically analysis of the gut content. Our results showed differences in the diet composition in different seasons and between different size groups. These differences were related to both taxonomical and size composition.

Key words: *stonefly nymphs, species response curves, GLM, ecology*

Acknowledgement: This study was supported by the grants APVV-0154-07 and OPVaV: ITMS 26220120041.

Extraction and isolation of anthocyanins from ecologically pure plant materials of Carpathian region

Mariychuk R.[1,3], Šalamon I.[2], Fejér J.[3]

[1] *Department of Ecology and Environment Protection, Faculty of Chemistry, Uzhhorod National University, Pidgirna 46, 88000, Uzhhorod, Ukraine; e-mail: mariychuk@ukr.net*
[2]*Excellence Centre of Human and Animal Ecology, Presov University in Presov, 17th November St. 1, 08116 Presov, Slovakia*
[3]*Department of Ecology, Faculty of Humanities and Natural Sciences, Presov University in Presov, 17th November St. 1, 08116 Presov, Slovakia*

Abstract

The results of investigation dedicated to the development of large scale technique for isolation of anthocyanins from plant materials of Carpathian region are presented. The most interesting natural sources of anthocyanins were observed as *Sambucus nigra*, *Aronia melanocarpa*, *Vaccinum myrtillus*, *Vaccinum corumbosum* and *Vitis vinifera* from local farms.

Different starting materials (fresh, frozen and freeze-dried) were used for discovering of optimal conditions. Anthocyanins were extracted from a mixture of berries at different temperatures using ethanol and acetone (alone or water diluted) acidified with acetic, hydrochloric, citric or tartaric acids at a solvent to solid ratio from 1 to 10. We were mostly concentrated on studying of ethanol-water extracting system because ethanol is generally accepted to safe and it is suitable for preparation of food products in opposite to acetone, chloroform or methanol.

The purification process was investigated for different reversed phases (C-18, XAD-7 and talcum). C-18 was recognized as best adsorbent. However, using of XAD-7 also leads to obtaining of pure anthocyanins with minimal loses. The anthocyanins extraction efficiency can reach up to 90% of total amount in fresh plant materials.

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Key words: *anthocyanins, large-scale extraction, isolation*

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Possibilities of Using Entomopathogenic Fungus in Biological Control of Insects

Mudrončeková S. [1], Mazáň M. [2], Šalamon I.[3]

[1]*Department of Ecology, Faculty of Humanity and Natural Sciences, Presov University in Presov, 01, 17th November St., SK-080 01 Presov, Slovakia*
[2] *Slovak Academy of Science, Chemistry Institute, Centre of Glycomic, 09, Dubravska Av., SK-845 38 Bratislava, Slovakia*
[3]*Excellence Centre of Animal and Human Ecology, Presov University in Presov, 01, 17th November St., SK- 080 01 Presov, Slovakia*

Abstract

The purpose of this scientific work is a biological control of cosmopolitan pest *Ips typographus*. The most important pathogens of spruce bark beetle are entomopathogenic fungus of Hypocreales species. *Beauveria bassiana* and *Metarhizium anisopliae* are enemies of wide range of pests in agroecosystems of temperate climate zones. They are suitable candidates for biological control.

Entomopathogenic fungus were isolated and identified from soil samples and dead infected insects collected in localities of High Tatras. The growth, infectivity and mortality of selected isolates of entomopathogenic fungus on *Ips typographus* were watched.

The infectivity and mortality of bark beetle caused by infection of isolates *Beauveria bassiana* and *Metarhizium anisopliae* conidia were watched. 9 isolates of *Beauveria bassiana* and 1 isolate of *Metarhizium anisopliae* were used.

For identification and differentiation of fungus species was isolated the genomic DNA, which was analyzed for specific DNA segments amplified by PCR method.

The theoretical part was focused on characterization, natural occurrence, reproduction; course of infection mentioned isolates entomopathogenic fungus and bark beetle.

Key words: *Beauveria bassiana, Metarhizium anisopliae, Ips typographus, spruce bark beetle, entomopathogenic fungus, biological control, High Tatras*

The importance of the study of mtDNA derived from ancient samples

Nagy M.[1], Mende B. G.[2], Csősz A. [2], Poráčová J.[3], Makovický P.[1], Csákyová V. [4], Blaščáková M. [3], Bauerová M.[4]

[1] *J. Selye University in Komarno, Department of Biology, Bratislavská cesta 3322, 945 01, Komárno, Slovakia, e-mail: nagym@selyeuni.sk*
[2] *Hungarian Academy of Science, Archaeological Institute, 1014 Budapest Úri u. 49. Hungary*
[3] *Presov University in Presov, Department of Biology, 01, 17th November Street, 081 16, Presov, Slovakia*
[4] *Constantine the Philosopher University in Nitra, Faculty of Science, Department of Botany and Genetics, Tr. Andreja Hlinku 1, 949 74 Nitra, Slovakia*

Abstract

New methods in molecular genetics affect many other sciences. Analysis of ancient mtDNA increasingly penetrate into archaeology and allow refining the initial findings, identifying individuals, determining their sex and haplotype, assessing the relative genetic distance of populations, determining familial relationships between the findings respectively detecting diseases. Some of mtDNA mutations cause genetic diseases with physiological expression and through the mutations we can characterize the individuals of investigated ancient population. Through this method archaeologists are now getting new insights and information to open new areas to knowing our past in such dimensions that previously could not be taken into account.

Key words: *archaeogenetics, mitochondrial DNA, mutation, physiological expression*

Antioxidant properties of blueberry extracts and juice (*Vaccinium corymbosum* L.)

Poráčová J.[1], Sedlák V.[2], Tkáčiková, Ľ.[3] Blaščáková, M.[1], Kotosová, J.[2]

[1]*Presov University in Presov, Excellence Center of Human and Animal Ecology, Faculty of Humanities and Natural Sciences, 17 November Street 1,081 16, Prešov, Slovak Republic; poracova@unipo.sk*
[2]*Presov University in Presov, Faculty of Humanities and Natural Sciences, 17 November Street 1,081 16, Prešov, Slovak Republic*
[3]*University of Veterinary Medicine and Pharmacy in Košice, Komenského 73,040 01, Košice, Slovak Republic*

Abstract

Antioxidants are among the most important substances that act positively on human as well as animal body. They are found in many natural resources, especially in the dark fruits of various fruits including blueberries. Antioxidant activity in different extracts and juices of highbush blueberry (*Vaccinium corymbosum* L.) was determined using the $DPPH^+$ method. The concentration of total anthocyans in samples ranged from 2.25 mg.ml-1 (highbush blueberry - aqueous extract) to 16.67 mg.ml-1 (highbush blueberry concentrated ethanol extract). SC_{50} parameters in blueberry samples ranged from 27.24 (concentrated ethanol extract) to 255.50 (aqueous extract). The highest parameters were determined in the aqueous extract of blueberry - 255, 50, the aqueous extract - 251.56 and juice - 205.67.

A regular supply of antioxidants protects the bodies against the harmful effects of free radicals.

Key words: *blueberry, antioxidant activity, the $DPPH^+$ method, free radicals*

Acknowledgement: The participation is supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, the project: 00162-0001 (MS SR-3634/2010-11) "Isolation of Natural Plant Substances by Lyophilisation and Change of their Qualitative-Quantitative Properties".

Ecological Factors Affecting Secondary Metabolite Content and Composition in Medicinal and Aromatic Plants

Sekeroglu N.

Kilis 7 Aralık University, Faculty of Arts and Sciences, Department of Biology, 79000, Kilis, Turkey
E-mail: nsekeroglu@kilis.edu.tr

Abstract

Ecology is of important factors for plant growth and agricultural plant production. Its significance is distinctively different in medicinal and aromatic plants (MAPs) which contain economically important secondary metabolites. Secondary metabolite content and compositions are specifically affected by ecological factors such as geographical properties of the region, climate and edaphic factors, altitude and light intensity. In condition that these abiotic factors are well evaluated, high quality drug production could be achieved. Determining the accurate plant species for certain ecological conditions is one of the most important stages in MAPs production. Among the ecological conditions, geographical properties of the land primarily affect the plant secondary metabolite content and composition. Aspect and altitude of the lands are the main geographical conditions. South aspects are considered as optimum fields for essential oil plants. Temperate regions are the main production areas for essential oil plants throughout the world. Average temperature and its changes in the day, annual rainfall and its distribution, humidity, wind and its direction are important climatic factors in secondary metabolite production. In addition, the secondary metabolite content and composition in MAPs are influenced by soil properties. These properties are mineral composition, salinization and alkalinity of soil. Calcareous soils encourage essential oil production in aromatic plants. To sum up, knowledge on ecological factors affecting secondary metabolite content and composition in MAPs is vital for industrial raw material production and special market demands. When the ecological factors are evaluated in agricultural production of these special crops, high drug yields with desired composition can be provided. In the present study, the effects of ecological factors on secondary metabolite content and composition in medicinal and aromatic plants were discussed and compared in detail based on the recently reported papers.

Keywords*: aromatic plants, ecology, essential oil, medicinal plants, secondary metabolite, variability*

Comparison of methods of Y-haplogroup determination in the Slovak Romany population

Petrejčíková E., Čarnogurská J., Bernasovská J., Boroňová I.

University of Prešov, Faculty of Humanities and Natural Sciences, Department of Biology, Ul.17. novembra 1, 08001 Prešov, Slovak republic, petrejci@unipo.sk

Abstract:

Y-chromosomal polymorphisms are valuable markers to study the origin and history of human populations. Approaches to predicting the Y-chromosome haplogroup from a set of Y-STR markers is presented and compared to results of Y-haplogroup determination by SNP analysis. In this study the efficiency of two programs (Athey`s Haplogroup Predictor, Cullen`s Haplogroup Predictor) for Y-haplogroup prediction was tested with 130 samples of know haplotypes and haplogroups from the Slovak Romany population. One subclade of Haplogroup H, H1a- M82, was the most frequent in the studied population with the frequency 43.07%. Our results showed that Y-chromosome haplogroup prediction based on Y-STRs is less accurate. 3.84% of error has revealed in the studied samples by using haplogroup predictor. Typing a set of SNPs precisely define a phylogenetic branch and is reliable method to establish, to which haplogroup a given sample belongs.

Key words: *haplogroup, Y-chromosomal polymorphisms, prediction, Romany population*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Effect of occupationally phthalate exposure on pulmonary functions in Slovakian plastic industry

Pilka T., Petrovičová I., Kolena B.

Constantine The Philosopher University in Nitra/ Faculty of natural sciences, Department of zoology and anthropology, Nábrežie mládeže 91, Nitra,949 74, Slovakia; tomas.pilka@ukf.sk

Abstract

Phthalates have adverse effect on human endocrine or reproduction system, but there is still lot of questions about their potential activity in human physiological functions. Number of papers indicates respiratory symptoms associated with possible phthalate exposure. Especially presence of MBP in human urine has been associated with decrease of FVC and FEV1 values. The aim of this study was to assess, by biological monitoring, worker's exposure to phthalates in the flexible-PVC industry in Slovakia to provide additional occupational exposure data, which are particularly scarce. Additionally, parameters of pulmonary functions and anthropometric values were obtained and analysed with exposure data. In response to determine human exposure to phthalates, we used high performance liquid chromatography (HPLC) and tandem mass spectrometry (MS/MS) analysis to quantitate trace levels of four phthalate metabolites, monobutyl phthalate (MBP), monoethylhexyl phthalate (MEHP), mono-n-octyl phthalate (MnOP) and monoisooctyl phthalate (MiOP) in human urine. Urine samples, somatometric measures and spirometric values were collected from group of workers in plastic manufacture (n = 15; average age 44.8 ± 11.34). Lower values of FEV1 and FEV1/FVC point to potential airways obstruction in 13.3 % of probands (n = 2, average p/y = 12.5). We also observe overweight in 53.3 % of probands (n=8) indicated by BMI ≥ 25. Phthalate metabolites were detected in all urine samples. We suppose that occupationally increased exposure to phthalates has potential adverse effect on observed pulmonary parameters. However, to prove this assumption, we need more data to be analyzed. This study is the result of implementation of projects: "Environmental aspects of urban area" (ITMS: 26220220110) supported by the Research & Development Operational Programme funded by the ERDF; "Analysis of selected environmental factors in relation to potential health risks" supported by VEGA.

***Key words**: phthalates, HPLC/MS/MS, pulmonary functions, spirometry, anthropometry,*

Risk factors of obesity

Sudimáková I., Ferencová V., Mačeková S., Bernasovská J.

*University of Presov in Presov, Faculty of Humanities and Natural Sciences, Department of Biology, 17 Novembra 1, 08116 Presov, Slovakia; ivana.sudimakova@*gmail.com

Abstract

Nowadays obesity is considered to be the greatest threat to health. Analysis of International Obesity Task Force (IOTF) and the World Health Organization (WHO) concluded that in the world there is 1.1 billion adults who are overweighed and with obesity. Over the last twenty years there has been a sharp increase in the incidence of obesity and obesity has reached epidemic proportions. It is a growing health problem that can support the creation and development of serious and very often life-threatening diseases in terms of cardiovascular and respiratory diseases such as heart disease, high blood pressure, diabetes second type, hyperlipidemia, degenerative joint disease, obstructive sleep apnoea and disorders of the spine. It affects not only the excessive rate of adults, but in the last decade it has had also a global increase in the prevalence of obesity in children and adolescents. Nowadays children eat differently than a few years ago and this is considered to be a significant factor in the high prevalence of obesity. The aim of this research work was through a questionnaire survey estimate the prevalence of obesity and weight gain among Romany and non-Romany students in primary schools and to determine whether differences are present not only in the socio-economic sphere, but whether these two ethnic groups differ in the way of eating and sport activity. When comparing the values of anthropometric indicators such as body height and body weight, we found that Romany children achieve compared to non-Romany lower values of these parameters. Statistically significant differences in the prevalence of obesity and weight gain between these two ethnic groups were found. In Romany students we were able to demonstrate a higher incidence of irregular meals during the day, increased consumption of sausages and a significantly lower consumption of milk, dairy products, fruits and vegetables.

Key words : *Obesity, Risk factors, Nutrition, Sports activities, Prevalence*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Optimisation of Lyophilisation Process at Isolation of Natural Substances

Šimko V.[1] , Tomasch J.[1] Šalamon I.[2]

[1] Research and Development Department, Medicproduct a.s. kpt .Nálepku Street No. 2, SK – 082 71 Lipany, Slovak Republic. E-mail: tomasch@vulm.sk
[2]Excellence Centre of Animal and Human Ecology, University of Presov in Presov, 17th November Street No. 1, SK - 08001 Presov, Slovak Republic. E-mail: salamon@unipo.sk

Abstract

The aim of the work was optimisation of lyophilisation process with acetone extracts of fruits of the following plants: northern highbush blueberry *Vaccinium corymbosum L.,* European blueberry (*Vacciniu myrtillus L.),* elderberry *(Sambucus nigra L.),* black chokeberry *(Aronia melanocarpa L.*), European grapevine *(Vinis vitifera L.)*. The acetate extracts were supplied in a frozen condition in the volume of about 400 ml. The organic solvent acetone was vacuum-evaporated after extraction from all samples.
Note: Preparation of extracts, measurement of their qualitative composition and their subsequent processing prior to the lyophilisation are subject to a separate work.
The device GEA Lyophil SMART LYO 2 from the German producer GEA was used for the lyophilisation.
The work consisted of two parts:
Optimally diluted samples by purified water after defrosting
Optimisation of the lyophilisation program in a way to achieve the final product in form of a dry powder at the end of the process
Authors described in their work method of adjustment and dilution of samples prior to the lyophilisation as well as lyophilisation programs, which successfully resulted in a dry product.

Key words*: lyophilisation of extracts from fruits of medicinal plants*

Acknowledgement: The participation is supported by the Ministry of Education, Science, Research and Sports of the Slovak Republic, the project: 00162-0001 (MS SR-3634/2010-11) "Isolation of Natural Plant Substances by Lyophilisation and Change of Their Qualitative-Quantitative Properties".

Niche overlap of fish species in Bačkovský Brook

Ševc J., Koščo J.

University of Prešov, Faculty of Humanities and Natural Sciences, Department of Ecology, Ul. 17. novembra č. 1, 081 16, Prešov, Slovakia; e-mail: jansevc@gmail.com

Abstract

This report deals with niche overlap of fish species in Bačkovský Brook, which is a 18,4 km long right – hand tributary of Topľa River. Fish were sampled by point abundance sampling method at three localities during the years 2008 – 2010. The most important microhabitat variables (substrate type, water depth, distance from the bank, average and maximum water velocity) were recorded. Data were evaluated using by the new method, which enable a unified analysis incorporating data of different types. The species occupying the same and different niches were identified.

Key words: *niche overlap, fish, Bačkovský Brook*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Antimicrobial properties of anthocyanin extract prepared from berries by ethanol and acetone extraction

Tkáčiková Ľ.[1], Kšonžeková P.[1], Poráčová J.[2], Mariychuk R.[2,3], Eliašová A.[2]

[1]*University of Veterinary Medicine and Pharmacy, Department of Microbiology and Immunology, Komenského 73, 041 81 Košice, Slovakia; tkacikova@uvmf.sk*
[2]*Presov University, FHNS, Department of Ecology, 17th November St. 1, 081 16, Presov, Slovakia*
[3] *Uzhhorod National University, Faculty of Chemistry, Department of Ecology and Environment Protection, Pidgirna str. 46, 88 000, Uzhhorod, Ukraine*

Abstract

Berries are rich in anthocyanins, compounds that provide pigmentation to fruits and serve as natural antioxidants. Earlier studies have shown that berry anthocyanins have also antibacterial properties. The aim of this study was to evaluate the antimicrobial properties of the crude ethanol (EE) and acetone extract (AE) of anthocyanins prepared from blueberry (*Vaccinium corymbosum* L.), elderberry (*Sambucus nigra* L.) and aronia (*Aronia melanocarpa* Wild.) against 11 bacteria (*Staphylococcus aureus, Micrococcus luteus, Enterococcus faecalis, Bacillus cereus, Bacillus subtilis, Lactobacillus plantarum, Escherichia coli, Pseudomonas aeruginosa, Enterobacter aerogenes, Salmonella enterica* ser. Typhimurium, and *Listeria monocytogenes).* The antimicrobial activity was performed at three concentration of each extract (1, 2.5 and 5 mg/ml) by the agar well diffusion method. The EEs exhibited a higher degree of antimicrobial activity as compared with AEs; the EEs from *Vaccinium corymbosum* and *Sambucus nigra* were more effective than *Aronia melanocarpa.* The AE from *Sambucus nigra* had no antibacterial activity; the *Vaccinium corymbosum* and *Aronia melanocarpa* AEs exhibited the antimicrobial activity only at concentration 5 mg/ml. *B. cereus* was the most susceptible bacteria to all extracts. On the contrary, *L. plantarum* was the most resistant microorganism. In general, tested berry extracts better inhibited the growth of Gram-positive bacteria than Gram-negative bacteria. The EEs from *Vaccinium corymbosum* and *Sambucus nigra* were the most effective against *M.luteus*, and *L.monocytogenes*. The EE from *Vaccinium corymbosum* also had a high antibacterial activity against *B. subtilis*. *E.coli* was the most susceptible G- bacteria to all extracts. On the contrary, *E. aerogenes* was the most resistant G- bacteria to EEs from *Vaccinium corymbosum* and *Sambucus nigra,* and *S.* Typhimurium to EE from *Aronia melanocarpa.* This study showed that for antimicrobial activity of berry extract compounds may have important applications in future as natural antimicrobial agents in function food development and in food preservative purposes.

Key words*: berries, anthocyanins, antibacterial activity*

Acknowledgement: The participation is supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, the project: 00162-0001 (MS SR-3634/2010-11) "Isolation of Natural Plant Substances by Lyophilisation and Change of their Qualitative-Quantitative Properties".

Case report: Atypical cranial finding of individual from St. Emmeram Cathedral, Nitra, Slovakia (14th – 18th century AD)

Tonková M.[1], Vondráková M. [1], Halaj M.[2] , Kolena B.[1]

[1]*Constantine the Philosopher University in Nitra, Faculty of Natural Sciences, Department of Zoology and Anthropology, Nábrežie mládeže 91, 949 74, Nitra, Slovakia; tonkova.maria@gmail.com*
[2]*Jessenius - diagnostické centrum a.s., Špitálska 6, 949 50, Nitra, Slovakia*

Abstract

This article presented osteological finding of skeletal remains from the St. Emmeram Cathedral, where cranial trauma was detected. Osteological remains were excavated during archaeological examination of the site Nitra - Hradný kopec, especially Nitra - Katedrála in 2008, where bishops, canons and children (probably from aristocratic families), were buried since 14th till 18th century AD. Therefore more accurate dating of the skeletal remains is not possible. The aim of our study was investigate the process of formation of this wound with available methods. Skeletal remains were anthropomorphological and paleopathological determined and diagnosed by RTG and CT scans to ascertain etiology of aperture of parietal bones. Mentioned skeletal remains of an individual from grave no. 211 entirely consist of calvarium (probably male, adultus II/ maturus I) which came from rubble, therefore there are no other remains of this individual presented. Presented calvarium showed trauma of likely man-made aperture. Aperture is situated on parietal bones in biconvex shape of approximately length 100 mm and thickness in the middle 40 mm. Based on anthropological examination we conclude on accidental damage during exhumation of skeletal remains.

Key words: *cranial finding,* palaeoanthropology, radiodiagnostic examination, *Post-Medieval Period*

Molecular studies done with *Leucojum vernum* (*Amaryllidaceae*)

Tulenková M., Šutiaková I.

University of Prešov, Faculty Humanities and Natural Sciences, Department of Biology, 17. November 1 ,081 16, Prešov, Slovakia; tulenkom@unipo.sk

Abstract

The work presents molecular studies of taxa *Leucojum vernum* of *Amaryllidaceae*. The purpose of these studies was: (1) to study the phylogenetic relationships of *Leucojum* and *Galanthus* in greater detail and elucidate relationships among the rest of Mediterranean *Amaryllidaceae* using a combination of the plastid gene *mat*K and the internal transcribed spacers (ITS) of nuclear ribosomal DNA sequences and a morphological dataset; (2) to produce a well supported phylogenetic hypothesis for *Amaryllidaceae* based on combined analyses of *matK*, ITS and additional plastid *trnL-F* sequences; and (3) to use the phylogenetic framework to evaluate the distribution of alkaloids and acetylcholinesterase inhibitory activity.

Key words: *molecular studies, Leucojum vernum, Amaryllidaceae, phylogenetic relationships, alkaloids*

Monitoring changes in anthropometric dimensions of Slovak patients' heads with diagnosed craniostenosis before and after surgery.

Valachovičová E.[1], Dúbravová D.[1], Neščáková E.[2], Horn F. [1], Trnka J. [1]

[1] *Comenius University,Medical Faculty, Department of Pediatric Surgery Children's Teaching Hospital, Limbova 1, 83340, Bratislava, Slovak Republic, e-mail: evalacho@gmail.com.*
[2] *Comenius University, Faculty of Natural Sciences, Department of Anthropology, Mlynská dolina, 842 15, Bratislava 4, Slovak Republic.*

Abstract

The present research deals with specific issues of dimensions in craniofacial changes Slovak patients diagnosed with craniostenosis. We deal with changes in various types of synostosis and changes before and after surgery and in no operated patients. We evaluate the pathological growth of patients' cranium and deviations from the healthy population. Anthropometric examinations are carried according to the methodology of Martin and Saller (1957) and its modifications. We use standard anthropometric instrumentations with donation of Grant Comenius University (UK/77/2012). In our group of patients (n = 43) prevailed in 44% synostosis of suture sagittal, in 24% synostosis of suture metopic, in 12% synostosis of suture coronal, in 3% synostosis of suture squamosal and in 17% complex synostosis. We found that patients, who were operated on, had values of anthropometric dimensions approaching to the standard, as those who were not operated on. In these patients we are dealing with pathologies in length, head circumference, in the width of the head and face width. Trend growth of cranium is parallel with the standard in progress 3 months after surgery. Cephalic index is suitable identifier due to rapid and non-invasive determination of pathology growth of cranium. Long-term monitoring of patients allows us to record trend growth of cranium in craniostenosis and disproportionality of observed anthropometric dimensions.

Key words: *anthropometry, craniostenosis, cephalic index, longitudinal study, pathological growth, craniofacial dimensions.*

Acknowledgement: Financial support for the project solution of young scientists Grant UK/77/2012.

Poster Sessions

Study of Medicinal and Aromatic plants in Dibra Region, Albania

Ibraliu A.[1], Gjoni Z.,[1], Plaku F.,[1] Mullaj A.[2]

[1]Department of Crop Production, Faculty of Agriculture, Agricultural University of Tirana; *E-mail: albanibraliu@ubt.edu.al*
[2] Research Centre for Flora and Fauna, Faculty of Natural Sciences, Tirana University, Albania

Abstract

In the period 2010-2011, a special emphasis was put on the inventory and distribution of medicinal and aromatic plants in Dibra region, located in the North East of Albania and distinguished for the rich flora. Field investigations were carried out in the growing seasons of 2010, 2011 and 2012. A number of 207 medicinal and aromatic plant species are registered till now. The plants found in Dibra region belong to 69 families, mainly to the *Asteraceae* (20 taxa), *Lamiaceae* (17), *Rosaceae* (12), *Poaceae* (13) and *Fabaceae* (10). *Hemicryptophytes* followed by therophytes are the most abundant life forms. A relatively higher percentage of Mediterranean taxa and a lower percentage of Cosmopolitan/Circumboreal taxa were recorded. A study shows that stocks of many medicinal plant species in the Dibra region have declined in the past decades with some species becoming rare or endangered due to habitat loss, habitat modification and over-exploitation. Effective control and monitoring mechanisms must be established and a comprehensive management plan has to be developed, which should guarantee that medicinal and aromatic plant sourcing does not exceed sustainable levels.

Keywords: *Dibra, Flora, Medicinal and aromatic plants, population density*

Level of contamination of soil and water environment by heavy metals in environmentally loaded area of Middle Spiš.

Angelovičová L., Fazekašová D.

University of Prešov / Faculty of humanities and natual sciences, Department of Ecology, St 17. November 1, 081 16, Prešov, Slovakia; lenka.angelovicova@gmail.com

Abstract

The Middle Spiš region represents an old mine area which has been affected negatively by mining activities and subsequent processing of complex Fe and Cu ores. Mining activities and mining related industries are some of the primary sources of heavy metal pollution in the environment. Heavy metals cannot be degraded or destroyed, they are accumulated in environmental components such as water, soil and biota. Polluted soils lose basic biological properties and they are not appropriate for crop production. Water quality is associated with the soil conditions and the pollution or contamination of groundwater. Polluted areas become the sources of undesirable substances that can enter the body and cause long-term health problems.

The aim of the study was to determine the level of heavy metal pollution in soil and water environment in Krompachy city and Slovinky village, which represent one of the most polluted areas in Middle Spiš region. Research was realized in summer period in 2011 and 2012. Soil samples were taken from 5 sites, which were selected according to the spread of immision. Water samples were taken along the creek, for the mapping of the entire length of the stream from the source to the mouth. Soil and water samples were processed and analyzed in collaboration with accredited laboratory. In soil samples presence of total and available content of heavy metals was determined. The reached data were compared with the limit values of Government Regulation in Slovakia. The results showed that in soil samples Cu, Cd, Pb, Zn exceeded permissible limit values for total and also for available content of heavy metals. The most extreme values were measured for Cu and As, which several times exceeded limit values at all sampling localities. In water samples above the limit content of Cu, As and Pb was determined.

Key words: *heavy metals, mining activities, environmental loads*

Mutation screening in Roma family affected by tooth agenesis

Bindasová M., Bernasovská J., Gabriková D.

University of Prešov in Prešov, Faculty of Humanity and Natural Sciences, Department of Biology, Ul. 17. Novembra, č.1, SK-081 16, Prešov, Slovakia; mariana.bindasova@centrum.sk

Abstract

Tooth agenesis - congenital absence of one or more teeth - represents one of the most common developmental anomalies in humans. Our research deals with mutation screening of two genes known to be associated with nonsyndromic tooth agenesis: MSX1 and PAX9. MSX1 gene has critical role for the normal development of the teeth. PAX9 is a paired domain transcription factor that plays a critical role in odontogenesis. Mutations identified in these genes have been associated with hypodontia or oligodontia. Target group of our study was Roma family from Eastern Slovakia with autosomal dominant inheritance of tooth agenesis. Nine individuals were affected, with four to twelve teeth missing. Two exons of MSX1 gene were sequenced and association of PAX9 gene was analyzed by haplotype analysis using microsatellite markers (D14S253, D14S69, D14S1432, D14S1428). Following polymorphisms of MSX1 gene were detected in the family: c.125C>T, c.159C>T, c.217G>A, c.353C>G, c.519A>T, c.582C>T, c.1153C>T, c1421A>G. All of these polymorphisms were excluded as the cause of disease in the studied family. Similarly, analysis of the PAX9 gene did not reveal any haplotype following inheritance pattern of disease in the family. Both MSX1 and PAX9 were excluded as causative genes of tooth agenesis in the Roma family. Further analyses of other genes known to be a rare cause of nonsyndromic dental agenesis (AXIN2, EDARADD, WNT10A) is suggested.

Key words: *Tooth agenesis, Roma population, MSX1, PAX9.*

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The incidence of factor V Leiden in the group of slovak women with spontaneous abortions

Bôžiková A.[1], Pitoňák J. [2], Mačeková S. [1], Gabriková D.[1], Hronská D.[1], Bernasovská J.[1]

[1] *Prešov University in Prešov, Faculty of Humanities and Natural Sciences, Dept. Of Biology, 17.novembra 1, 080 01 Prešov, Slovakia; alexandra.bozikova@gmail.com*
[2] *FNsP J.A.Reimana, Dept. Of gynecology and obstetrics, Jána Hollého 14, 081 81 Prešov, Slovakia*

Abstract

Hereditary thrombophilia represents an innate predisposition for thromboembolic disease. It plays an important role in the pathogenesis of many obstetric complications and is associated with an increased risk of spontaneous abortion. One of the most common causes of hereditary thrombophilia is G1691A mutation in the gene for factor V (Leiden mutation). The aim of our study was to examine the association of this important thrombophilic mutation with spontaneous fetal loss in the group of Slovak women. Our studied group consisted of 64 patients with a history of at least one pregnancy loss and 105 controls (women with no complications in pregnancy). Mutation was detected using real-time PCR method using TaqMan probes. The frequency of the risk allele A was 8.6% in the group of women with pregnancy loss and 1.4% in the control group. Factor V Leiden frequency was significantly higher in patients compared to controls ($p = 0.001$), and the risk allele A was associated with 6.5-fold higher risk of pregnancy loss.

Key words: *Thrombophilia, Factor V Leiden, Obstetrics, Spontaneous abortion*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Ecological conditions and a fruit yield in different varieties of blueberry (*Vaccinium corymbosum* L.)

Daniel J.[1], Medvecky M.[1], Fejer J.[2], Šalamon I.[3]

[1]*Plant Production Research Center Piešťany, Regional Research Station, 027 55 Krivá na Orave, Slovak Republic. E-mail: scpv@orava.sk*
[2]*Department of Ecology, The Faculty of Humanities and Natural Sciences, University of Presov in Presov, 17th November Street No. 1, SK - 08001 Presov, Slovak Republic*
[3]*Excellence Centre of Animal and Human Ecology, Univerity of Presov in Presov, 17th November Street No. 1, SK - 08001 Presov, Slovak Republic*

Abstract

The consumption of fruits rich in nutraceuticals is encouraged in the prevention and treatment of illnesses such as cancer. Berries of the blueberry (*Vaccinium corymbosum* L.) are rich of dietary antioxidant – anthocyanins. Breed varieties are high yield potential of the berries. We were evaluated yield potential of selected varieties of this species and description of ecological conditions on the experimental planting in our study. The locality is situated in North part of Slovakia, by altitude 700 m above see level, average temperature during the year is 6 ^{o}C and precipitation is 895 mm. The soil is very acidic with pH up to 4.2. We were selected six varieties of the blueberry – Blueray, Bluecrop, Berkeley, Bluejay, Brigitta, and Patriot for the evaluation. The yield of the fruits in the years 2007 – 2011 ranged from 1942 g per plant (by variety Blueray, year 2009) to 4721 g per plant (by variety Bluecrop, year 2008). The highest average yield during the five research years was found by variety Berkeley 3981 g per plant and the lowest by variety Patriot 2638 g per plant. Between varieties Blueray – Bluecrop, Blueray – Berkeley, Bluecrop – Patriot and Berkeley – Patriot were statistically significant differences in the average berries yield (years 2007 – 2011). The highest yield of fruits was noted in 2008 year on average six varieties 3758 g /plant and the lowest in 2007 on average six varieties 2867 g/plant. The difference between this two years was statistically significant.

Key words*: blueberry (Vaccinium corymbosum L.), ecological conditions, variety, yield*

Acknowledgement: The participation is supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, the project: 00162-0001 (MS SR-3634/2010-11) "Isolation of Natural Plant Substances by Lyophilisation and Change of their Qualitative-Quantitative Properties".

Variability of anthocyanin content in *Vaccinium corymbosum* berries

Eliašová A.[1], Fejér J.[1], Mariychuk R.[2], Šalamon I.[1]

[1]*University of Prešov in Prešov, Faculty of Humanities and Natural Sciences, Department of Ecology, 17. novembra St. 01, SK-081 16 Prešov, Slovak Republic; adriana.eliasova@unipo.sk*
[2]*Uzhorod National University, Faculty of Chemistry, Department of Ecology and Environmental Protection, Pidgirna St. 46, UA-88000 Uzhorod, Ukraine*

Abstract

Blueberry (*Vaccinium corymbosum* L.) is a deciduous shrub native in North America. It is cultivated also in Europe as a source of fruits with good taste and health benefits. Typical blue colour of berries is given by anthocyanins, fenolic secondary metabolites possessing anticancer, antimicrobial, as well as anti-inflammatory effects on human organism. In this paper the results of HPLC-DAD evaluation of anthocyanins in blueberry plants of various genotype, cultivated in North Slovakia are presented. Anthocyanins were once extracted by acetone with the yield of 60–70% of their total amount in fruits. No substantial differences in spectrum of anthocyanins between the cultivars were observed, but the total content of pigments in fresh berries varied in wide range (0.7–3 mg/g). It can be caused by synergy of genetic and environmental factors, which affects the plant ontogenesis including flowering and ripening of fruits. In our study, some early as well as medium early blueberry cultivars were found to contain the highest amount of anthocyanins. With respect to obtained results these cultivars appear as appropriate for the cultivation practice under the climatic conditions of Slovakia in order to get a high quality food product.

Key words: *Vaccinium corymbosum, blueberry, anthocyanin, HPLC*

Acknowledgement: The participation is supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, the project: 00162-0001 (MS SR-3634/2010-11) "Isolation of Natural Plant Substances by Lyophilisation and Change of their Qualitative-Quantitative Properties".

Biodiversity research and conservation of medicinal and aromatic plants at the Presov University in Presov

Fejér J.[1], Šalamon I.[2]

[1]*Department of Ecology, The Faculty of Humanities and Natural Sciences, University of Presov in Presov, 17th November Street No. 1, SK - 08001 Presov, Slovak Republic. E-mail: jozef.fejer@unipo.sk*
[2]*Excellence Centre of Animal and Human Ecology, Univerity of Presov in Presov, 17th November Street No. 1, SK - 08001 Presov, Slovak Republic.*

Abstract

Medicinal and aromatic plants (MAPs) are a group of the special crops. They are used in phytotherapy, veterinary and human medicine, cosmetics and food industry. Their functions are additive, ecological, decorative and sanitary-hygienic and have positive influence on water system, soil conservation and plant pasture for bees. Biodiversity research of these plant species is most important for their breeding and conservation. Research and development of MAPs is carried out at the Department of Ecology, Faculty of Humanities and Natural Sciences at Prešov University in Prešov (Slovakia) on experimental school field. It is involved as workplace of the National Program for the Protection of Plant Genetic Resources for Food and Agriculture. There are preserved about 50 basic species and several genotypes of MAPs, on the field as plant and as seed collections. Research is orientated for collecting different genetic resources, its conservation, determination of chemotypes and preparing the seed collection. Seeds of interesting genotypes are stored in the Slovak Gene Bank (Piešťany). An important part of this work is the selection of genotypes for breeding (german chamomile - *Matricaria recutita* L.; mint - *Mentha x piperita* L.; opium poppy - *Papaver somniferum* L.) and possibilities of introduction wild plants to agricultural production with proceeding and using in pharmaceutical (puncture vine - *Tribulus terrestris* L.) or distillery industries (juniper - *Juniperus communis* L.).

Key words*: biodiversity, conservation, medicinal and aromatic plants (MAPs)*

Acknowledgement: The participation is supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, the project: 00162-0001 (MS SR-3634/2010-11) "Isolation of Natural Plant Substances by Lyophilisation and Change of their Qualitative-Quantitative Properties".

The Conventional Breeding of Medicinal Plants at the University of Presov, Slovak Republic

Fejér J.[1], Šalamon I.[2]

[1]*Department of Ecology, The Faculty of Humanities and Natural Sciences, University of Presov, 17th November Street No. 1, SK - 08001 Presov, Slovak Republic. E-mail: jozef.fejer@unipo.sk*
[2]*Excellence Centre of Animal and Human Ecology, University of Presov, 17th November Street No. 1, SK - 08001 Presov, Slovak Republic.*

Abstract

Plant breeding is a systematical and creative work with populations, chemo types, cultivars, forms etc. In harmony with requirements of safety, efficacy and stability of medicinal plant, their raw-material, products, phyto pharmaceutical preparations, there is general requirements for a very high quality of new varieties of these special crops. Any way the appreciate varieties of medicinal plants are important factor in achieving high quality of plant material in order to yields and composition of natural substances.

There were used different methods for breeding such as exploitation of natural biodiversity and genetic resources, individual selection, mass selection, polyploidisation, mutation and genetic engineering. The conventional breeding methods were used, which included the exploitation of genetic resources, their individual selection and examination of off springs. This method was used for breeding of German Chamomile (*Matricaria recutita* L.) and Peppermint (*Mentha x piperita* L.). Inflorescences of new-breed Chamomile cultivar have high content of /-/-α-bisabolol (about 55 %) and low content of /-/-α-bisabolol oxides A (1.7 %) and B (2.0 %) in essential oil (0.60 – 0.75%). Individual selection of clones of Peppermint resulted in a high content of essential oil (about 1.5 %) and its dominant component menthol (highest: 70 %).

Important part of the breeding work was evaluated the morphological characteristics by test guide UPOV 152/4 for Chamomile and UPOV TG 229/1 and Peppermint new varieties, for assessment of distinctness, uniformity and stability selected plant materials. At this time the cultivars is testing by the Central Control and Testing Institute of Agriculture Bratislava – the Test Station in Nove Zamky (the West Slovakia) for the purpose of their registration as new varieties.

Key words*: breeding, conventional methods, medicinal and aromatic plants, variety*

Acknowledgement: The participation is supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, the project: 00162-0001 (MS SR-3634/2010-11) "Isolation of Natural Plant Substances by Lyophilisation and Change of their Qualitative-Quantitative Properties".

Anthropometric characteristics of Romany and non-Romany children in Prešov region

Gaľová J., Dvorščáková V., Mačeková S., Bernasovská J.

University of Presov in Presov, Faculty of Humanities and Natural Sciences, Department of Biology, Ul.17.novembra 1, 08016 Prešov, Slovakia; galova.jane@gmail.com

Abstract

The goal of this research was to provide actual information about somatic growth and development of Romany children of school age in the Prešov region, identify and characterize the specifics of the physical structures and compare them with non-Romany children with their physical characteristics. The object of the research was a set of Romany and non-Romany children of younger and older school age from two primary schools in Prešov. Both sexes were observed, boys and girls in five age groups. In both studied groups we monitored selected anthropometric parameters - body height, body weight, abdominal circumference, hip circumference, chest circumference and width of the pelvis. The most significant differences between Romany and non-Romany girls were found in the fourth age group, where in Romany girls were statistically significant higher mean values of all parameters, except height. In Romany girls were recorded significantly higher mean values of abdominal circumference, in the fourth ($p=0.001$), as well as fifth ($p=0.035$) age group. When comparing the average values of selected parameters of Romany and non-Romany boys, no statistically significant differences were found. Romany as a specific ethnic group in anthropological view is characterized by several feature differences from non-Romany population arising precisely from their origin, genetic background or culture.

Key words: *Anthropometry, Romany population, younger and older school age*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Antigerminative Activity of Essential Oil of *Mentha×piperita* L.

Gruľová D.[1], De Matino L.[2]

University of Prešov, Faculty of Humanities and Natural Sciences, 17 November st. 1, 081 16 Prešov, Slovakia; dgrulova@gmail.com
Salerno University, Faculty of Pharmacy, Deparment of Pharmaceutical Sciences and Biomedicine, via Ponte don Melillo, 84084 Fisciano (SA) Italy

Abstract

Allelopathy is an expression of the general chemical interaction among plants. A large number of plants possess both inhibitory and stimulatory effects on the growth of neighbouring or successional plants by releasing chemicals into the soil. The study of plant compounds, which inhibit or stimulate the germination and the development of other species, is important for understanding the mechanisms of the ecological interaction.

Samples of essential oil of *Mentha×piperita* L. collected in growing period 2010 (Aprile – September) were evaluated for their possible phytotoxic activity against germination and initial radical elongation of radish (*Raphanus sativus*) and garden cress (*Lepidium sativum*). The germination of radish was not statistically significantly ($p<0.05$). The essential oil had an influence on radical elongation of both investigated species (radish and garden cress). More sensitive for inhibition was radish and significant effect was noted on Aprile 2010 in the highest dose (1.25 μg/mL). Addition to the inhibitory effect there was also recorded the stimulation effect on root elongation. The roots of radish were less sensitive and this kind of effect was significant on July and August (2010).

Key words: *antigerminative activity, Mentha×piperita L., inhibition effect, ecological interaction, allelopathy.*

Association of Polymorphisms in the Promoter of the Protein C Gene with Endothelial Protein C Receptor Gene and Risk of Venous Thrombosis

Horakova K. [1], Kolorz M. [1] , Bartosova L. [1],Suchy P. [1], Pechacek V. [2], Wroblova K. [1]

[1] *University of Veterinary and Pharmaceutical Sciences Brno Faculty of Pharmacy, Department of Human Pharmacology and Toxicology, Palackeho 1-3, 612 00, Brno, The Czech Republic; kristynahorak@gmail.com*

[2]*Vascular Unit, Health centre Zahradnikova 2, 602 00, Brno, The Czech Republic*

Abstract

The main abnormalities associated with the increased risk of deep venous thrombosis (DVT) are the inherited deficiencies of protein C. Protein C encoded by *PROC* gene acts through its high affinity binding to its transmembrane receptor (EPCR) encoded by *PROCR* gene. The objective of the present study was to analyze the link between three polymorphisms in the promoter region of *PROC*, polymorphism in the *PROCR* gene and the occurrence of DVT.

We genotyped 135 individuals, 51 cases with documented DVT and 84 healthy volunteers without the history of DVT. The occurrence of three polymorphisms in *PROC* gene (-1654C/T, -1641A/G and -1476A/T) was determined by one PCR reaction, where -1654C/T and -1476A/T were detected by PCR-REA and -1641A/G by allele-specific probes by REAL-TIME PCR. 6936A/G polymorphism in the *PROCR* was detected by PCR-REA.

The occurrence of TAA haplotype of *PROC* gene was significantly more frequent in the control group (n=48; 57.1%), compared with the group of patients (n=18; 35.3%), (*P*=0.0206). Healthy individuals were also significantly more often carriers of TAA haplotype and standard genotype *PROCR* (50% vs. 25.5%) than patients (*P*=0.0066). The frequency of haplotypes *PROC*, CAA and CGT was insignificantly higher in patients (15.7% and 21.6%, respectively) than in the control (9.5% and 13.1%). The combination of haplotype CAA/CAA and variant genotype *PROCR* AG was confirmed with a higher frequency in the group of patients (3.9% vs. 1.2%).

This analysis showed that *PROC* haplotype associated with high protein C level (TAA) plus *PROCR* AA genotype was significantly more frequent in healthy volunteers (*P*=0.0066). Even though the statistically significant occurrence of *PROC* haplotype with a low production of protein C (CAA or CGT) was not confirmed, these haplotypes were more frequent in patients with DVT. Similar relationship was confirmed in the genotype consisting of CAA haplotype and *PROCR* AG genotype.

Key words: *gene polymorphism; Protein C; endothelial cell protein C receptor; deep vein thrombosis, PROC, PROCR*

Comparison of diet in native and non-native fish species in oxbows of Bodrog and Latorica Rivers

Hrabkovský B.[1], Koščo J.[1], Nowak, M.[2]

[1]*Department of Ecology, Faculty of Humanity and Natural Sciences, University of Prešov, ul. 17. novembra 1, Prešov, 080 16, Slovakia ,b.hrabkovsky@gmail.com*
[2]*Agricultural University of Cracow, Department of Ichtyobiology and Fisheries, Prof. T. Spiczakowa ul., no. 6, Krakow, Poland, PL - 30 149.*

Abstract

According to many studies dealing with invasions of organisms, non-native animal species are considered one of the causes of the natural communities and ecosystems disturbance. Thanks to their tolerance to various adverse effects of environment and low requirements for environment resources, they are becoming a serious threat for native species. Invasion of a non-native species in any type of ecosystem can result in changes on different levels. At the level of individuals, presence of a non-native species affects behaviour and morphology. At the population level, invasions result in demographic and distributional changes. Consequently, through these changes invaders modify community composition and thus alter existing food webs, which can eventually bring about changes at ecosystem level (e.g. changes in biochemical cycles). Up to the present day, ten non-native fish species were described in waters of Slovakia. The objective of this paper is to compare feeding preferences in native and invasive fish species in oxbows of Bodrog and Latorica Rivers.

Key words*: Native species, Invasive species, Diet composition, Oxbows, Bodrog, Latorica*

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Epigenetic changes in multiple myeloma cells

Jugová A.[1,2], Legartová S.[1], Parák T.[2], Bártová E.[1]

[1]Academy of Sciences of the Czech Republic v.v.i, Institute of Biophysics, Department of Molecular Cytology and Cytometry, Královopolská 135, 612 65, Brno, Czech Republic; betka.jugova@mail.muni.cz
[2]University of Veterinary and Pharmaceutical Sciences Brno, Faculty of Pharmacy, Department of Human Pharmacology and Toxicology, Palackého tr. 1/3, 612 42, Brno, Czech Republic

Abstract

Epigenetic changes, including DNA methylation and histone modifications, alter gene activity and play an important role in the normal development, cell growth and division. Aberrant epigenetic regulation can lead to cancer, and abnormal expression of histone deacetylases has been widely described in solid tumors and haematological malignancies.

Here, we focus on multiple myeloma and epigenetic changes in multiple myeloma cells. We show how the histone signature can be affected by inhibitors of histone deacetylases (HDACs) and DNA methyltransferases (Dnmts). Both inhibitors, trichostatin A (TSA) and etoposide, have the ability to change the histone signature in a tumor-specific manner. In myeloma cells, we observed changes in H3K9 dimethylation and H3K9 acetylation. Additionally, levels of apoptotic and tumor suppressor proteins were analyzed. We revealed an increase in caspases and that the retinoblastoma protein (pRb1) is more sensitive to epigenetic-based anti-cancer stimuli than p53. We also confirmed a significantly reduced proliferation of the cells treated by TSA and etoposide.

The study of epigenetics shows great promise for understanding the gene expression alterations that underlie malignancies, and provides exciting novel drugable targets.

Key words: *epigenetics, histone code, multiple myeloma*

Do Great Tit *Parus major* nestlings adapts for optimum living in disturbed natural environments ?

Puchowski P.[1,2], Kamiński P.[1,3], Jerzak L.[4], Koim-Puchowska B.[1], Kuligowska-Prusińska M.[5], Bombolewska K.[1], Wieloch M.[1]

[1]*Nicolaus Copernicus University, Collegium Medium in Bydgoszcz, Department of Ecology and Environmental Protection, M. Skłodowska-Curie St. 9, PL 85-094 Bydgoszcz, Poland, e-mail: piotr.kamiński@cm.umk.pl, beatakoim@cm.umk.pl, k.bombolewska@gmail.com, monicjus@wp.pl*

[2]*Government Forestry in Toruń; Zamrzenica Forestry District, Zamrzenica 1A, PL 89-510 Bysław, Poland, e-mail: piotr.puchowski@toruń.lasy.gov.pl*

[3]*University of Zielona Góra, Faculty of Biological Sciences, Institute of Biotechnology and Environment Protection, Department of Biotechnology, Prof. Szafran St. 1, PL 65-516 Zielona Góra, Poland, e-mail: p.kaminski@wnb.uz.zgora.pl*

[4]*University of Zielona Góra, Faculty of Biological Sciences, Institute of Biology and Environment Protection, Department of Nature Protection, Prof. Szafran St. 1, PL 65-516 Zielona Góra, Poland, e-mail: l.jerzak@wnb.uz.zgora.pl*

[5]*Nicolaus Copernicus University, Collegium Medicum in Bydgoszcz, Department of Laboratory Diagnostics, Skłodowska-Curie St. 9, PL 85-094 Bydgoszcz, Poland, e-mail: magdalenakuligowska@wp.pl*

Abstract

We compared oxidative damage (lipid peroxidation as MDA content, according to Hermes-Lima et al. (1995), the activity of antioxidant enzymes: superoxide dismutase SOD and catalase CAT (Cayman Chemical Co.) in the liver of Great Tit *Parus major* nestlings (N=165) from three differentiated environments: A-polluted sodium manufacture, B-agricultural (central Poland), C- unpolluted control (Tuchola Forestry). We took under consideration the nestlings in different growth stages: 1 (1-7 days), 2 (8-14 days), 3 (15-21 days) in two breeding seasons 2009-2010. We examined the levels of Na, Ca, Cu, Mn, Se, Cd (ICP-MS) and ecophysiological responses of birds to various degree of biogeochemical balance of the environment.

SOD activity in the liver of nestlings from polluted environment was lower than those from control in 1st group in opposite to CAT in 1st and 2nd group. The level of lipid peroxidation was higher in agricultural and polluted areas than in the control. We stated significant higher Ca concentration in polluted environment in 1st group in opposite to Cu, and Mn in 2nd and 3rd group as compared with control. Se concentration was higher in agricultural areas in 1st and 3rd group than in the control and in polluted environment (2nd group). Na, Ca and Mn decreased with age of nestlings from polluted environment. Cu concentration increased (A) and decreased (B) in dependence of environment, whilst Cd increased in the A and B. Nestling's age didn't impact Se concentration but it affects intensity of lipoperoxidation. SOD activity decreased in the liver (A,C) similar to CAT (A), whilst CAT increased with nestling's age in the control. We stated significant relations between biochemical indices and concentration of elements, which depends on the type of environment. Our results suggest that Great Tit nestlings are negatively affected by environmental oxidative stress. The type of environment bears on the level of Na, Ca, Cu, Mn, Se and Cd in growing tits. The initiation of enzymatic and lipoperoxidation activity and the increase of chemical elements' level create the activity of antioxidant mechanisms and indicate the mobilization of defence mechanisms environmentally dependent.

Key words: *ecophysiological responses, environmental oxidative stress, lipoperoxidation, CAT, MDA, nestlings, Great Tit, Parus major*

Factors influencing pandemic potential of influenza A viruses

Kotlárová L., Varečková E.

Institute of Virology, Slovak Academy of Sciences, Dúbravská cesta 9, 84505, Bratislava, Slovakia; lucia.kotlarova@savba.sk

Abstract

Influenza A viruses (IAV) cause an acute respiratory disease, which represents one of most important public health problems at presence. A high variability of IAVs spreading in human population and their broad host specificity impede to predict influenza virus subtype which will occur and will cause epidemic or pandemic. New viruses to which human population has no immunity arise by cumulative substitutions in virus genome or by reassortment among segments of human and avian viral genomes. The lacking of immunity in humans specific to new emerging IAV, as well as their interaction with human host determine the danger which new emerging viruses represent. Factors, which influence virus-host interactions (like receptor specificity, RNA polymerase activity, HA cleavability by host proteases, glycosylation of viral proteins, properties of PB1-F2 protein, etc.) are studied on theoretical and on experimental levels. Our group is focused on HA, particularly its conserved HA2 glycopolypeptide (gp). HA is initially expressed as a precursor molecule, HA0, which is proteolytically cleaved into HA1 and HA2 subunits, linked by a single disulphide bond. The HA1 subunit is responsible for virus attachment to susceptible cells, while HA2 gp mediates the fusion of viral and endosomal membranes. The fusion potential is activated by structural change of HA due to reduced pH in endosome, leading to insertion of fusion peptide into target membrane resulting in fusion of both membranes. The structural change of HA, which is a result of releasing of intermolecular interactions in the HA trimer, influences its fusion activity. It can consequently influence the virulence of virus. The aim of our study was to examine how the differences in the fusion activity of HA influence *in vitro* and *in vivo* replication ability of two antigenically identical viruses of H3 subtype.

Key words: *Influenza A virus, vaccine, conserved region of haemagglutinin, fusion activity and pandemic potential.*

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The value of the selected enzymatic activities in piglets serum after the consumption of feed plant additives

Kotosová J.[1], Poráčová J.[2]

[1]*Presov University in Presov, Faculty of Natural Sciences and Humanities, Department of Ecology, ul. 17th November, 081 16 Prešov, Slovak Republic, e-mail:* jankakotosova@hotmail.com
[2] *University of Prešov, Centre of Excellence ecology of animals and humans, ul. 17th November, 081 16 Prešov, Slovak Republic*

Abstract

In our work, we focused on monitoring enzymatic activities of LDH, AST, ALT in the blood serum of pigs (piglets), aged from 21 days of age to 42 days of life. The blood samples were taken once a week, always in the morning on an empty stomach, from the ophthalmic vein (vena ophtalmica). All experimental animals were fed with compound feed ČOS1, ČOS2, without any feed additives. Piglets were divided into two groups.The first group was the control group (n = 7 piglets) and the second the experimental group (n = 7 piglets), the piglets were given sage essential oil in a concentration of 0,05%. The average results observed from enzymatic activities on their 21st day of life were as follows: control group of piglets: LDH – 20,57 μkat/l , AST – 0,89 μkat/l and ALT – 0,75 μkat/l. and in the experimental group, the average results observed enzymatic activity: LDH - 21.5229 μkat/l, AST - 1.07143 μkat/l and ALT - 0.92 μkat/l. Repeated samples on their 42nd day of life in both groups observed, the results showed higher enzymatic activities, but the ALT value in the experimental group was lower.

Key words*: piglets, sage (Salvia officinalis L.), enzyme activity, feed additives*

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Association analysis of the common FTO variant rs9939609 with obesity in Slovak population

Macekova S., Bozikova A., Gabrikova D., Bernasovska J., Boronova I., Sudimakova I.

University of Presov, Faculty of Humanities and Natural Sciences, Department of Biology, 17. Novembra 1, 08116, Presov, Slovakia; e-mail: murna@centrum.sk

Abstract

One of the most recently discovered candidate genes for obesity is FTO gene. Up to now, many replication studies confirmed an association between common genetic variants of FTO gene and obesity in many different European populations. The aim of our study was to examine the association of the rs9939609 polymorphism in FTO gene with obesity phenotype in Slovak population. Our study involved 335 unrelated adults (mean age 32.47±11.49 years). Genomic DNA was extracted from buccal swabs. TaqMan assay SNP genotyping was performed using Applied Biosystems StepOne™ Real-Time PCR system (Applied Biosystems Foster City, CA, USA). Frequency of the FTO rs9939609 polymorphism risk allele A was 0.44 and the genotype distribution was in agreement with Hardy-Weinberg equilibrium. Our results showed significant differences in mean values of obesity related anthropometric parameters such as BMI, waist circumference and WHR between different genotypes ($p=0.004$, $p=0.001$ and $p=0.014$, respectively). In conclusion, the results of this study revealed a significant association of the FTO polymorphism rs9939609 with obesity in Slovak population.

Key words: *FTO, polymorphism, association, obesity, population*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

The Kinetics of Milk Ejection and the Milkability of Sheep

Makovický P.[1], Nagy M.[1], Poráčová J.[2]

[1] *J. Selye University in Komarno, Department of Biology, Bratislavská cesta 3322, 945 01, Komárno, Slovakia, e-mail: nagymelinda@gmail.com*
[2] *Presov University in Presov, Department of Biology, 01, 17th November Street, 081 16, Presov, Slovakia*

Abstract

Breeding programs regarding dairy sheep farming throughout the world as well as in Slovakia, in addition to permanently increasing the production of sheep milk are also focused on the so-called functional and morphological properties, which means, features directly related to the mammary glands of sheep (kinetics ejections of milk dairy ewes, respectively, health status of the mammary glands). Research in this area has greatly intensified during the last period mainly possibly due to the involvement of a modern computer and instrument technology used in doing research (electronic recording of milk secretion, respectively, ultrasonography). In the present work we deal with complex problems of obtaining milk from the udders of ewes by means of a milking machine stored in its cisternal and alveolar fraction. Great attention is also devoted to physiological responses of sheep to machine milking, and their biological needs associated with a complete, fast and friendly milking process.

Key words: *sheep, milk ejection, milkability, physiology*

Carboxyhaemoglobin (COHb) concentrations in foetal umbilical vein during pregnancy of smoking and nonsmoking women

Pavúk A.

University of Presov in Presov, Faculty of Humanities and Natural Sciences; Department of Biology, 17 novembra 1 081 16 Prešov,Slovakia; andrej.pavuk@unipo.sk

Abstract

We investigated the carboxyhaemoglobin concentration (COHb) in fetal umbilical vein during pregnancy of smoking and nonsmoking women at The Gynecology – maternity department of the J.A. Reiman Faculty Hospital in Prešov. The group consisted of 48 women of the majority population and 54 women of Roma ethnic group. The average carboxyhaemoglobin concentration (COHb) in the umbilical vein of foetuses of all observed smoking women was (1.96 %) significantly higher ($p<0.05$) than the carboxyhaemoglobin concentration (COHb) in the umbilical vein of foetuses of nonsmoking women (1.59 %). The average carboxyhaemoglobin concentration (COHb) in the umbilical vein of foetuses of women of the majority population (1.69 %) was significantly lower ($p<0.05$) than carboxyhaemoglobin concentration (COHb) in the umbilical vein of foetuses of women of Roma ethnic group (2.36 %).

Key words: *carboxyhaemoglobin (COHb), smoking, pregnancy, umbilical vein*

Work environment and health risks in plastic industry

Petrovičová I., Kolena B., Pilka T.

Constantine the Philosopher University in Nitra, Faculty of Natural Science, Department of Zoology and Anthropology, Nabrezie mladeze 91, 949 74, Nitra, Slovakia; ipetrovicova@ukf.sk

Abstract

Study focuses on the impact of specific occupational conditions on human health in plastic industry, because of the potential human toxicities of phthalates as a particle of plastic material. A cross-sectional study was conducted in an environmentally exposed group (n = 15; average age 44.8±11.34) from Nitra; personal questionnaire, spirometry and anthropometry were examined by standard methods. FVC, FEV1, FEV1%, VC%, FEV1/FVC, height and weight, BMI, WHR, FMI, FFMI and visceral fat level of individual, type of residence and pack / year index were analyzed. In a cohort were detected COPD symptoms in 13.3 % of probands (n = 2, average p/y = 12.5). Overweight, based on BMI ≥ 25, was detected in 53.3 % of subject (n = 8; 62.5% of female; 37.5 of male). The women registered a high WHR value of 0.87±0.07, whereas men had moderate to values at 0.96±0.04. Visceral fat level (10.67±2.08 for man; 7.45±3.05 for women) reached low risk; FMI value was high (6.3±0.9 for men; 10.82±5.0 for women). Meanwhile the FMI for the women was higher their FFMI was in the normal reference values, with 16.35±1.41. FFMI in men was in the high reference value 19.88±0.65. We hypothesize that occupational exposure in the manufacture of plastics materials in specific type of work environment could affect selected parameter. The results show on negative effects of work environment with higher exposition of environmental burdens on the state of human health. To determine possible involvement of phthalates on human health, a 2x2 mL urine sample was collected from each subject and stored at -75 °C, which are currently being investigated by HPLC MS/MS.

Key words: *spirometry, anthropometry, airway obstruction, work environment*

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Antioxidant properties of selected fruits of berry plants

Poráčová J. [1], Tkáčiková Ľ. [2], Sedlák V. [3], Blaščáková, M. [1], Muchaničová, A.[3]

[1]*Presov University in Presov, Excellence Center of Human and Animal Ecology, Faculty of Humanities and Natural Sciences, 17 November Street 1,081 16, Prešov, Slovak Republic; poracova@unipo.sk*
[2]*University of Veterinary Medicine and Pharmacy in Košice, Komenského 73,040 01, Košice, Slovak Republic*
[3]*Presov University in Presov, Faculty of Humanities and Natural Sciences, 17 November Street 1,081 16, Prešov, Slovak Republic*

Abstract

Plant polyphenols including anthocyanins are characterized by a wide range of biologically active effects on the body. They are significant due to their antioxidant ability. Antioxidant effects of the selected fruits containing anthocyans was determined by DPPH method. Into the fruits (balck chokeberry, *Aronia melanocarpa* Wild., black elderberry, *Sambucus nigra* L.) and berries (highbush blueberry, *Vaccinium corymbosum* L., grapevine, *Vinis vitifera* L. – varieties Cabernet Sauvignon and Frankovka) in the amount 5 grams, 100 ml of methanol was added. After 5 days in the prepared solutions which was stored in the dark and cold antioxidant activity was determined spectrophotometrically at a wavelength of 515 nm. SC_{50} parameter ranged from 17,74 (black elderberry) to 1139,65 (highbush blueberry). The highest SC_{50} value was observed in the berries of highbush blueberry (139,65), lower valuesin grapevine (80,46 – variety Frankovka) a 72,14 (variety Cabernet Sauvignon).

Key words: *berry plants, aronia, elder, blueberry, vine, antioxidant activity*

Acknowledgement: The participation is supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, the project: 00162-0001 (MS SR-3634/2010-11) "Isolation of Natural Plant Substances by Lyophilisation and Change of their Qualitative-Quantitative Properties".

Haematopoiesis in relation to growth at selected group of horses

Poráčová J. [1], Pošiváková T. [2], Blaščáková M.[1], Pošiváková S. [3], Sedlák, V. [2]

[1]*Presov University in Prešov, Excellence Center of Human and Animal Ecology, Faculty of Humanities and Natural Sciences, 17 November Street 1,081 16, Prešov, Slovak Republic;* poracova@unipo.sk
[2]*Presov University in Prešov, Faculty of Humanities and Natural Sciences, 17 November Street 1,081 16, Prešov, Slovak Republic*
[3]*University of Veterinary Medicine and Pharmacy in Košice, Komenského 73,040 01, Košice, Slovak Republic*

Abstract

Main idea of work was monitoring and describing the physiological state of blood in model group of horses and also consequently to describe haematologycal changes in blood of the experimental group of horses. The analysis of blood was performed after we created the model group of animals and drafted a model scheme of the experiment. We observed a haematological profile and also his possible consequent changes depending on age, and the gender of the horse. Model group of horses was composed of three mares, two foals, one thoroughbred stallion and one gelding, in age from three days in the nineteenth year of life. The content and scheme of the experiment consisted of regular blood collections and consequent evaluation of quantitative and qualitative parameters of blood. Altogether thirty-four blood takings was performed, assessed and discussed. Haematological examinations and evaluations were made following the last standard laboratory methods. We have come to the following result: for a horse with No. 1 in the three cases were confirmed by reduction of Lc, whereas horse No. 2 in two times of red blood cells showed a decrease. The horse No. 3 at the fifth, blood collection we found a mild leucopenia. In blood collection both foals blood count was normal, as in horse No. 7. For the horse with No. 6 at the third blood collection showed an increased number of Lc.

Key words*: hemopoiesis, hemogram, blood, horses foal, mare .*

Acknowledgement: This study was supported by the grants OPVaV: ITMS 26220120041, KEGA 016PU-4/2012.

Fine Mapping of Interaction between PB1-F2 and Catalytic Polymerase Subunit of Influenza A Virus Using Deletion Library

Práznovská M., Košík I., Hollý J., Kostolanský F., Russ G.

Institute of Virology, Slovak Academy of Sciences, Dúbravská cesta 9, 845 05 Bratislava, Slovak Republic, virumarp@savba.sk

Abstract

Influenza A virus is important pathogen, which causes widespread infections in birds, mammals and humans. In humans, influenza causes frequently epidemics and pandemics because of antigenic changes in surface glycoproteins. A major proapoptic virulent and pathogenic factor of influenza A virus is PB1-F2 nonstructural protein that can induce cell death and potent bacterial secondary infections. PB1-F2 is localized in infected cells in mitochondria, cytoplasm and nucleus. PB1-F2 is encoded by an alternative reading frame of the PB1 polymerase gene. It is present in most of the PB1 coding sequence. PB1-F2 effects are strain- and host-specific. PB1 protein (catalytic polymerase subunit) is part of the polymerase complex. This complex is responsible for replication and transcription of the eight separate segments of the viral RNA genome in infected cells. It was shown that PB1-F2 interacts with PB1 subunit by N-terminal region and enhances expression of catalytic polymerase subunit. This interaction influences the intracellular localization of PB1. PB1-F2 is important protein of influenza A virus due to its immuno-pathologic effect. The deletion library was prepared by mutagenic PCR in our laboratory for study molecular and biological properties of PB1-F2. Deletion library was used to identify short 10aa long PB1-F2 region responsible for interaction with influenza A virus catalytic subunit. This information will be used to design and test therapeutical peptides which could compete PB1-F2 with PB1 interaction and thus decrease virus replication. This interaction between particular deletion mutants of PB1-F2 protein and catalytic polymerase subunit will be followed by proximity ligation assay.

Key words: *Influenza A virus, PB1-F2 protein, deletion library, proximity ligation assay*

Acknowledgement: Supported by APVV-0250-10, VEGA 2/0101/10, VEGA 2/0176/12, VEGA 03/0117/12 grants.

Classification of soil transport function in experimental locality Milhostov

Semancová P. [1] Kotorová D.[2]

[1]*University of Presov, Faculty of humanities and natural sciences, Department of ecology, 17.Novembra 1, 080 16 Presov, Slovakia; e-mail: petrasemanco@gmail.com*
[2]*CVRV Agroecology Research Institution of Michalovce, Spitalska 1273, 071 01 Michalovce, Slovakia.*

Abstract

The aim of this study is to show the importance of soil not only in terms of its production ability but also in non-productive terms of specific transport functions. The research was performed at experimental locality Milhostov on heavy soils between 2006 and 2009. Soil samples were taken from depth 0.0 – 0.6 m in spring time. Granulometric composition, bulk density, total porosity and maximum capillary capacity were determined. Content of clay particles was in range 59.14 – 68.53 % and characterize soil as clay-loamy soil till clayey soil. High variability of soil textures confirmed its spatial heterogeneity. Average bulk density (1426 kg m^{-3}) and average total porosity (45.99 %) indicates a potential soil compaction. It also means reduction of the transport function in the whole soil profile.

Key words: *heavy soils, transport function, physical and hydrophysical parameters*

Positive biological effects of anthocyans in the fruits of the bilberry (*Vaccinium myrtillus* L.), black elderberry (*Sambucus nigra* L.), grapevine (*Vitis vinifera* L.) and black chokeberry (*Aronia melanocarpa*)

Sedlák V.[1], Poráčová J. [2], Blaščáková M.[2], Kovaľová L.[2], Pošiváková T.[1]

[1] *University of Presov in Presov, Faculty of Humanities and Natural Sciences; Department of Ecology, 17 November Street 1, 081 16 Prešov, Slovakia*
[2] *University of Presov in Presov, Faculty of Humanities and Natural Sciences; Department of Biology, 17 novembra 1 081 16 Prešov,Slovakia; poracova@unipo.sk*

Abstract

Berries are the most affordable type of berries, which have antioxidant effects, and they are a rich source of vitamins, minerals as well as dietary fiber. They have biologically active compounds and antioxidants that protect the body against civilization diseases. Scientific studies show a beneficial effect of polyphenols on the cardiovascular system which can be found in wine, especially for reducing total cholesterol, lowering LDL cholesterol and increasing HDL cholesterol, reducing platelet aggregation and blood viscosity, They have a positive effect on vascular function, in the prevention of heart attacks and kidney stones. Anthocyanins contained in fruit such as blueberries affect the health of the urinary tract and they are also important in the prevention of diseases of the teeth and gums. Phenolic substances of the elderberry fruit have broad effects, especially antioxidant, anti-inflammatory, immunostimulating, antiviral, anti-allergic, anti-pyretic and are calming. The active substances contained in elderberry fruit are mainly used for influenza, upper respiratory tract infection, inflammation of the oral cavity, constipation, inflammatory diseases of the joints and also to improve blood circulation in the limbs and support digestion. Fruit of the black chokeberry has the highest value of bioactive compounds and therefore affects countless processes in the organism. Polyphenols found in the fruit of the black chokeberry can be used in the prevention of cardiovascular diseases, for example atherosclerosis and deep venous thrombosis. Chlorogenic acid, present in fruits of the black chokeberry reduces glucose absorption and thereby may prevent or delay the onset of diabetes. Anthocyanins from the berries of the black chokeberry have a positive affect on the digestive tract and have antioxidant and anti-inflammatory activity.

Key words: *berries fruit, antioxidants, polyphenols, prevention, human health*

Acknowledgement: This study was supported by the grants OPVaV: ITMS 26220120041, KEGA 016PU-4/2012.

What do forest wells and temporary forest puddles hide?

Smoľák R.

University of Prešov, of Humanity and Natural Sciences, Department of Ecology, Faculty ul. 17. novembra 1, Prešov, 080 16, Slovakia, eres@unipo.sk

Abstract

Untill now, not much attention has been paid to the research of small forest temporary ponds. However, these water bodies represent aquatic mosaic landscape elements important from the perspective of conservation of biological diversity and the spread of small aquatic invertebrates. In our research, we recorded the spring term of life of small temporary ponds. We focused on species composition, abundance and zooplankton ecology of three forest puddles and three forest wells on south-west foothill of Vihorlat Mountains. The samples were taken in four dates during the period March to June of 2012. In July, the puddles definitely dried for the rest of summer 2012.

We found 32 taxa of zooplankton. In abundance and frequency of occurrence in zooplankton, dominant were juvenile crustacean (nauplius and copepodit). Abundance of zooplankton in puddles was higher than in wells. Frequency of taxa occurrence in the group Cladocera was higher in puddles, in the group Rotatoria in wells, in the group Copepoda was frequency of taxa occurrence between puddles and wells identical. Most frequently occurring species were *Daphnia obtusa* (Cladocera), *Brachionus leydigii* (Rotatoria), *Eucyclops serrulatus* (Copepoda).

Key words: *Temporary puddles, Forest wells, Zooplankton, Abundance, Frequency of occurrence, Vihorlat Mountains*.

Eco-morphological and Biochemical Studies on *Hypericum maculatum* Crantz from the Eastern Slovakia

Šalamon I.[1], Taylorová B.[2]

[1]Department of Ecology, Faculty of Humanities and Nature Sciences, University of Prešov, 1, St. November 17, 080 01 Prešov, Slovakia, e-mail: salamon@fhpv.unipo.sk
[2]Department of Ecology and Environmental Sciences, Faculty of Nature Sciences, Constantine the Philosopher University, 1, Tr. A. Hlinku, 065 01 Nitra, Slovakia, e-mail: beatay123@gmail.com

Abstract

The aim of the study was investigation in the morphological properties of natural resources of *Hypericum maculatum* CRANTZ and evaluation of total hypericin levels during the flowering period in dried Hyperici herba during the consecutive years in 2009-2011. Wild populations of *Hypericum maculatum* CRANTZ (*Hypericaceae*) were studied repeatedly in wooded hay-meadows in a former Military Training Area Javorina in Levočské vrchy (Slovakia). The plant material was measured repeatedly on 125 wild growing individual plants (plant height, flowering stem height, inflorescens diameter, number of leaves on the main stem, length and width of the leaves) growing in four different localities. Dried *Hyperici herba* was extracted to methanol and the content of diantron derivates was determined by the spectrophotometric method (Ph. Eur. 4). The results of investigation revealed high morphological diversity and total hypericin content recorded during the stage with fully opened flowers varied from 0.16 – 0.29 %.

Key words: *Hypericum maculatum* CRANTZ , morphometric analysis, hypericin, wild populations

Acknowledgement: The participation is supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, the project: 00162-0001 (MS SR-3634/2010-11) "Isolation of Natural Plant Substances by Lyophilisation and Change of their Qualitative-Quantitative Properties".

Anthocyanins Concentration in Relation to Quality and Composition of Fruits

Šandor J.[1], Šalamon I.[2]

[1]*Department of Ecology, Faculty of Humanities and Natural Sciences, University of Presov, 01, 17th November St.,, SK – 081 16 Presov, Slovak Republic*
[2]*Excellence Centre of Animal and Human Ecology, University of Presov, 01, 17th November St., SK – 081 16 Presov, Slovak Republic*

Abstract

Environmental changes directly affect the concentration of anthocyanins in the plants fruits. Anthocyanins are classified as multifunctional compounds that determine the coloring of fruits and are capable of providing protection against various types of biotic and abiotic stresses. Anthocyanins are significantly integrated into plant stress signaling networks and their phenolic metabolism, which results in the regulatory effects of the content of this substances. Process of regulation of anthocyanins by environmental factors, their presence and the adaptive value of fruits, should be viewed and interpreted on the background of the dissemination and interaction, in relation to genotype and environment. Diversity of fruit colors indicates the increasing specialization to facilitate the biotic propagation of plants. Fruit colour, as an expression of different levels of anthocyanins accumulation is a good indicator of maturity and internal quality of the fruit for their consumers. Such expressions of color can be classified as a method of signaling values associated with the rules of each ripened fruits type. There is a possibility that fruits coloration provides information on the nutrient content and about defense and other skills, on the basis of the surface reflection. Color indicated characteristic of fruits may increase their relative attractiveness to different groups of animals. Anthocyans accumulation is also associated with the onset of sugar accumulation process and is determined by the level of sugar concentration. An interesting assumption could thus be a potential ability to assess the sweetness and the content of sacharides in fruits, depending on the extent and intensity of their color.

Key words: *anthocyanins, concentration, signaling, specialization, environmental factors, the color of fruit the quality, interactions*

Acknowledgement: The participation is supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, the project: 00162-0001 (MS SR-3634/2010-11) "Isolation of Natural Plant Substances by Lyophilisation and Change of their Qualitative-Quantitative Properties".

Prevalence and Functions of Anthocyanins in Fruits

Šandor J.[1], Šalamon I.[2]

[1]*Department of Ecology, Faculty of Humanities and Natural Sciences, University of Presov, 01, 17th November St., SK – 081 16 Presov, Slovak Republic*
[2]*Excellence Centre of Animal and Human Ecology, University of Presov, 01, 17th November St., SK – 081 16 Presov, Slovak Republic*

Abstract

Basic regularities of anthocyanins concentration in fruits of plants and their functions are influenced by various environmental factors and interactions. Environmental changes reflect in the general principles of occurrence, distribution, concentration, and different functions of anthocyanins. Anthocyanins create relations to the biological cycles of living organisms and they are directly affected with a variety of endogenous and exogenous factors. Their functions had been taken into account through the contribution to color and quality parameters of fruits, seeds distribution and their accumulation. Summary of basic knowledge on natural pigments as color bearers of fruits and their importance, methods of usage, and prospects for the future, are the basis of visual examination of potential distribution and physiological functions of anthocyanins in the fruit and their nutritional value. We need to synthetically consider the general question of the dynamics of their extension, feeding rate synchronization to relations with animals, the level of pigmentation as signaling and protection against various types of biotic and abiotic stress. Finally, it is also necessary to determine the concentration changes of these natural substances as a result of natural conditions in the relationship of fruit color and movement of animals. The concentration of anthocyanins as active components in various aspects of the morphology and physiology of plants is associated with the regulation of anthocyanins synthesis and then in maintaining stable color polymorphism conditional to preferences of animals. Acquired facts and collected knowledge should subsequently provide high-quality base for further investigation, or acquisition of knowledge and skills in the subject.

Key words: *anthocyanins, accumulation, concentration, distribution, environmental factors, fruit color, interactions regulation*

Acknowledgement: The participation is supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, the project: 00162-0001 (MS SR-3634/2010-11) "Isolation of Natural Plant Substances by Lyophilisation and Change of their Qualitative-Quantitative Properties".

Visual Systems of Animals and Anthocyanins in Attraction

Šandor J.[1], Šalamon I.[2]

[1]*Department of Ecology, Faculty of Humanities and Natural Sciences, University of Presov, 01, 17th November St., SK – 081 16 Presov, Slovak Republic*
[2]*Excellence Centre of Animal and Human Ecology, University of Presov, 01, 17th November St., SK – 081 16 Presov, Slovak Republic*

Abstract:

Organisms are effectively adapted to their environment and way of life by body structure, physiological attributes and the behavior. Natural selection of individual species at different stages of development, conditionally acquired the genetically encoded attributes and reactive capabilities. Attractive and creative coloring of fruits during ripening period is considered to be one of those adaptations that affect animals consuming fruit (*frugivores*) within the trophic relationships. This ability is closely related to the values of the concentration of anthocyanins in fruits and is seen as a certain way of signaling ripeness or unripeness of the fruits. The degree of ecological specialization and developmental excellence of species leads to the development of the ability to distinguish colors, depending on the development or presence of unique photoreceptors in the retina of the species. The action of various environmental factors leads to the various levels of pigment concentrations in the fruit producing different levels of a wide range of colors. For different groups of animals it is the range of colors generated by anthocyanins more or less visible. It depends on development of the visual system and the ability of absorption of light at different wavelengths. On the other hand, the basis of interactions with plants and fruits leads to the adaptability of fruits to new tasks: attract, reward, or repel. Knowledge of anthocyanins attractiveness on the basis of their concentration levels in relation to the visual system of animals will serve to penetrate deeper into the issue of behavior of plants and animals at the level of trophic interactions, dissemination processes, preferences signs and protective disposals.

Key words: *anthocyanins, adaptation, attributes, capabilities, environmental factors, fruits color, visual systems, interactions*

Acknowledgement: The participation is supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, the project: 00162-0001 (MS SR-3634/2010-11) "Isolation of Natural Plant Substances by Lyophilisation and Change of their Qualitative-Quantitative Properties".

Drug addiction in the Roma population

Škovranová K., Adamusová N., Mačeková S., Bernasovská J.

The University of Prešov in Prešov, Faculty of Humanities and Natural Sciences, Department of Biology, Ul.17.novembra 1, 08016 Prešov, Slovakia; k.skovranova @ gmail.com

Abstract

Drugs and drug addiction problem is now a widely discussed topic in our country as well as in the world. Young people often become the victims of abuse. One of the reasons is the easy availability of drugs, already in childhood. A large part of the Roma population is characterized by an inappropriate way of life which is related to the lack of economic security. It is expected that children who grow up in such circumstances will result in the same life as their parents. Based on this assumption, we decided to compare the lifestyle of Roma and non-Roma children, focusing on the consumption of addictive substances. The research was conducted through the questionnaire among Roma children from Chminianske Jakubovany and non-Roma children from the village Medzany. The aim of our research was to determine to what extent the Roma and non-Roma pupils come into contact with the commercially available addictive substances and to identify the impact of the families on incidence of drug addiction in both groups. The analysis results showed that Roma children have first experience with alcohol at a younger age compared to non-Roma children. A significant difference was found in the frequency of smoking, especially among Roma and non-Roma girls at the secondary level ($p=0.037$). The overall results of the research showed that parents of Roma children increasingly take addictive substances, which is likely related to the results of our analysis in the context of alcohol and smoking. Our research has confirmed the need to continue in paying attention to this issue, intensive work in education and prevention not only in the Roma population.

Keywords*: drug addiction, addictive substance, Roma children, non-Roma children*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Fecundity of the loaches from the families Cobitidae and Balitoridae in Olšava river and Bačkovský brook

Škovranová L.[1], Koščo J.[1]

[1] *University in Prešov, Faculty of Humanities and Natural Sciences, Department of Ecology 17th November 1, 081 16 Prešov, Slovakia, lucia.skovranova@gmail.com*

Abstract

Fecundity of three loaches species – danubian spined loach (Cobitis elongatoides), golden loach (Sabanejewia balcanica) from the family Cobitidae and stone loach (Barbatula barbatula) from the family Balitoridae –was studied in two streams – Olšava River and Bačkovský Brook. Samples were collected on three localities of each stream. Material was collected in the spring, summer and autumn 2009 and 2010. We caught 44 individuals in Olšava River and 28 specimens in Bačkovský brook. The gravimetric method was used to determine the number of eggs in the gonads. Barbatula barbatula in Olšava River from the locality Nižná Myšľa had the highest absolute fecundity. With the average length of 103.3 mm and average weight of 14.89 grams, the absolute average fecundity was 4363.2 eggs, which ranged from 2322 to 6179 eggs. Values of fertility rate ranged from 2.29 to 27.95%. Mean relative fecundity was 226.559 eggs/g. The lowest values have been identified in Nižná Myšľa too, where the absolute fecundity of Cobitis elongatoides ranged on average 96.75 eggs. With the average body length of 66 mm and weight 3.29 g, the relative fecundity of this species ranged about 31.26 eggs/g.

Key words*: absolute fecundity, relative fecundity, Cobitis elongatoides, Sabanejewia balcanica, Barbatula barbatula*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

Analysis of TNFRSF11B gene single nucleotide polymorphism in patients with osteoporosis.

Zigová M., Behulová R., Bernasovská J., Bôžiková A.

University of Prešov in Prešov, Faculty of Humanities and Natural Sciences, Department of Biology, 17. Novembra no.1, SK-081 16, Prešov, Slovakia; michaela.zigova@gmail.com

Abstract

Osteoporosis is a condition of decreased bone strength that leads to susceptibility to the bone fractures and it is one of the most common types of bone diseases. Osteoprotegerin (OPG), the product of TNFRSF11B gene, is a key negative regulator of osteoclastogenesis and is secreted by osteoblasts/stromal cells. Polymorphisms within the TNFRSF11B gene, located on 8q24, have been studied and associated with osteoporosis and fracture risk. This work explains importance of TNFRSF11B gene in bone biology. In the centre of our study is single nucleotide polymorphism rs2073618 (1181 G/C) in exon 1 of TNFRSF11B gene. It is assumed, that this polymorphism is connected with osteoporosis. We analysed genotype and allele frequencies of rs2073618 in patients with diagnosed osteoporosis. Objects of our study were 80 patients diagnosed with osteoporosis, 74 women and 6 men, from districts Banská Štiavnica and Prešov in age of 41 to 83. Their DNA samples were isolated from buccal swabs or from peripheral blood lymphocytes. This work presents results of real-time PCR analysis that were consequently statistically evaluated. Frequencies of genotypes CC, CG and GG were 0.26, 0.43 and 0.31, respectively. The frequency of risk allele C was 47.5%. Comparison of genotype and allele frequencies between two districts showed that allele C was found in higher frequency than allele G in district Banská Štiavnica, while allele G was prevalent in district Prešov. However, we did not find any statistically significant differences in genotype and allele distribution between the districts.

Key words: *TNFRSF11B gene, osteoprotegerin, rs2073618*

Acknowledgement: This study was supported by the grant OPVaV: ITMS 26220120041.

LIST OF AUTHORS

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VULM je moderná a dynamicky sa rozvíjajúca slovenská farmaceutická spoločnosť, ktorá nadväzuje na dlhoročné tradície, know-how, výskumnú, vývojovú a výrobnú činnosť Výskumného ústavu liečiv Modra založeného už v roku 1972. Hlavné sídlo spoločnosti je na Slovensku a vďaka dlhoročným skúsenostiam vo farmaceutickom priemysle si VULM neustále upevňuje svoju pozíciu na medzinárodnom farmaceutickom trhu.

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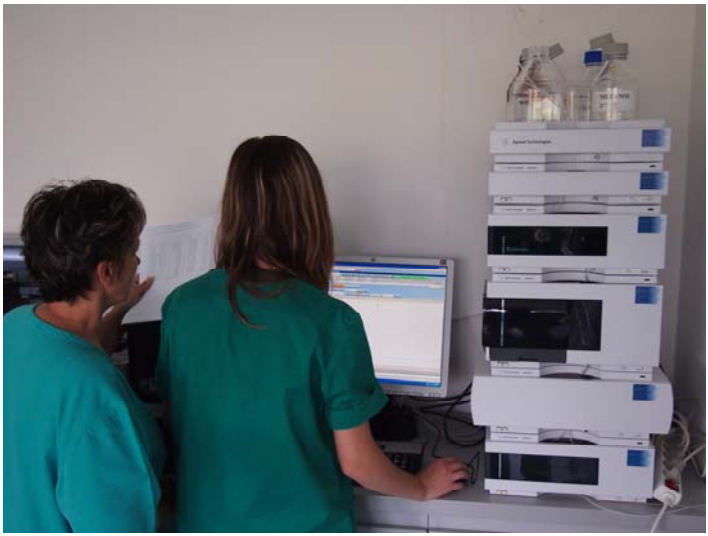

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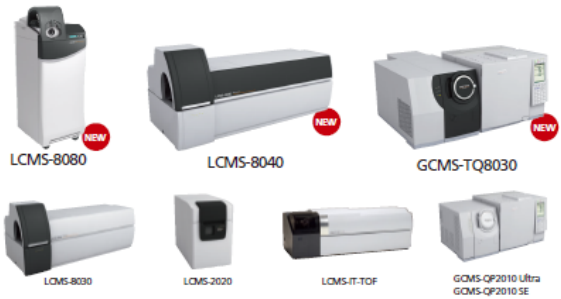
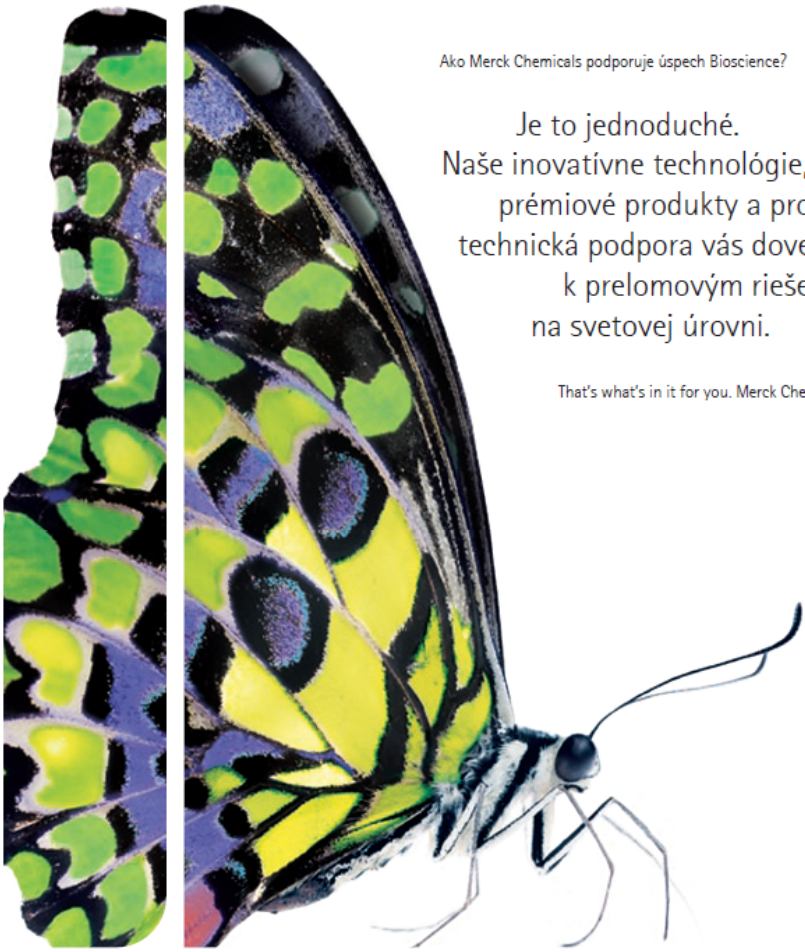


Merck Chemicals pre Bioscience. Výskum je úspešný, keď má možnosť využiť inovácie a výhody, ktoré súčasná veda prináša, tak ako výskum pod hlavičkou Merck Chemicals. Každý rok uvádzame stovky nových produktov pre Bioscience. Naš cieľ? Pomôcť vám byť lepšími medzi najlepšími. Podporujeme výskum produktami prémiovej kvality. Ako najlepší z najlepších myslíme dopredu a novými technológiami dláždime cestu pre vás.
www.merck-chemicals.com



Ako Merck Chemicals podporuje úspech Bioscience?

Je to jednoduché.
Naše inovatívne technológie,
prémiové produkty a profesionálna
technická podpora vás dovedú
k prelomovým riešeniam
na svetovej úrovni.

That's what's in it for you. Merck Chemicals

MERCK

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Je jednou zo skupiny firiem pôsobiacich v krajinách Strednej a Východnej Európy pod registrovanou značkou TECHNISERV.

Spoločnosť TECHNISERV, s.r.o., založená v roku 1999, je zameraná na dodávateľskú a servisnú činnosť komunikačných technológií a špeciálnych systémov, s realizáciou, vývojom a servisom komplexných IT riešení v oblasti hlasových a dátových komunikácií a špeciálnych systémov. Spoločnosť ďalej rozšírila okruh svojich aktivít tak, aby v maximálnej miere bola schopná zabezpečiť komplexné riešenia pre návrh, dodanie, realizáciu a implementáciu technických a vývojových laboratórií a *Centier excelentnosti*.

V produktovom portfóliu spoločnosti TECHNISERV, s.r.o. je možné nájsť predovšetkým komunikačné a dátové technológie, technológie Kontaktných centier, riešenia pre laboratóriá a *Centrá excelentnosti*, špeciálne systémy určené pre obsluhu, podporu a údržbu letovej prevádzky letísk/heliportov a špeciálne bezpečnostné systémy.

Čo vám TECHNISERV, .s.r.o. vie ponúknuť?

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- **Výber** konkrétnej a vhodnej **technológie**
- **Komplexnú realizačnú činnosť**, plne v súlade s normatívnymi požiadavkami na kvalitu, bezpečnosť a environmentálne aspekty
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Získané certifikáty a osvedčenia

- Osvedčenie o spôsobilosti vykonávať výskum a vývoj
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- ISO 9001
- ISO 14001
- OHSAS 18001
- SOŠ AQAP 2130
- Licencia na prevádzkovanie technickej služby
- Osvedčenia na činnosti vo vojenskom letectve
- Oprávnení Úradu civilního letectví České Republiky
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Kontakty na spoločnosť:

TECHNISERV, s.r.o., Nobelova 34, 831 02 Bratislava

Web: **www.techniserv.sk**
www.heliports.eu
Tel: **+421 2 4920 2811**
Email: **techniserv@techniserv.sk**
obchod@techniserv.sk

AMEDIS spol. s r.o.

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Mlynská 10, 921 01 Piešťany
tel. 00421-33-7744230, 7744231
fax:00421-33-7720932
e-mail: amedis.py@amedis.sk

Kancelária Bratislava
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Zastúpenie, dovoz, inštalácia, zaškolenie, záručný a pozáručný servis

DIONEX	iónová chromatografia Accelerated Solvent Extraction HPLC, LC/MS, IC/MS mikro-, kapilárna- a nano-HPLC
BRUKER Chemical Analysis	**NOVINKA !!!** GC/MS systémy na báze jednoduchého a trojitého kvadrupólu **SCION SQ a SCION TQ** plynové chromatografy **430-GC a 450-GC** kapilárne a náplňové GC kolóny
CEM	**laboratórne mikrovlnné systémy:** mineralizácia tlaková/otvorená, extrakcia proteínová hydrolýza, kjeldahlizácia stanovenie vlhkosti a sušiny NMR bezkalibračné stanovenie tukov mikrovlnná organická syntéza, syntéza peptidov
LCTech	**NOVINKA !!!** prístroje a imunoafinitné kolónky na stanovenie mycotoxínov plne automatizovaná GPC a SPE zariadenia na post-kolónovú derivatizáciu firmy Pickering
TELEDYNE ISCO A Teledyne Technologies Company	nízkotlaková LC, Flash chromatografia zberače frakcií vysokotlakové lineárne čerpadlá
OXFORD INSTRUMENTS	líder v X-ray (röntgenovej) analýze
ERWEKA Quality through Experience Since 1951	**NOVINKA !!!** disolučné systémy pre testovanie tabliet fyzikálne testy tabliet
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PHOTRON PTY. LTD.	výbojky pre AAS Varian, GBC, Unicam, Perkin-Elmer, Shimadzu, Zeiss
INFICON	prenosný GC/MS systém **INFICON HAPSITE ER** na detekciu, identifikáciu a kvantifikáciu chemických látok prenosné mikro-GC systémy na analýzu plynov **3000 u-GC** kontinuálny monitorovací systém **CMS5000**
VARIAN	**autorizovaný servis prístrojovej techniky Varian** dodávka náhradných dielov a spotrebného materiálu
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ITES Vranov, s. r. o.

už 19 rokov Vám prinášame to, čo potrebujete vo Vašom laboratóriu:

- ***široký sortiment laboratórneho skla***
- ***laboratórne pomôcky***
- ***laboratórne chemikálie***
- ***prístrojovú techniku rôznych značiek***
- ***laboratórny nábytok a digestory certifikované podľa príslušných EN***

Sme tu, aby sme Vám pomohli riešiť Vaše potreby v laboratórnej praxi.

ITES Vranov, s. r. o.
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Fax: 057/44 220 97
e-mail: ites@ites.sk
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Spoločnosť PRELIKA, a.s. Prešov je známa na slovenskom i zahraničnom trhu ako výrobca liehovín, horčice a octu a história jej vzniku, ako aj história liehovarníctva v Prešovskom regióne sa datuje od roku 1903, kedy bol založený prvý liehovar na spracovanie poľnohospodárskeho liehu.

Hlavným výrobným programom je výroba konzumných a značkových liehovín, destilátov, horčice a octu. Zo značkových liehovín vyrábaných pod produktovou značkou EX 1903, čo je záruka vysokej kvality a tradície treba spomenúť výrobky rady Staroslovanská, kde patrí Staroslovanská slivka, Staroslovanská hruška, Staroslovanská baracka, Staroslovanská borovička, Staroslovanská zrubovka a Staroslovanský čaj. Všetky tieto výrobky majú veľmi pozitívne ohlasy na trhu pre svoju jedinečnú chuť a originálny dizajn.

Medzi obľúbené a v poslednej dobe zákazníkmi veľmi žiadané sú výrobky radu Horec, kde k staro-novým produktom Horec Vodka, Horec Borovička a Horec Rubín pribudli úplné novinky Horec Gold, Horec Black, Horec Cherry a Horec Aloe Vera. Svojou lahodnou chuťou s výťažkom z horca, príjemnou farbou a celkovým moderným dizajnom balenia patria k značkovým liehovinám vysokej kvality, ktoré nemajú na slovenskom trhu konkurenciu.

Akciová spoločnosť PRELIKA, a.s. Prešov vyrába vo vlastnej pálenici „YELLOW HOUSE – Žltý dom“ vysoko kvalitné ovocné destiláty. Prešovská Jahodovica, Hruškovica, Malinovica a Slivovica sú známe nielen na Slovensku a v Európe, ale aj v ďalekej Kanade.

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PRELIKA, a.s. Prešov
Protifašistických boj.4
080 01 Prešov
Tel: +421 51 7732143
Fax: +421 51 7732143
e-mail: prelika@prelika.sk
www.prelika.sk

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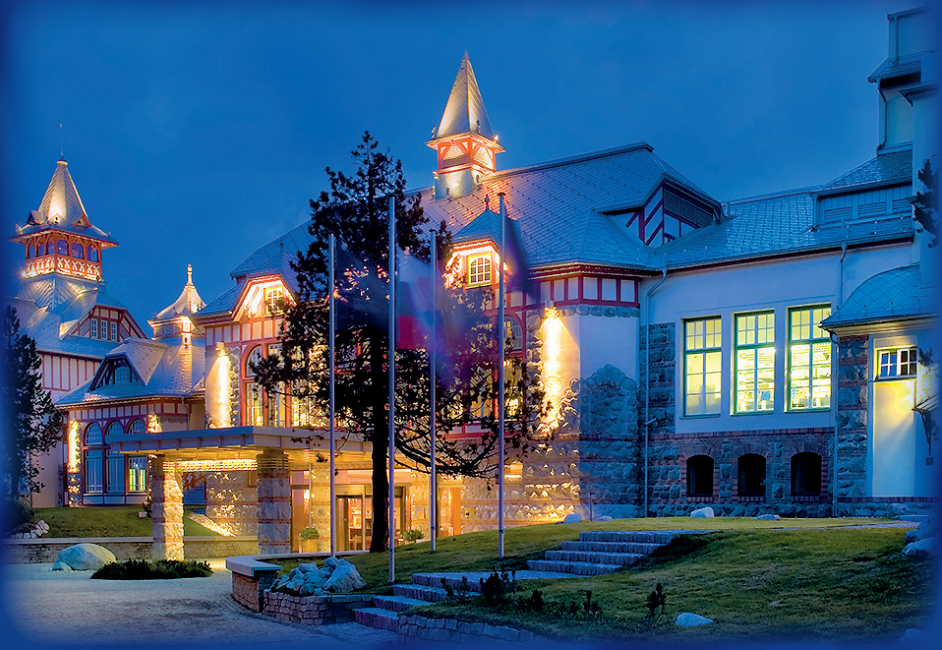

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