

Czech EPBRS Meeting

World Biodiversity and the European Taxonomy

Strategies in taxonomy: research in a changing world

Slovakia

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National reviews guidelines

The aim of national reports and e-conference is to bring together potential users of taxonomy in Europe. The EPBRS meeting under the Czech Presidency is designed to investigate what the users of taxonomic information see as the main issues that taxonomists should focus on. Encouraging taxonomy users to participate actively in the e-conference and the meeting itself might also help to strengthen the policy bit of the science-policy interface.

The following headings will be used to structure the work of the EPBRS in the e-conference and during the meeting.

1-Taxonomic Information: Strategy and Methods

Inventory and Identification: “What is it, and how does it fit among its relatives?”

- 1.1 Does your country use taxonomy-based tools for biodiversity assessments and policy making? What are these tools?

In Slovakia, there are several taxonomy-based tools including botanical, zoological and microbiological taxonomical groups. There are three interconnected main groups of tools, which are the most essential for biodiversity assessment and policy making.

1. Checklists
2. Complex taxonomical surveys: Flora of Slovakia, Databank of Slovak fauna, web pages related to the most important institutions and projects dealt with taxonomy
3. Broad literature sources – mainly books and articles related to detailed description and analysis of particular taxonomic groups

- 1.2 Does your country have a national checklists? When were they last revised and updated? Is there any national assessment of which taxa in particular lack taxonomic information? Did you submit a response to the GTI questionnaire on these issues?

Yes, there are national checklists both for botanical and zoological part. Marhold, K., Hindák, F., (eds.) 1998: Checklist of non-vascular and vascular plants of Slovakia, Veda, vydavateľstvo SAV,

Bratislava, 687 pp. – in digital form (Access database tool – 1999). The *Checklist of non-vascular and vascular plants of Slovakia* is the first attempt to present a full list of the representatives of the Slovak flora. The aim of the editors and authors was to prepare this checklist as manual not only for those who work with plants as specialists in systematic botany and taxonomy, but also for phytocoenologists, environmentalists, plant ecologists and others who work in other botanical or biological sciences. In our checklist we included correct names and synonyms used in our botanical literature and selectively also the literature of neighbouring countries, which will help also non-specialists to use the relevant literature and nomenclature. The present checklist also represents a new version of the Red list of the flora of Slovakia and a list of Slovak vernacular names of plants. While for the cyanophytes/cyanobacteria, algae, lichens, and bryophytes special checklists have already been published, in the case of fungi it is the first attempt. Cyanophytes/Cyanobacteria and Algae, Fungi (Microfungi - *Myxomycota*, *Chytridiomycota*, *Oomycota*, *Zygomycota*, *Ascomycota*, *Basidiomycota*, *Deuteromycota*), (Macrofungi - *Ascomycota*, *Basidiomycota*), Lichen-Forming Fungi (Lichens), Bryophytes, Ferns and Flowering Plants. More detailed description is available on webpage: <http://ibot.sav.sk/page/intro.htm>.

The Checklist Stloukal, E. & Kalúz, S.: Checklist of the Slovak fauna - databases and software, based on the taxonomic backbone of the Fauna Europaea project and data published in thousands of articles and monographs, is currently available on webpage http://www.dfs.sk/default_en.htm and is waiting for finalisation and publication. This webpage is maintained by the Department of Zoology Comenius University, Bratislava, Slovakia. Project of DFS started in co-operation of former Department of Systematic Zoology, the Zoological Institute of Comenius University, the Slovak National Museum and the Institute of Zoology of Slovak Academy of Sciences in 1980. DFS maintains the taxonomic information system on fauna and protozoans of terrestrial and fresh-water habitats occurring in Slovakia and the Carpathian Mountains. DFS continually collates faunal database with data on known distribution of animals in Slovakia. DFS does provide a unique reference on Slovak fauna (species composition, distribution, changes and trends) for scientists, government, industry, conservation communities, educational programs and zoologists-enthusiasts. Data and tools of DFS were applied in dozens of projects.

The partial checklists are available on webpages: birds - <http://www.vtaky.sk/atlas/atlasvtakov.php>, orthoptera - <http://orthoptera.sk/sk/index.php?page=atlas&submenu=atlas>, butterflies - www.lepidoptera.sk.

- 1.3 Describe 1-2 flagship projects related to bullet points below and suggest some recommendations useful for meeting as a result from these projects: Please outline any national taxonomy-based monitoring or surveys designed to establish the distribution, status and trends of any taxonomic group.

1.) Flora of Slovakia, duration 1999 – present. Principal investigator: K. Goliašová, Co-investigators: I. Hodálová, E. Kmeťová, J. Kučera, R. Letz, E. Michalková, P. Meredá, P. Mráz, V. Mrázová, M. Peniašteková, M. Perný, M. Slovák, H. Šipošová, O. Ťavoda et al. To Flora of Slovakia there are processed all autochthonous, domesticated, allochthonous, temporary spread, often cultivated and expected plant taxa. The work is bringing original descriptions, determination keys, scientific names of plant taxa, critical reevaluation of nomenclature in terms of international code of

botanical nomenclature, nomenclatorial and taxonomical notes and comments, information about variability and number of chromosomes, biological, phytosociological and ecological characteristics, data about height maximals and minimums and utility properties. Important is information about new, expected or mistakenly mentioned taxa of Slovakia. Dissemination is elaborated with all available data about occurrence in Slovakia, complemented by the map appendix. Flora of Slovakia has special importance for science and national culture. Results of research have very broad utilization not only for knowledge of Carpathian-Pannonia flora, but also in national and international contexts and for all components of nature conservation. It is very often comparative and supplementing informative source for Slovak red books, red lists, determination keys, maps of vegetation, as well as works of international character as Flora Europaea and Atlas Florae Europaeae, for various international projects of Ministry of Environment of Slovak republic. Very important is utilization in application research (agriculture, forestry, water management and education.

2.) EDIT - The European Distributed Institute of Taxonomy (EDIT) is the collective answer of 28 leading European, North American and Russian institutions to a call of the European Commission, issued in 2004, for a network in « Taxonomy for Biodiversity and Ecosystem Research ». The EDIT consortium agreement has started on the 1st of March 2006 and will last 5 years. Among the members of EDIT are the premier natural history collections-based institutions worldwide, which have both the management capacity and the will to progress toward EDIT's objectives. Their collections are global in coverage and are supported by complementary expertise. More than half of the world's natural history specimens, which constitute the large scale infrastructure for taxonomic research, are held in the repositories of EDIT's membership. The inclusion in the consortium of network institutions devoted to management of biodiversity data, and of a research organisation directly related to users of taxonomy for agriculture and environment, in addition to the links or inclusion of many partners with universities will facilitate dissemination of EDIT taxonomic research and training toward a wide audience. EDIT will bring together the leading taxonomic institutions in Europe that for historical reasons have developed independently. The association with leading North American and Russian partners will make it a worldwide leading network. The consortium so constituted unites the premier natural history collections-based institutions, to progress toward EDIT's structural and scientific objectives.

1.4 Is there any coordinated effort in your country regarding bar-coding for identification or the assessment of biodiversity?

Yes, this coordinated effort is in development, particular information is available on webpages: <http://ibot.sav.sk> , <http://www.zoo.sav.sk> , <http://www.dfs.sk/> .

1.5 Are you aware of any major efforts (or projects) in your country to integrate morphological and molecular taxonomy?

Yes. There are several efforts and projects, e.g.:

1. Phylogenetic relationships in the polyploid complex *Alyssum montanum* - *A. repens* (Brassicaceae). Duration: 2009 – 2012. Financial support: Scientific Grant Agency of the Ministry of Education of Slovak Republic and the Slovak Academy of Sciences (VEGA, Vedecká grantová agentúra Ministerstva školstva SR a Slovenskej akadémie vied), Slovak Republic

The genus *Alyssum* belongs to poorly studied *Brassicaceae* genera, in spite of its species richness and a wide distribution area. It comprises 170-195 species distributed almost entirely in Eurasia. In this project we will concentrate on the *A. montanum* - *A. repens* group in Central Europe, Balkan and Apennine Peninsula. Using a broad spectrum of methods (karyological, morphometrical, molecular) we aim to (1) circumscribe subspecies of *A. montanum*, explore their morphological and genetic variation and differentiation, delimit their distribution areas; (2) clarify phylogenetic relationships within the *A. montanum* - *A. repens* group, revise taxonomic position of doubtful taxa; (3) explore cytotype distribution patterns and frequency of polyploidization events, analyze correlations of ploidy levels with morphological and genetic variation; and last but not least (4) identify local endemics and critically endangered species important for biodiversity conservation.

2. Database of Chromosome Numbers of Pteridophytes and Flowering Plants of Slovakia (A Revised Chromosome numbers Survey of ferns and flowering plants of Slovakia will include a bibliography of the published chromosome data, critical revisions and revision of voucher herbarium specimens.)

3. Species Plantarum - Flora of the World: *Cardamine* and related genera. The project "Species Plantarum - Flora of the World" represents a complex of co-ordinated activities funded from various sources with an aim to publish Flora of the World in separate volumes dedicated to a single family or a group of genera. Several volumes dealing with smaller families have been already published (*Irvingiaceae*, *Stangeriaceae*, *Welwitschiaceae*, *Schisandraceae* and *Prioniaceae*, for details see Brummitt et al. 2001) as well as considerably larger world-wide accounts of the families *Juncaceae* (Kirschner et al. 2002, in total 440 species of seven genera) and *Chrysobalanaceae* (Prance & Sothers, in total 530 species of eight genera) were either published or submitted publication. These volumes do not represent only a summary of the knowledge about a family or a group of genera which is at present at disposal, but based on the comparison of the world-wide material, they often bring a new view on their taxonomic treatment.

2-Taxonomy as a basis for ecological research and sustainable management of the biodiversity

Ecological functions and services: "What does it do, and what does it interact with?"

How does taxonomic research contribute to better understanding of the functions and attributes of species, and to the management of biodiversity?

2.1 Do you know projects involving taxonomists in the understanding of ecological functioning, or the assessment of ecosystem services?

Yes, there are several projects e.g. ALTER-Net - A Long-Term Biodiversity, Ecosystem and Awareness Research Network; EUMON - EU-wide monitoring methods and systems of surveillance for species

and habitats of Community interest; GLORIA - Global observation research initiative in alpine environments; etc.

2.2 What is the contribution of taxonomy in your country to the management of biological invasions?

The mapping of invasive species has been realised in close collaboration and direct involvement of taxonomists. During intensive research, 20 of invasive species were found. Invasive species are also anchored in Regulation Ministry of Environment of Slovak republic Nr. 24/2003 Z.z..

2.3 What is the contribution of taxonomy in your country to efforts to understand the status and trends of key functional groups such as pollinators?

There is detailed taxonomical research related to pollinators, especially for selected species of pollinators and particular plants.

Taxonomy, biodiversity and its conservation: "How to manage it in sustainable way?"

Describe 1-2 flagship projects related to bullet points below and suggest some recommendations useful for meeting as a result from these projects:

2.4 Are there also non-professional organisations recording biodiversity data collections (e.g. ornithologists) involved in the decision process of land use planning etc.?

What kind of organisation is meant as "non-professional"? If it is possible to include also non-governmental organisations, there are several organisations in Slovakia, which deal with collecting of biodiversity data.

SOVS - Slovak ornithological society /Birdlife Slovakia <http://www.vtaky.sk/>

DAPHNE – Institute of applied ecology http://www.daphne.sk/index_a.htm

BROZ – Bratislava´s Regional Association for Nature Conservation
http://www.broz.sk/index.php?option=com_content&task=view&id=29&Itemid=65&lang=en

SON – Association for protection of bats <http://www.netopiere.sk/>

2.5 Are there some indicators (or red-list species) monitoring Natura 2000 sites for delimitation and management of nature reserves used in your country?

Yes. Publication " Šeffler, J., Lasák, R., (eds.) 2004, Bratislava, 107p.: Natura 2000 in Slovakia - Methodology for Site´s Identification" . It includes: identification of taxa and habitats included in the

habitats directive; sources of information for identification of Natura 2000 sites; preparation of data for selection of SCIs; identification of the proposed sites of community importance (pSCIs); specification and adjustment of borders; references; annexes (lists of habitats and taxa with threshold values of coverage; maps of habitats and taxa; scientific proposal of Natura 2000 network).

- 2.6 Which taxonomy-related research (standardized taxonomic metadata, delivery of checklist building tools, building expertise network) in developmental non-European biodiversity-rich countries is supported by policy-makers from your country based on your national expertise and experience?

There are projects related mostly to research of particular species or problems as for building of taxonomical tools; e.g. The effect of light on development of the thoracic muscle and flight behaviour of tsetsefly (*Glossina pallidipes*); Supply of tsetse pupae for tsetse eradication in Ethiopia, etc.

- 2.7 Is there a National Needs Assessment of GTI in your country? If yes, what are your specific needs, e.g. for conservation, protected areas, CITES/customs, dealing with invasive species etc?

There is National focal point and member of the co-ordination mechanism for the Slovak Republic (2001–) Prof. Karol Marhold, working for Department of taxonomy of vascular plants, Institute of Botany Slovak Academy of Sciences, Bratislava.

3- Taxonomy, potential users and capacity building of experts

Open access to information: “How to find out about it?”

How does taxonomic information get from where it resides to where it is needed elsewhere in the world?

- *Bioinformatics*

- 3.1 To what extent is taxonomic research in your country contributing to international biodiversity initiatives and projects (e.g GTI, GBIF, PESI, EOL, Etc...)

GTI - National focal point and member of the co-ordination mechanism since 2001

Implementation of the GTI Programme of Work, particularly at the European level within the frame of project EDIT.

GBIF – Slovak republic became the full member in June 2007. There are several activities contributing to international BD initiatives.

1. Checklist of non-vascular and vascular plants of Slovakia. The Checklist of non-vascular and vascular plants of Slovakia includes accepted names, synonyms, basionyms, substituted names, misidentifications, Slovak vernacular names and other additional information about taxa, such as status (native, introduced, cultivated, etc.), endangerment (IUCN criteria), endemism, and

invasiveness. It consists of five indifferent parts (Cyanophytes, Algae, Fungi, Lichens, Mosses, and Ferns and Flowering Plants).

2. František Nábělek's Collection 1909-1910 (Type specimens from the area of Bahrain, Iran, Iraq, Israel, Jordan, Turkey)(unit data available via BioCASE Portal, BGBM, Germany).

3. Biodiversity collections (metadata available via BioCASE Portal, BGBM, Germany).

4. Database of Chromosome Numbers of Pteridophytes and Flowering Plants of Slovakia (A Revised Chromosome numbers Survey of ferns and flowering plants of Slovakia will include a bibliography of the published chromosome data, critical revisions and revision of voucher herbarium specimens.)

5. NaTaF - National Taxonomic Facility (The joint research and educational centre of Comenius University, the Slovak Academy of Sciences, J.P. Safarik University and Slovak National Museum)

PESI – full participation of Institute of botany of Slovak Academy of Sciences in project

3.2 What is the state of the art in biodiversity informatics in your country? (e.g. e-taxonomy and e-science tools)

The biodiversity informatics in Slovakia is at relatively high level. Almost all important taxonomical information is available via internet and developed Access database tools.

3.3 Has there been a national assessment of best practices for taxonomic data quality and validation?

Yes, but assessment was done unevenly according to particular taxonomical groups.

3.4 Do you have any national guidelines on how to approach the proof of absence?

No, there are not general national guidelines. The criteria IUCN are followed.

3.5 What are the taxonomic standards used in the databases (TDWG, Darwin core, COL, PESI, etc...)?

The international standards for taxonomic databases are followed in Slovakia. TDWG – Taxonomic databases working group – www.tdwg.org ; Brummitt & Powell, Authors of Plant Names – www.ipni.org ; Botanico-Periodicum-Huntianum www.ipni.org

3.6 Could you identify the major digitization efforts for biodiversity data (e.g. collections, observations, species checklists, etc...)?

The major digitization efforts follow completing of botanical, zoological and microbiological collections. The checklists are available both in printed form and digital tools (Access and web databases).

3.7 Is there any effort in your country to make taxonomic information especially identification services easily accessible and useful to practitioners?

Yes, there are good links between scientific taxonomical information and readable and understandable outputs for practitioners. There is big effort oriented for science communication and production of layman reports.

Capacity building in biodiversity-rich countries and worldwide:

3.8 Are there any policy initiatives in your country to orient capacity building in taxonomy?

No.

3.9 Are there any sources of finance or policy actions in your country dedicated to applied taxonomy (e.g. identification tools, training for parataxonomists)?

There are special projects dedicated to applied taxonomy, mainly originated by non-governmental organisations.