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EDITED BY

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Editors' Column

1

Dear IOPB members,

Time is getting close to the IOPB Symposium in Amsterdam and this issue of the Newsletter is much characterized by that circumstance. An actualized programme as far as it is now planned is included as well as "profiles" from two Dutch and one German institution, all closely connected to the Symposium organizers. We hope this will stimulate you to consider participation in Amsterdam – we trust that will be a most rewarding and pleasant occasion.

We would like to remind you that the Tromsø symposium volume that was published a number of months ago now is available to IOPB members of good standing at a discount of more than 25%, which means approximately USD 80. The contents were presented in detail in the previous issue. You may order the symposium volume by e-mail to "bengtj@bergianska.se".

You will find in this Newsletter fortunately quite a long list of new members, who have announced their interest in connection with the Amsterdam symposium. Many of them are from countries of the former Soviet Union and we realise that for our colleagues there, as well as in many other countries around the world, IOPB is particularly import-

ant as a link and source of information. We have in Amsterdam to discuss and decide on means that would reduce financial problems as a barrier to membership of IOPB.

Later in the spring nominations for IOPB Executives and Council will be sent out separately to all members for voting. We hope that you take this opportunity to express your opinion. We will particularly underline that nominations may now and before the 15th of May (extended time) be sent in to any of the IOPB Executives – you find as usual all names and addresses in some of the last pages of the Newsletter.

We would very much appreciate contributions to coming Newsletters – profiles of institutions as well as viewpoints, requests for materials, etc. You may also call attention to meetings and symposia you may think to be of interest to IOPB members. This will be the last Newsletter before the Amsterdam symposium, where we hope to meet many of you. Material for the next issue would be appreciated by the end of September.

Liv Borgen & Bengt Jonsell

ALLIUM SENESCENS

News, Notes & Requests

2 Recently published

A doctoral thesis with a biosystematical theme was defended at Uppsala University, Dept. of Plant Systematics, in March 1998, viz.

Reinhammar, Lars-Gunnar. 1998. Variation in *Pseudorchis albida* s.l. (Orchidaceae) and *Carex capitata* s.l. (Cyperaceae): morphology, genetic diversity, ecology and systematics. Acta Univ. Upsaliensis, Comprehensive summaries of Uppsala dissertations from the Faculty of Science and Technology 343. 42 pp. ISBN 91-554-4147-5. Distributed by Uppsala Univ. Library, Box 510, SE-751 20 Uppsala, Sweden. Summary published together with six papers printed or to be printed in international journals. Co-authors in some of those papers are M. Hedrén, Lund, E. G. A. Olsson, E. Sørmealand and B. Bele, Trondheim.

Prof. **Fu Chengxin**, Lab. of Plant Science, Dept. of Biology, Zhejiang Agricultural University, Hangzhou 3100029, P. R. China, would like to communicate the following.

PUBLICATIONS DURING THE LAST YEARS

Fu C. X. et al. 1993. Variation and evolution of karyotype of *Smilax* II. Karyotype analysis of seven species from Southern China. *Cathaya* 5: 151-166.

Fu C. X. et al. 1995. Variation and evolution in *Smilax* and *Heterosmilax* (Smilacaceae) III. Analyses of karyotypes and evolution from

twelve taxa in southern China. *Cathaya* 7: 105-124

Fu C. X. et al. 1996. Analyses of variation and evolution of karyotypes in *Smilax* and *Heterosmilax* and systematic position in the family. Theory and Application of Life Sciences. Zhejiang Univ. Press: 249-250. and four further papers.

CURRENT PROJECT

Studies of the evolution and systematics on Smilacaceae and allied groups.

PROJECT COMPLETED

Studies of the cytotaxonomy of *Smilax* and *Heterosmilax*.

PROJECT STARTED

Studies of evolution of the herbaceous species of *Smilax* in East Asia and North America.

REQUEST

for research material and information: Seeds and specimens of *Smilax* and *Ripogonum* in USA and Australia.

You may reach Prof. Fu Chen-xin by fax +86-571-6049815 and e-mail fucxsmi@public.hz.zj.cn

Dr Hann-Chung, Lo, Dept. of Forestry, National Taiwan Univ., P.O.Box 13-387, Taipei 100, Taiwan, Rep. of China, would like to inform you that in exchange for publications you may receive *Flora of Taiwan* (in English), 2nd ed, Vol. III, 1084 pages. Dicotyledons from the fam. 51 Hamamelidaceae to the fam. 107 Umbelliferae, according to the system of Engler-Diels' Syllabus ed. 11, 1936.

The Profiles

3 Amsterdam

Profile of a Lab: Experimental Plant Systematics, Universiteit van Amsterdam. Host of the VIIIth International IOPB symposium August 1998.

Hans den Nijs

A PIECE OF HISTORY

Traditionally, the research group for Experimental Plant Systematics is one of the sections of the Hugo de Vries Laboratory of the University of Amsterdam. The Laboratory has long been the center for systematic and ecological studies of plants. It was named in honor of the famous botanist Hugo de Vries, the first occupant of the chair in plant systematics, who at the beginning of this century founded modern research in the evolutionary processes in plants. He is well known as one of the rediscoverers of the Mendelian laws of heredity, and he also initiated experimental studies in plant speciation, particularly in the extremely variable group of *Oenothera*. On the basis of these studies, he formulated his Mutation Theory, which became one of the foundations of the current Synthetic Theory of Evolution. In this very year, we are celebrating Hugo de Vries' 100th birthday, and for that reason a part of the former experimental grounds will be reinstalled at the botanical garden.

Ever since then, some of the central aspects of Hugo de Vries' research, such as the genetics of the inheritance of specific characters and the key factors involved in plant spe-

ciation, have been central to the ongoing efforts of the research group. For example, in the 1960's dr. A. Sterk analysed the inheritance and the ecological function of the seed wing in two species of *Spergularia*, in which this character was discovered to play an important role in species delimitation. Sterk also originated a demographic approach to the study of plant biosystematics, as illustrated in his work on *Anacamptis pyramidalis* and *Anthyllis vulneraris*. He was among the first in The Netherlands to stress the crucial value of such data for understanding the dynamics of plant populations in nature. Later, Prof. dr. K. Bachmann continued in this vein with his penetrating studies of the genus *Microseris*, in which he aimed to unravel the developmental relationship between genes and species-specific traits. Simultaneously, dr. J. den Nijs and co-workers' biosystematic studies of some sections of the genus *Taraxacum* has brought much insight into the evolutionary patterns in a group where sexual and asexual (apomictic) mode of reproduction co-occur. Thus the past research in the section has lead to a much better understanding of the phylogenetic relationships and evolutionary mechanisms in plants, especially in polyploid species complexes. One of these is the *Rumex acetosella* complex where Den Nijs' studies elucidated quite a part of the distributional and evolutionary patterns in West and South-East Europe. However, as usual, there also arose many new questions replacing the old ones.

In recent years, the section has also focused on the study of the localized decline of biotic variation, i.e., the loss of species due to (local) extinction. Large scale destruction and fragmentation of habitats, as well as deterioration of the environment, threaten bio-

diversity. Dr. Oostermeijer's publications on *Gentiana pneumonanthe* forms a clear and comprehensive model study of these effects.

CURRENT RESEARCH PROFILE

At present, the research group Experimental Plant Systematics focuses research on the mechanisms that underlie the origin and maintenance of genetic and morphological variation. This is linked with the application of evolutionary concepts in conservation biology aimed at developing applied strategies in the sustained management of biodiversity. In this, the section focuses on the effects of loss of variation, pursuing two intermingled main lines of research: one studying several genera of the family Compositae, Lactuceae (*Taraxacum*, *Cichorium* and *Microseris*), the other in conservation biology dealing with selected taxa of Dutch rare plants.

In the first line of research in the group, members of the section study the mechanisms of speciation and resulting phylogenetic patterns. This includes: 1) speciation involving adaptive radiation, 2) repeated independent local speciation of allopolyploids, 3) clonal evolution, and 4) allopatric speciation after long-distance dispersal both at the diploid level and after allotetraploid formation. Diploid annuals form convenient material for experimental genetic studies and permit the analysis of genetic control of morphological and physiological characters. QTL maps are made to study the genes involved. Genetic differentiation patterns are analyzed, especially those involved in maintaining ecological relationships, allowing reconstruction of the mode of evolution of isolated (founder/relict) populations. One of the groups studied is *Taraxacum*, where one of the aims is on elucidating the phylogeny. In addition,

the wide spread sexual and apomictic reproduction in this genus, often occurring within a single population, offers an ideal experimental model system for the study of the balance between sexual and asexual reproduction. Methods for clonal identification are worked out, and genetic population structure is studied in both (assumed) fully apomictic and mixed sexual and apomictic situations, respectively.

A second current line of research of the group deals with aspects of conservation biology and concentrates on the demographic and genetic aspects of the extinction of populations (and species). This is especially critical in small and isolated populations resulting from man made changes in the environment. In small populations, several key factors in the reproductive biology such as reproductive success and offspring quality can decline to levels that might cause an irreversible deterioration of the population's (evolutionary) perspectives. In selected examples of rare plants of the Dutch flora, we know that loss of genetic variation and certain crucial parameters of the reproductive biology can be quantitatively characterized. The aims of this metrical approach are to develop predictive models of population perspectives and monitoring strategies for evaluation of conservation management restoration projects. Among the taxa under study are all indigenous *Gentiana* and *Gentianella* species, *Arnica montana*, several species of the genus *Orchis*, and *Juniperus communis*.

THE FUTURE

The aim of the section for the future is to further the development of experimental plant systematics in higher plants using molecular techniques, concerning reticulate as well as

divergent evolution around the species level, and using both comparative and experimental approaches. Application of population genetics and population biology approaches will be explicitly aimed at. One of the focusing topics may be the implementation of insights into reticulate evolution patterns into the phylogeny of study taxa.

With the world-wide biodiversity crisis, the study of the processes of decline of biodiversity is indispensable. The aim is to continue investments in this societal problem by applying molecular analysis and experimental ecology techniques in comparative studies of fitness-characters, including reproductive success in small and large populations of plant species, and populations that are at risk of extinction.

Aspects of the section's current research projects may offer perspectives for the future, for instance, the experience in: speciation involving adaptive radiation, and origin and maintenance of species differences; the evolution of polyploid complexes, including clonal evolution/speciation in apomicts; application of genetic and demographic population structure studies for conservation biology and aspects of biosafety.

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Wageningen

Profile of a Lab for Systematic Research of Crop Plants and their Wild Relatives – the Centre for Plant Breeding and Reproduction Research (CPRO-DLO), Wageningen, the Netherlands.

L. W. D. van Raamsdonk

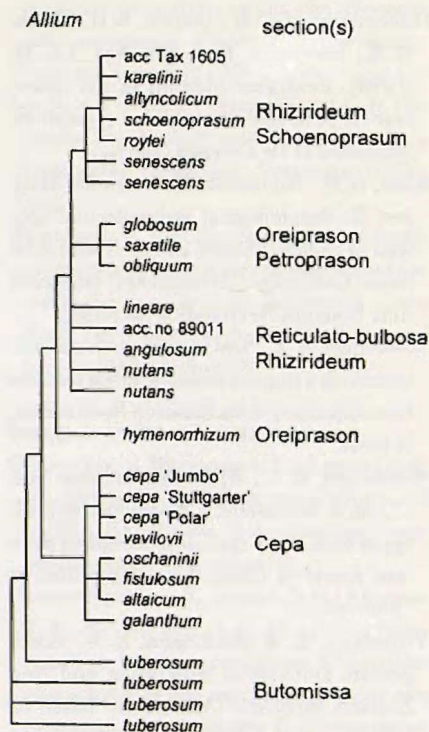
The research of the Centre for Plant Breeding and Reproduction Research (CPRO-DLO), part of the Agricultural Research Organisation (DLO) of the Netherlands, covers the entire range from plant breeding, molecular and cell biology, to seed quality testing and registration of new cultivars for plant breeders rights. The *Allium* group of the Department of Vegetable and Fruit Crops in which I am working, is focused on the development of advanced breeding methods, breeding for resistances and food quality, and on biodiversity. My current research is concerned with the analysis of biodiversity for the exploitation of genetic variation for *Allium* breeding. In this respect information on the systematic position of the crop, diversity screening for a variety of characters and crossability research are of eminent importance.

One of the main objectives of my research is to predict crossability relationships from phylogenetic trees. A single phylogeny is not necessarily related in a linear way to levels of crossability, due to all kinds of evolutionary

mechanisms. On the other hand, it is known that phylogenies of the same set of species but based on different sources of data, such as nuclear vs. chloroplast vs. mitochondrial DNA variation, can vary greatly. These differences can be clarified by the fact that nDNA is of biparental origin and is passed to the next generation after recombination during meiosis, whereas cpDNA and mtDNA are both of uniparental origin, and recombination is not encountered for cpDNA. During the process of introgression a hybrid plant acting as mother will pass the entire cpDNA from only one parent to a next backcross generation, but the share of the remote parent in the nDNA of the backcross hybrid will be 'diluted' from 50% to 25%. In a group of species where introgression took place, which is the interesting feature for conventional plant breeding, one might expect that differences between nDNA and cpDNA phylogenies occur.

The *Allium* species as included in my current study belong to the sections *Cepa*, *Rhizirideum*, *Schoenoprasum*, *Oreiprasum*, *Petroprason*, *Reticulato-bulbosa* and *Butomissa* of *Allium* subgenus *Rhizirideum*. Sequence data was gathered of the *trnL-F* intron of the *trn* gene family in the chloroplast genome. The analysed fragment varied in size among the wild accessions between 304 base pairs in *A. tuberosum* and 339 bp long in the group with *A. globosum*, *A. saxatile* and *A. obliquum*. The group with *A. vavilovii* and the domesticated *A. cepa* possessed a unique duplication of 25 bp long.

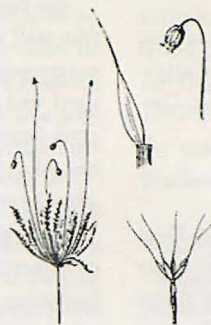
The most parsimonious trees obtained after phylogenetic analysis with PAUP 4.0 (beta-version) have a Consistency Index of 0.929 and a Retention Index of 0.964. The strict consensus tree is presented in the figure.



The species of sections *Rhizirideum* and of *Oreiprasum* are each divided in two different clades. On the other hand, all species of section *Cepa* are placed in one monophyletic clade. It is remarkable to see that *A. oschaninii* is connected with *A. fistulosum* and *A. altaicum* instead of *A. vavilovii* and *A. cepa*. The location of *A. galanthum* at the root of this clade is in agreement with previous considerations (van Raamsdonk et al., 1992, 1997). The position of *A. roylei* is different from the position that this species occupied in the cpDNA tree of Havey (1992) based on RFLP variation. However, in this study only species of section *Cepa* and *A. roylei* were involved. The absence of other species of section *Rhizirideum* can greatly affect the tree position of certain species. The currently pre-



MICROSERIS DOUGLASHII



MICROSERIS CAMPESTRIS



MICROSERIS LACINIATA

sented trees have to be regarded as gene trees since they are only based on one sequenced fragment. At least one additional fragment has to be sequenced in order to validate the current gene tree and to provide a better basis to a chloroplast DNA tree.

Generating the data for the assessment of nDNA variation is currently in progress. The comparison of the nDNA and the cpDNA trees may provide useful information. Further information on this research and related subjects can be found at the CPRO-DLO website at www.cpro.dlo.nl/vfc/allium.

Systematic research embedded in the total research of CPRO-DLO can be utilised directly. Besides the value for fundamental research, the results may have spin off in the fields of biodiversity, risk assessment of transgenic plants, conservation and gene bank collections, and breeding, depending on the crop that is involved.

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Gatersleben

Profile of a Lab: Department of Taxonomy, Institut für Pflanzengenetik und Kulturpflanzenforschung, IPK Gatersleben, Germany.

Konrad Bachmann

The Institute of Plant Genetics and Crop Plant Research is a research institute within the "Research Community Gottfried Wilhelm Leibniz", an association of about 80 German institutes that are financed jointly by the Federal Government and the government of the State in which they are located. The IPK is a direct continuation of an institute for crop plant research founded by Hans Stubbe in 1943 and located in the fertile loess belt north of the Harz mountains that is an ideal area for seed production. Many of the famous German breeding firms are located in the State of Saxe-Anhalt. A unique concept dating from the time of Stubbe is the integration of the National Genebank, the crop resources center, with an institute for state-of-the-art basic and strategic research on crop plants. Another remarkable fact is the inclusion of a Department of Taxonomy together with Departments of Molecular Genetics, Cytogenetics, and Cell Physiology in a research institute. The location of these departments on a large and pleasant campus at the edge of the village of Gatersleben favors cooperation, and it will be difficult to find another department of taxonomy with such easy access to all the expertise needed for modern research in plant biology. A newly initiated Plant Genome Resource Center dealing with the comparative characterization of genomes and gene expression, primarily in barley, serves to bundle and integrate the various departmental specialties.

The Department of Taxonomy has a scientific staff of four permanent and three temporary positions. Additionally, one postdoctoral and three predoctoral positions are grant-funded. Prof. Dr. Konrad Bachmann has taken over as department head in 1996 after the retirement of Dr. Peter Hanelt.

The department has charge of the reference collections for the Genebank, including the herbarium (GAT) of about 300.000 sheets, a voucher collection of 80.000 seed samples and a special collection of ears and seed samples of about 30.000 accessions of wheat, barley, rye, oats and their wild relatives. Together with the Genebank, Taxonomy edits the "World Catalogue of Cultivated Plants", an updated English version of the four-volume "Mansfelds Kulturpflanzen-Verzeichnis" (Dr. Reinhard Fritsch, Dr. Joachim Kruse, Dr. Klaus Pistrick).

The department has several closely integrated research interests:

1. Large-scale taxonomic analysis at the level of species and genera. *Allium*, a genus with few and "difficult" morphological diagnostic characters, has been a model system for a large-scale taxonomy of the genus for about a decade (Dr. Reinhard Fritsch, Dr. Joachim Kruse, Dr. Klaus Pistrick). About 3000 accessions of 300 species of the genus, many of them collected in the wild and from type localities, are cultivated in the living collection so that adequate comparative material is available. Recently, molecular methods have been adapted to deal comparatively with large numbers of accessions (at present about 250) in a phylogenetic analysis of chloroplast (Sven Pollner) and nuclear DNA (Dr. Nikolai Friesen). With these methods, the overall phylogeny of *Allium* is being resolved, and aspects of domestication

are being investigated. For the detailed investigation of *Allium cepa*, microsatellite markers are being developed (Dirk Fischer). The molecular analysis of *Allium* is a pilot project for the up-scaling of molecular marker methods to deal with hundreds of accessions of closely related species (Dr. Frank Blattner). The results of these analyses touch very basic questions of taxonomy at the species level. Many taxonomic problems found in wild populations are greatly exaggerated in cultivated plants and demand practical and theoretical treatment. One of these problems is the ubiquitous occurrence of reticulate evolution by hybridization at the diploid level, which are also investigated with methods of molecular cytogenetics (Dr. Nikolai Friesen).

2. The genetic analysis of taxonomically diagnostic characters by QTL mapping in hybrids combining alternate character states. An example is the analysis of the genes involved in the evolutionary reduction of the number of microsporangia from 4 to 2, which is a synapomorphy of three species in the genus *Microseris* (Compositae) (Oliver Gailing).

3. The use of computer graphic methods for the representation of morphological data in the form of realistic three-dimensional computer models of the phenotypes (Dr. Gerhard Buck-Sorlin). These models help to visualize predictions from multilocus genotypes on the basis of the QTL analysis. The interactions of the genes and alleles detected in the genetic analysis are analyzed in the segregating population and the phenotypes for any genotypes not present in the sample can be predicted and shown in the form of a three-dimensional representation of the plant or of an organ.

With the start of the Genome Resources Center, all three approaches are now adapted

to the analysis of the barley accessions of the Genebank. The publications of members of the Department of Taxonomy in 1996 and 1997 illustrate the results from our work and the extent of cooperation leading to publications:

Adler, K., Kruse, J., Rosso, H., Miséra, S. & Kunze, G. Slow-speed freezing and high-speed freezing – two valuable alternative cryo-methods in ultrastructure research. In: EUREM96 (Ed.), EUREM 96: Proceedings of the 11th European Congress on Electron Microscopy, Dublin 26–30 August 1996 (on CD-ROM). UCD Belfield, Dublin/Ireland (1996) Section B5: ADLER, Dublin 1996.

Bachmann, K. Het herbarium in het tijdperk van computers en DNA. Symposium: Herbarium en biodiversiteit. (21. november 1996). Landbouwwuniversiteit Wageningen, Wageningen (1996).

Bachmann, K. Moleküle und was dann? Zur Zukunft der Systematik. In: Fritsch, R. & Hammer, K. (Eds.), Evolution und Taxonomie von pflanzengenetischen Ressourcen: Festschrift für Peter Hanelt. (Schriften zu Genetischen Ressourcen, 4). IGR/ZADI, Bonn (1996) 98–108.

Bachmann, K. Nuclear DNA markers in plant biosystematic research. *Opera Bot.* 132 (1997) 137–148.

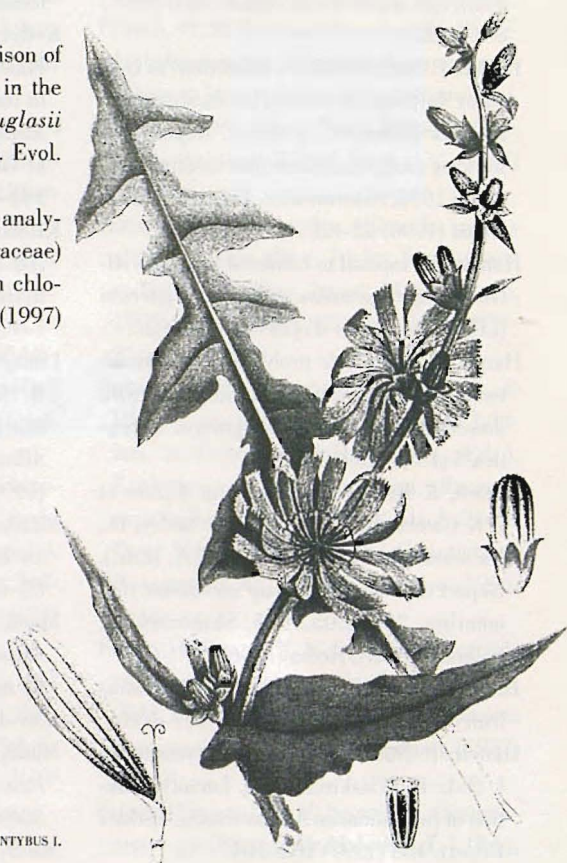
Bachmann, K. The Genebank and genetic resources at the IPK, Gatersleben, Germany. *Plant Varieties and Seeds* 10 (1997).

Bachmann, K. & Hombergen, E.-J. Mapping genes for phenotypic variation in *Microseris* (Lactucaceae) with molecular markers. In: Caligari, P. D.S. & Hind, D.J.N. (Eds.), Proceedings of the international Compositae Conference, Kew 1994. Vol. 2: Biology

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- Friesen, N., Fritsch, R. & Bachmann, K. Hybrid origin of some ornamentals of *Allium* subgenus *Melanocrommyum* verified with GISH and RAPD. *Theor. Appl. Genet.* 95 (1997) 1229–1238.
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- Frizen [Friesen], N. V. Semejstvo Cuscutaceae – povilikovyje. In: Malyshev, L. I. (Ed.),

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CICHORIUM INTYBUS L.



IOPB Chromosome Data 13

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ARACEAE

Arum alpinum Schott & Kotschy emend.
Terp6. 2n=28. Romania: distr. Valcea, Caciulata, s.n.

A. maculatum L. 2n=56. Romania: distr. Hunedoara, Simeria, s.n.; distr. Gorj, Monastery Tismana & Fantana Chihaia s.n.; distr. Caras-Severin, Valea Cerna near Baile Herculane & Toplet, s.n.. Austria: Mureck on the Mur. s.n.

A. orientale Bieb. 2n=28. Romania: distr. Arges, Padurea Cascioarele & near Arges river, 36 km from Bucharest to Pitesti & 60 km from Bucharest to Pitesti & Merisani, s.n.

- **Marija Bedalov**, Department of Botany, Faculty of Science, University of Zagreb, Marulicev trg 20/II, HR-10000 Zagreb, Croatia
- and
- **Iva Hodalova**, Institute of Botany, Academy of Science, Dubravska cesta 14, 84223 Bratislava, Slovakia. Vouchers with authors.

ARACEAE

Arum alpinum Schott & Kotschy emend.
Terp6. 2n=28. Slovakia: Devinska Kobyla: S slope of state reservation Devinska Kobyla; near military base Devinska Kobyla; near hotel Alfonz, all s.n. Slovakia: Malé Karpaty: Pezinska Baba: 1 km from the top; 9 km from the top; Stupava-park; Zelezna Studienka, all s.n. Hungary: between Bezenye and Mosonmagyaróvár; Lajta River, between Level and Mosonmagyaróvár, and Mosonmagyaróvár-park; Mosoni-Duna River, between Mosonmagyaróvár and Halaszi, and between Feketeerdo and Dunakiliti, and between Dunakiliti and Rajka, and near Sopron, and near Nagycenk, all s.n. Austria: between Kittsee and Wolfstahl, s.n.

A. maculatum L. 2n=56. Hungary: between Bezenye and Mosonmagyaróvár, and Mosonmagyaróvár-park, and Mosoni-Duna River, between Mosonmagyaróvár and Hala'szi, all s.n.

A. x sooi Terpó (*A. alpinum* x *A. maculatum*). 2n=42. Hungary: between Bezenye and Mosonmagyaróvár, s.n.

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ARACEAE

Arum cylindraceum Gasparr. 2n=28. Italy: Sicily, Madonie, Portella Colla (of Polizzi), s.n.

A. italicum Mill. subsp. *italicum*. 2n=84. Italy: Sicily, Madonie, Piano Zucchi, s.n.

- **Marija Bedalov**, Department of Botany, Faculty of Science, University of Zagreb, Marulicev trg 20/11, HR-10000 Zagreb, Croatia and • **Andras Terpó**, Institute for Agricultural Advising and Research Organization, University of Agricultural Sciences, Péter K. u. 1, H-2103 Gödöllő, Hungary. Vouchers with authors.

ARACEAE

Arum alpinum Schott & Kotschy emend. Terpó. 2n=28. Hungary: Budapest: Buda-mountains, Remete-valley; Vertes mountains, Tatabánya and Oroszlani; Bakony

mountains, Zirc, all s.n.

A. italicum Mill. subsp. *albispatham* (Steven ex Ledeb.) Prime. 2n=84. Russia: Krasnodar, Sochi, s.n.

A. maculatum L. 2n=56. Hungary: Bakony mountains, Zirc; Halászi, near Mosonmagyaróvár, s.n.

- **Kenton L. Chambers**, **Diantha Green**, **Sandra Potampa**, & **Linda McMahan**. Department of Botany and Plant Pathology, Oregon State University, 2082 Cordley Hall, Corvallis, OR 97331-2902, USA. Collectors' abbreviations: KLC=Kenton L. Chambers, LJD=LaRea J. Dennis. Specimens deposited at OSC.

APIACEAE

Sphenosciadium capitellatum A. Gray. n=11. Oregon, Lane Co., Gold Lake marsh, Cascade Range, 24.07.1963, LJD 2579.

ASTERACEAE

Adenocaulon bicolor Hook. n=23. Oregon, Benton Co., highway 34, 6.4 km SW of Philomath, 17.07.1964, KLC 2253.

Arnica amplexicaulis Nutt. n=19. Oregon, Multnomah Co., Latourelle Falls, Columbia Gorge Scenic Highway, 05.08.1964, KLC 2267.

Artemisia pycnocephala (Less.) DC. n=9. Oregon, Coos Co., highway 101, 6.4 km south of Bandon, 09.07.1964, KLC 2233.

Cirsium peckii L.F. Hend. n=16. Oregon, Harney Co., Steens Mountain, N of Blitzen Gorge, 25.07.1965, KLC 2392.

Crocidium multicaule Hook. n=9. California, Modoc Co., highway 139, 32.2 km S of Tulelake, 04.05.1963, KLC 2018; Oregon, Josephine Co., between O'Brien and Takilma, Illinois River valley, 27.02.1965, KLC 2315.

- Dugaldia hoopesii* (A. Gray) Rydb. n=15. Oregon, Harney Co., Steens Mountain, head of Indian Creek, 25.07.1965, KLC 2377.
- Erigeron compositus* Pursh var. *glabratus* Macoun. n=27. Oregon, Harney Co., Steens Mountain, ridge above Big Indian Gorge, 25.07.1965, KLC 2386.
- Grindelia integrifolia* DC. x *G. nana* Nutt. n=6. Oregon, Benton Co., Oak Creek road, W of Corvallis, 20.09.1963, KLC 2070.
- G. stricta* DC. var. *stricta*. n=12. Oregon, Curry Co., Battle Rock, Port Orford, 10.07.1964, KLC 2234; Lincoln Co., Yaquina Bay salt marsh, 26.09.1963, KLC 2072.
- Helenium bolanderi* A. Gray. n=16. Oregon, Curry Co., 4.3 km N of Rogue River at Gold Beach, 10.07.1964, KLC 2239.
- Lasthenia californica* DC. ex Lindl. n=8. California, Butte Co., highway 32, 15.1 km S of Forest Ranch, 17.05.1952, KLC 411a; Fresno Co., highway 33, 2.9 km S of Coalinga, 13.04.1952, KLC 379a; Monterey Co., 4.7 km N of Jolon on road to King City, 22.04.1954, KLC 475; San Diego Co., Mission Gorge road, 6.9 km NE of the Old Mission, 25.04.1954, KLC 491; San Mateo Co., highway 1, c.3.2 km S of the mouth of Pescadero Creek, 20.06.1956, KLC 1046.
- L. californica* DC. ex Lindl. n=16. California, San Francisco Co., Presidio of San Francisco, 25.05.1954, KLC 506a.
- L. debilis* (Greene ex A. Gray) Ornduff. n=4. California, Kern Co., highway 178, 5 km up Kern River Canyon from the mouth, 25.03.1956, KLC 1008.
- L. fremontii* (Torr. ex A. Gray) Greene. n=6. Solano Co., highway 12, half way between Fairfield and Rio Vista, 25.04.1953, KLC 451a; Solano Co., Subeet junction between Cordelia and Suisun City, 26.04.1953, KLC 335a.
- L. macrantha* (A. Gray) Greene ssp. *macrantha*. n=24. California, San Mateo Co., highway 1, c.3.2 km S of the mouth of Pescadero Creek, 20.06.1956, KLC 1045.
- L. microglossa* (DC.) Greene. n=12. California, Kern Co., highway 178, Temblor Grade, 4.2 km E of the summit, 07.04.1956, KLC 1012.
- L. minor* (DC.) Ornduff. n=4. California, Alameda Co., highway 50, 7.1 km W of Livermore, 20.04.1952, KLC 382a; San Mateo Co., highway 1, mouth of Pescadero Creek, 20.06.1956, KLC 1044; San Mateo Co., highway 1, c.3.2 km S of mouth of Pescadero Creek, 20.06.1956, KLC 1047.
- L. platycarpha* (A. Gray) Greene. n=4. California, Butte Co., highway 99E, 6.3 km N of junction with highway 35 in Chico, 15.03.1961, KLC 1542.
- Luina hypoleuca* Benth. n=30. California, Del Norte Co., highway 199, 8 km above Patrick Creek, 10.07.1964, KLC 2243.
- Senecio fremontii* Torr. & A. Gray. n=20. Oregon, Harney Co., Steens Mountain, head of Indian Creek, 25.07.1965, KLC 2379.

BERBERIDACEAE

- Berberis pumila* Greene. n=c.28. Oregon, Josephine Co., highway 199, 1.1 km S of Rough-and-Ready Creek, 18.03.1967, KLC 2483.

BRASSICACEAE

- Arabis subpinnatifida* S. Watson. n=7. Oregon, Josephine Co., Onion Mountain road, 3.7 km W of highway 199, 17.03.1967, KLC 2479.
- Thlaspi montanum* L. var. *siskiyouense* P.K. Holmgren. n=7. Oregon, Josephine Co., highway 199, 1.1 km S of Rough-and-Ready Creek, 18.03.1967, KLC 2481.

CAROPHYLLACEAE

- Arenaria aculeata* S. Watson. n=11. Oregon,

Harney Co., Steens Mountain, head of Big Indian Creek, 25.07.1965, KLC 2388.

CONVOLVULACEAE

Calystegia soldanella L. n=11. Oregon, Curry Co., mouth of Hubbard Creek, S of Port Orford, 10.07.1964, KLC 2235.

CRASSULACEAE

Sedum lanceolatum Torr. n=8. Oregon, Harney Co., Steens Mountain, head of Indian Creek gorge, 25.07.1965, KLC 2383.

S. oreganum Nutt. n=12. Oregon, Clatsop Co., Saddle Mountain, 22.07.1963, LJD 2561.

DROSERACEAE

Drosera anglica Huds. n=20. Oregon, Clackamas Co., highway 26 at Government Camp bog, Mt. Hood, 05.07.1963, KLC 1999.

D. rotundifolia L. n=10. Oregon, Clackamas Co., highway 26 at Government Camp bog, Mt. Hood, 05.07.1963, KLC 1998; Lane Co., bog on Long Tom Creek, west of Eugene, 17.06.1963, KLC 1986.

ERICACEAE

Chinaphila umbellata (L.) W.P.C. Barton. n=13. Oregon, Lane Co., highway 242, McKenzie Pass near Frog Camp, 22.07.1964, KLC 2254.

FABACEAE

Lupinus lepidus Douglas ex Lindl. var. *lobbii* (A. Gray) C.L. Hitchc. n=24. Oregon, Harney Co., Steens Mountain, head of Big Indian Creek, 25.07.1965, KLC 2387.

Trifolium longipes Nutt. ssp. *hansenii* (Greene) J.M. Gillett. n=24. Oregon, Lane Co., Frog Camp, McKenzie Pass, 22.07.1964, KLC 2258.

GENTIANACEAE

Swertia albicaulis (Griseb.) Kuntze var. *albicaulis*. n=26. California, Modoc Co., highway 139, 39.3 km S of Tulelake, 24.04.1965, KLC 2332.

LAMIACEAE

Agastache parvifolia Eastw. n=9. California, Siskiyou Co., Lava Beds National Monument, 22.09.1965, KLC 2440.

A. urticifolia (Benth.) Kuntze. n=9. California, Modoc Co., Cedar Pass, Warner Mountains, 22.09.1965, KLC 2434; Oregon, Harney Co., Fish Lake, Steens Mountain, 25.07.1965, KLC 2373.

Mentha arvensis L. var. *canadensis* (L.) Kuntze. n=48. Oregon, Benton Co., McFaddens Marsh, 21 km S of Corvallis, 19.07.1963, KLC 2012.

Stachys rigida Nutt. ex Benth. n=32. Oregon, Benton Co., highway 34 at Marys Peak road junction, 02.07.1963, KLC 2053.

LILIACEAE

Leucocrinum montanum Nutt. 2n = c.50. California, Modoc Co., highway 139, 39.3 km S of Tulelake, 26.04.1964, KLC 2086 (see R. Ornduff & M. Cave, Madrono 23:66. 1975).

Xerophyllum tenax (Pursh) Nutt. n=15. Oregon, Linn Co., highway 20, 6.4 km W of Tombstone Pass, 18.06.1964, KLC 2099.

MALVACEAE

Sidalcea nelsoniana Piper. n=10. Oregon, Benton Co., Brook Lane, Corvallis, 19.07.1963, KLC 2016.

ORCHIDACEAE

Platanthera dilatata (Pursh) Lindl. ex Beck. n=21. Oregon, Clackamas Co., highway 26 at Government Camp bog, Mt. Hood, 05.07.1963, KLC 1997.

POLYGONACEAE

Eriogonum nudum Douglas ex Benth. var. *nudum*. n=20. Oregon, Benton Co., Marys Peak, W of Corvallis, 01.07.1964, KLC 2226.

Polygonum newberryi Small. n=10. Oregon, Marion Co., Skyline Trail near Breitenbush

Lake, Mt. Jefferson region, 17.07.1963, KLC 2010.

PORTULACACEAE

Calyptridium umbellatum (Torr.) Greene. n=22. Oregon, Lane Co., Frog Camp, McKenzie Pass, 22.07.1964, KLC 2261.

Claytonia sibirica L. n=12. Oregon, Benton Co., highway 34 at junction with road to Marys Peak, 02.07.1963, KLC 1989.

Lewisia columbiana (T. Howell) B.L. Rob. ssp. *rupicola* (English) Ferris. n=15. Oregon, Clatsop Co., Saddle Mountain, 13.07.1963, LJD 2540.

L. cotyledon (S. Watson) B.L. Rob. n=14. Oregon, Josephine Co., trail from Onion Camp to Babyfoot Lake, 22.09.1964, KLC 2282.

Naiocrene parvifolia (Moc.) Rydb. n=11. Oregon, Benton Co., Marys Peak, W of Corvallis, 01.07.1964, KLC 2227.

PRIMULACEAE

Dodecatheon conjugens Greene. n=22. California, Modoc Co., highway 139, 39.3 km S of Tulelake, 28.04.1964, KLC 2085.

RANUNCULACEAE

Delphinium depauperatum Nutt. n=8. Oregon, Harney Co., Steens Mountain, head of Indian Creek gorge, 25.07.1965, KLC 2374.

D. glareosum Greene. n=8. Oregon, Lane Co., Frog Camp, McKenzie Pass, 22.07.1964, KLC 2257.

D. pavonaceum Ewan. n=8. Oregon, Benton Co., highway 34 at Beaver Creek road, W of Corvallis, 22.05.1965, KLC 2343.

RHAMNACEAE

Ceanothus velutinus Douglas ex Hook. var. *velutinus*. n=12. Oregon, Linn Co., highway 20, 4.3 km W of Tombstone Pass, 18.06.1964, KLC 2220.

ROSACEAE

Luetkea pectinata (Pursh) Kuntze. n=9.

Oregon, Marion Co., Skyline Trail near Breitenbush Lake, Mt. Jefferson region, 17.07.1963, KLC 2008.

Sorbus sitchensis Roemer var. *grayi* (Wenzig) C.L. Hitchc. n=17. Oregon, Marion Co., Skyline Trail near Breitenbush Lake, Mt. Jefferson region, 17.07.1963, KLC 2004.

Spiraea densiflora Nutt. ex Torr. & A. Gray. n=9. Oregon, Clackamas Co., highway 26 at Government Camp bog, Mt. Hood, 05.07.1963, KLC 1995.

S. douglasii Hook. n=18. Oregon, Benton Co., McFaddens Marsh, 21 km S of Corvallis, 19.07.1963, KLC 2011.

RUBIACEAE

Galium oregonum Britton. n=11. Oregon, Benton Co., Marys Peak, W of Corvallis, 01.07.1964, KLC 2225.

SAXIFRAGACEAE

Saxifraga mertensiana Bong. n=18. Oregon, Josephine Co., Illinois River, 11.7 km W of Selma, 22.04.1967, KLC 2488; Wasco Co., highway 84, Mayer State Park, 0.8 km W of Rowena, 08.04.1967, KLC 2487.

Tolmiea menziesii (Pursh) Torr. & A. Gray. n=7. Oregon, Benton Co., Marys Peak, W of Corvallis, 02.07.1963, KLC 1991.

SCROPHULARIACEAE

Castilleja hispida Benth. n=12. Oregon, Benton Co., Marys Peak, W of Corvallis, 02.07.1963, KLC 1993.

C. miniata Douglas ex Hook. n=12. Oregon, Clackamas Co., highway 26 at Government Camp bog, Mt. Hood, 05.07.1963, KLC 1994.

C. parviflora Bong. var. *oreopola* (Greenm.) Ownbey. n=12. Oregon, Marion Co., Skyline Trail near Breitenbush Lake, Mt. Jefferson region, 17.07.1963, KLC 2005.

Penstemon cardwellii T. Howell. n=8. Oregon, Linn Co., highway 20, 5.8 km W of

- Tombstone Pass, 18.06.1964, KLC 2219.
- P. davidsonii* Greene ssp. *davidsonii*. n=8. Oregon, Marion Co., Skyline Trail near Breitenbush Lake, Mt. Jefferson region, 17.07.1963, KLC 2009.
- P. peckii* Pennell. n=16. Oregon, Jefferson Co., Metolius Meadows, Camp Sherman. 09.08.1980, KLC 4701.
- Synthyris missurica* (Raf.) Pennell ssp. *stellata* (Pennell) Kartesz & Gandhi. n=12. Oregon, Multnomah Co., John Yeon State Park, Columbia River Gorge, 17.03.1964. KLC 2075.
- Veronica americana* (Raf.) Schwein. n=18. Oregon, Benton Co., Marys Peak, W of Corvallis, 02.07.1963. KLC 1992; Clackamas Co., highway 26 at Government Camp bog, Mt. Hood, 05.07.1963, KLC 1996.
- V. scutellata* L. n=9. Oregon. Benton Co., McFaddens Marsh. 21 km S of Corvallis, 19.07.1963, KLC 2013.
- V. serpyllifolia* L. var. *humifusa* (Dickson) Vahl. n=7. Oregon, Clatsop Co., Saddle Mountain, 22.07.1963. LJD 2563; Marion Co., Skyline Trail near Breitenbush Lake, Mt. Jefferson region, 17.07.1963, KLC 2002.

- **V. Irudayaraj**, Environmental Resources Research Centre, Peroorkada, Pomalliyoor-konam, Thiruvananthapuram, India 695 005. Vouchers in ERRC or XCH. All localities in the Western Ghats of South India.

ADIANTACEAE

- Adiantum lunulatum* Burm. n=60. Kallar (Kerala) (ERRC 4111, 4120); Nilgiris, Nadugani (ERRC 4192).
- A. raddianum* C. Presl. n=57. Nilgiris, Kodhumudi (ERRC 4146); Kothagiri (ERRC 4214). n=114. Nilgiris, Nadugani (ERRC

4198); Palni Hills, Pannaikadu (XCH 3625).

ASPLENIACEAE

Asplenium varians Wall. ex. Hook. & Grev. n=36. Nilgiris. Sholur (ERRC 4177)

ATHYRIACEAE

Diplazium polypodioides Bl. n=41. Nilgiris, Nadugani (ERRC 4205).

D. esculentum (Retz.) Sw. n=41. Nilgiris, Nadugani (ERRC 4203).

DRYOPTERIDACEAE

Hypodematium crenatum (Forssk.) Kohn. n=82. Palni Hills, Pannaikadu (XCH 3621).

Lastreopsis tenera (R. Br.) Tindale. n=41. Palni Hills, Manalur Road (XCH 3635).

HEMIONITIDACEAE

Parahemionitis arifolia (Burm.) Panigr. n=90 (3x apogamous). Nilgiris, Sholur (ERRC 4160).

HYMENOPHYLLACEAE

Trichomanes schmidianum Zenker ex Taschn. n=72. Nilgiris. Sholur (ERRC 4254).

LINDSAEACEAE

Lindsaea ensifolia Sw. n=87. Nilgiris, Nadugani (ERRC 4187).

OLEANDRACEAE

Nephrolepis multiflora (Roxb.) Jarrett. n=41. Nilgiris, Nadugani (ERRC 4188).

POLYPODIACEAE

Microsorium membranaceum (D. Don) Ching. n=72. Nilgiris, Nadugani (ERRC 4207).

PTERIDACEAE

Pteris confusa T.G. Walker. n=58 (2x apogamous). Kallar (Kerala) (ERRC 4143); Nilgiris, Sholur (ERRC 4168, 4171). n=58 (2x apogamous). Palni Hills, Periakulam Path (XCH 3641); Tirunelveli Hills, Kothayar (XCH 3585).

THELYPTERIDACEAE

Trigonospora caudipinna (Ching) Sledge. n=36. Nilgiris, Nadugani-Gene Pool Forest (XCH 1589); Kallar (Kerala) (ERRC 4136);

Tirunelveli Hills, Kothayar (XCH 3604).
Pronephrium articulatum (Houlst. & Moore)
Holttum. n=36. Niligiris, Nadugani (ERRC
4204).
Amphineuron terminans (Hook.) Holttum.
n=72. Tirunelveli Hills, Kothayar (XCH
3577).
Christella parasitica (L.) H. Lévl. n=36. Palni
Hills, Manalur Road (XCH 3637).

• **M. G. Pimenov, T. V. Alexeeva, G. M. Artem'eva & E. V. Kljuykov**, Department of Plant Systematics and Geography, Botanical Garden, Moscow State University, Moscow 119899, Russia. E-mail: pimenov@2.bot-gard.bio.msu.ru. Vouchers in MW. Authors abbreviated to MP and EK.

APIACEAE

Bupleurum exaltatum Bieb. 2n=12. Kirghizia, Naryn prov., basin of Alabuga R., N slope of Fergana Mts. Shordebek pass, 2500 m. 41° 04'N, 74° 12'. 06.08.1995. MP & EK, K95-183.
B. petiolulatum Franch. n=6. China, prov. Yunnan, Lijiang, 2300 m. 27° 03'N, 100° 12'E. 28.07.1996. MP & EK, C96-11; China, prov. Yunnan, Lijiang Hsien, village of Shi-shi, Shi-lo-ko Mts, 2600 m. 27° 00'N, 100° 13'E. MP & EK, C96-59.
B. krylovianum Schischk. ex Kryl. n=6. Kirghizia, Kirghyz Alatau Mts, N slope, basin of Shamsi R., R. Tujuk. 42° 32'N, 75° 27'E. 01.08.1995. MP & EK, K95-17.
B. thianschanicum Freyn. n=6. Kirghizia, Dzhahalabad prov., Toguz-toroo distr., S slope of Moldotoo Mts, Karagor pass, 2700 m. 46° 32'N, 74° 41'E. 13.08.1995. MP & EK, K95-357.
Ferula czatkalensis Pimenov. n=11. Kirghizia, Dzhahalabad prov., N slope of Fergana Mts,

valley of Bekechal R. between Karakul and Tashkumyr, 700-800 m. 41° 32'N, 72° 29'E. 11.06.1996. MP & EK, K96-125.

F. ferganensis Lipsky ex Korovin. 2n=22. Kirghizia, Dzhahalabad prov., Toguztoroo distr., Kokirimtoo Mts, R. Kokcha, Mt. Atdjailau, S slope, 2000 m. 41° 28'N, 73° 53'E. 10.08.1995. MP & EK, K95-309.

F. rubroarenosa Korovin. n=11. Kirghizia, Dzhahalabad prov., red clay slopes W of Tashkumyr on the route to Ksyt-Dzhar, 500 m. 41° 19'N, 72° 06'E. 12.06.1996. MP & EK, K96-148.

F. tenuisecta Korovin. n=11. Kirghizia, Dzhahalabad prov., Chatkal Mts, Chapchama pass, 2800 m. 41° 32'N, 70° 48'E. 15.06.1996. MP & EK, K96-198.

F. transiliensis (Herd.) Pimenov. 2n=22. Kirghizia, Dzhahalabad prov., Toguztoroo distr., S slope of Moldotoo Mts, R. Kichine-Kin-dyk, 2400 m. 41° 34'N, 74° 38'E. 12.08.1995. MP & EK, s.n.

F. tschimganica Lipsky ex Korovin. n=11. Kirghizia, Dzhahalabad prov., valley of Chatkal R. opposite of mouth of Ters, 1400 m. 41° 32'N, 70° 44'E. 17.06.1996. MP & EK, K96-242.

Galagania ferganensis (Korovin) M. Vassilieva et Pimenov. 2n=22. Kirghizia, Dzhahalabad prov., Toguztoroo distr., valley of Naryn R., near the mouth of R. Kugart, 1400 m. 41° 12'N, 73° 56'E. 09.08.1995. MP & EK, s.n.

Hyalolaena intermedia Pimenov et Kljuykov. n=11. Kirghizia, Dzhahalabad prov., N slope of Fergana Mts, valley of Bekechal R. between Karakul and Tashkumyr, 700-800 m. 41° 32'N, 72° 29'E. 11.06.1996. MP & EK, K96-123.

Ligusticopsis integrifolia (H. Wolff) Leute. n=11. China, prov. Yunnan, Lijiang Hsien, village of Shi-shi, Shi-lo-ko Mts, 2600 m.

- 27° 00'N, 100° 13'E. 30.07.1996. MP & EK, C96-47 & 61.
- Ligusticum angelicifolium* Franch. n=11. China, prov. Yunnan, Lijiang Hsien, village of Shi-shi, Shi-lo-ko Mts, 2600 m. 27° 00'N, 100° 13'E. 30.07.1996. MP & EK, C96-52.
- Oenanthe linearis* Wall. ex DC. n=11. China, prov. Yunnan, Lijiang, 2300 m. 27° 03'N, 100° 12'E. 28.07.1996. MP & EK, C96-3.
- Physospermopsis delavayi* (Franch.) H. Wolff. n=9. China, prov. Yunnan, Lijiang, 2300 m. 27° 03'N, 100° 12'E. 28.07.1996. MP & EK, C96-14.
- Pimpinella rockii* H. Wolff. n=9. China, prov. Yunnan, Lijiang, 2300 m. 27° 03'N, 100° 12'E. 28.07.1996. MP & EK, C96-9.
- Pleurospermum linearilobum* W.W. Smith. n=11. China, prov. Yunnan, Lijiang Hsien, village of Shi-shi, Shi-lo-ko Mts, 2600 m. 27° 00'N, 100° 13'E. 30.07.1996. MP & EK, C96-44.
- Prangos pabularia* Lindl. 2n=22. Kirghyzia, Naryn prov., basin of Alabuga R., near Koshtobe, R. Manakeldy, 2300 m. 41° 07'N, 74° 10'E. 07.08.1995. MP & EK, K95-241.
- Schrenkia ugamica* Korovin. n=11. Kirghyzia, Dzhahalalabad prov., valley of Chatkal R., right bank below Aktash, limestone, 1400 m. 41° 42'N, 70° 42'E. 16.06.1996. MP & EK, K96-236.
- Selinum cryptotaenium* H. Boissieu. n=11. China, prov. Yunnan, Lijiang Hsien, Yulong Yueshan Mt., NE slope, 2900 m. 27° 08'N, 100° 13'E. 28.07.1996. MP & EK, C96-7.
- Seseli korshinskyi* (Schischk.) Pimenov. n=11. Kirghyzia, Dzhahalalabad prov., Toguztoroo distr., valley of Naryn R., right bank, Mt. Karagain-Chokusy, 1400 m. 41° 24'N, 74° 12'E. 11.08.1995. MP & EK, K95-326.
- S. luteolum* Pimenov. 2n=22. Kirghyzia, Naryn prov., basin of Alabuga R., near Koshtobe, R. Manakeldy, 2300 m. 41° 07'N, 74° 10'E. MP & EK, K95-243.
- S. mucronatum* (Schrenk) Pimenov et Sdobnina. n=11. Kirghyzia, Naryn prov., Baibichetau Mts, Beuraylju, 2700 m. 41° 06'N, 75° 02'E. 04.08.1955. MP & EK, K95-163.
- S. schrenkianum* (C.A. Mey. ex Schischk.) Pimenov et Sdobnina. n=11. Kirghyzia, Naryn prov., basin of Alabuga R., N slope of Fergana Mts, Shordebek pass, 2500 m. 41° 00'N, 74° 08'E. 07.08.1995. MP & EK, K95-189.
- S. yunnanense* Franch. n=11. China, prov. Yunnan, Lijiang, 2300 m. 27° 03'N, 100° 12'E. 28.07.1996. MP & EK, C96-15.
- Sinodielsia yunnanensis* H. Wolff. n=11. China, prov. Yunnan, Lijiang, 2300 m. 27° 03'N, 100° 12'E. 28.07.1996. MP & EK, C96-12.
- Sium medium* Fisch. et C.A. Mey. n=6. Kirghyzia, Kirghyz Alatau Mts, E extremity, basin of Chu R., R. Tjundjum, 1650 m. 42° 27'N, 75° 42'E. 02.08.1995. MP & EK, K95-69.
- Trachyspermum scaberulum* (Franch.) H. Wolff ex Hand.-Mazz. n=9. China, prov. Yunnan, Lijiang Hsien, village of Yu-shi, 2400 m. 27° 00'N, 100° 12'E. 20.07.1996. MP & EK, C96-55.



News from Plant Molecular Biosystematists

5

edited by Dan Crawford
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Please send contributions to Professor Dan Crawford at the above address, stating whether you are an IOPB member. Thank you.

A note from the editor of "News from Molecular Bio-systematists"

In the past, this part of the newsletter has consisted only of news from molecular laboratories, all of which were solicited by me (only because I received no unsolicited news). I would be pleased if you would send news from your laboratories, and I encourage you to send contributions to me. Also, I would like to expand this section to include additional features and to encourage each of you to contribute whatever you feel appropriate. For example, I encourage you to express your views about any issues involving the use of molecular data in plant systematics. Your comments will not be edited or censored just because I might disagree with them or they

are not generally-held ideas. Also, if you would like to provide a review of a recent book or other publication, feel free to send it to me. Lastly, if you have need of plant material for your research, send your needs to me. I realize that with e-mail, etc., this would be a rather slow process, but it may be that the newsletter will reach someone who can supply the material but would not see your needs via an electronic medium.

News from

Department of Higher Plant Systematics and Evolution of the University of Vienna, Austria

The Department of Higher Plant Systematics and Evolution of the Institute of Botany at the University of Vienna consists of the Head, o.-Univ. Prof. Dr. Tod F. Stuessy, Associate Professors Dr. Manfred Fischer and Dr. Christian Puff, Assistant Professors Dr. Josef Greimler, Dr. Christiane Konig, and Dr. Rosabelle Samuel, and Emer. o.-Univ. Prof. Dr. Friedrich Ehrendorfer. Postdoctoral research associates include Dr. Elvira Horandl, Dr. Maria Lambrou, Dr. Veronica Meyer, Dr. Erika Svoma and Dr. Ursula Thanheiser. Also associated with the Department are Dr. Walter Till, Curator of the Herbarium and Dr. Michael Kiehn, Curator of the Botanical Garden. Diplom and Ph. D. Students working on these include: Christoph Dobes, Thorsten English, Rainer Heimo, Gerhard Jakobovsky, Karin Tremetsberger, Andreas Tribsch, and Johannes Walter.

Research interests of the Department cover all aspects of fundamental and modern plant systematics. The 1.3 million sheet herbarium of the Institute (plus 3.7 million specimens in the nearby Naturhistorisches Museum) provide ample materials for initiating research

projects of all types. The botanical library resources of the University and within the city of Vienna are outstanding. Institute facilities that are used in support of plant systematic research involve the EM laboratory, the Botanical Garden (nearly 250 years old), and other laboratories dedicated to comparative plant studies, such as cytology, genetics, vegetation science, cryptogams, and phytochemistry. Studies are active in the Department dealing with morphology, anatomy, embryology, palynology, ethnobotany, morphometrics, cladistics, revisionary systematics, floristics, biogeography and molecular systematics.

Plant molecular systematic studies have been underway within the Department for the past seven years, but new steps include establishing a separate lab for DNA work (apart from the isozyme lab), the hiring of a lab technician, and purchase of an automatic DNA sequencer (ABI 377) plus other needed lab equipment.

The information below gives some idea of previously published molecular studies, plus research projects currently on-going.

1. Isozyme electrophoresis

PREVIOUSLY PUBLISHED WORK

- a. Samuel, R., Pinsker, W. & Ehrendorfer, F. 1990. Allozyme polymorphism in diploid and polyploid populations of *Galium* (Rubiaceae). *Heredity* 65: 369–378.
- b. Samuel, R., Pinsker, W., Balasubramaniam, S. & Morawetz, W. 1991. Allozyme diversity and systematics in Annonaceae—a pilot project. *Pl. Syst. Evol.* 178: 125–134.
- c. Ehrendorfer, F., Samuel, R. & Pinsker, W. 1995. Enzyme analysis of genetic variation and relationships in diploid and polyploid

taxa of *Galium* (Rubiaceae). *Pl. Syst. Evol.* 202: 121–135.

- d. Samuel, R., Pinsker, W. & Ehrendorfer, F. 1995. Electrophoretic analysis of genetic variation within and between populations of *Quercus cerris*, *Q. pubescens*, *Q. petraea* and *Q. robur* (Fagaceae) from eastern Austria. *Bot. Acta* 108: 290–299.

ONGOING RESEARCH PROGRAMS

- a. Evolution and systematics within the apomictic *Ranunculus auricomus* complex (Ranunculaceae): analysis of isozyme variation, morphology and distribution patterns. Dr. E. Horandl.
- b. Relationships within and between populations of *Biscutella* species (Cruciferae). Dr. C. König.
- c. Biosystematic studies (isozyme and morphometric analysis) in the *Erophila verna* group (Brassicaceae). Mr. T. English and Dr. R. Samuel.
- d. Evolution of stenochores and the role of ancient gene flow as exemplified by *Dianthus plumarius* agg. and *Gentianella germanica* agg. Dr. M. Fischer and Dr. J. Greimler.

2. DNA

WORK IN PRESS

- a. Samuel, R., Bachmair, A. Jobst, J. & Ehrendorfer, F. 1997. ITS sequences from the nuclear rDNA suggest unexpected phylogenetic relationships between Euro-Mediterranean, E. Asiatic and N. American taxa of *Quercus* (Fagaceae). *Pl. Syst. Evol.* (in press).
- b. Samuel, R., Pinsker, W. & Kiem, M. 1997. Phylogeny of some species of *Cyrtandra* (Gesneriaceae) inferred from the atpB/rbcL cpDNA intergene region. *Bot. Acta* (in press).

ONGOING RESEARCH PROGRAMS

- a. Continuation of the intergenic spacer sequences (atpB/rbcL) for tribes *Cyrtandreae* and *Didymocarpeae* (Gesneriaceae). Dr. R. Samuel and Dr. M. Kiehn.
- b. Chloroplast DNA sequences of trnL (UAA)-trnF (GAA) spacer and trnL intron for *Quercus* species (Fagaceae). Dr. R. Samuel and Prof. F. Ehrendorfer.
- c. World-wide monograph of *Hypochaeris* (Compositae) including nuclear ITS and chloroplast trnL spacer regions. Prof. T. Stuessy, Dr. R. Samuel, Dr. M. Lambrou and Dr. C. König.
- d. Nuclear ITS and intergenic spacer (atpB/rbcL) sequences for reconstructing phylogeny of Bromeliaceae, subfamily Tillandsioideae. Dr. W. Till, Dr. R. Samuel, Prof. T. Stuessy.
- e. Infrageneric and intergeneric relationships in tribe Clauseneae (Rutaceae) using nuclear (ITS) and chloroplast (intergenic spacer atpB/rbcL) markers. Dr. R. Samuel, Prof. H. Greger, Prof. E. Ehrendorfer.
- f. Chloroplast intergenic spacer sequences (atpB/rbcL) to determine phylogenetic relationships in Dipsacaceae. Dr. V. Mayer and Prof. E. Ehrendorfer.

Meetings – Past & Future

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Amsterdam,
August 10–15, 1998

VII International IOPB Symposium
“Plant Evolution in Man-made Habitats”
Universiteit van Amsterdam, The Netherlands

ORGANIZING COMMITTEE

Konrad Bachmann, Chairman, IOPB President-Elect, Universiteit van Amsterdam & Institut für Pflanzengenetik u. Kulturpflanzenforschung, IPK, Gatersleben

Hans C. M. den Nijs, Secretary General, Co-Editor Proceedings, Institute for Systematics & Population Biology, Universiteit van Amsterdam

Ruud van der Meijden, Scientific excursions Research Institute Rijksherbarium/Hortus Botanicus, Leiden University

Leo W. D. van Raamsdonk, Corresponding Editor Proceedings, Centre for Plant Breeding & Reproduction Research, CPRO-DLO, Wageningen

Ms. Jody dos Santos &

Ms. Ada Hoogendorp

Secretariat, Universiteit van Amsterdam

Guido van Reenen, IT manager, Universiteit van Amsterdam

Ms. Nelleke Werker, Abstract & Proceedings Handling, Research Institute Rijksherbarium/Hortus Botanicus, Leiden University

Conference Office

Practical Advise and Registration

Universiteit van Amsterdam

The Organizing Committee of the VIIth IOPB Symposium invites all members to attend the Amsterdam Meeting

Dear Colleagues,

We are looking forward to welcome you at our Seventh International Symposium. As announced before, the conference will be held from August 10-15, 1998 at the Universiteit van Amsterdam. It is being organized by a committee formed from the major plant biodiversity research groups in The Netherlands, the departments of Evolutionary Botany (Institute for Systematics & Population Biology, Universiteit van Amsterdam), the Research Institute Rijksherbarium/Hortus Botanicus (National herbarium & botanical garden; Leiden University), and the Centre for Plant Breeding and Reproduction Research (CPRO-DLO Ministry of Agriculture, Nature Management & Fisheries, Wageningen).

The co-operation between our institutes, enables us to focus this symposium on a very timely and globally relevant topic, "Plant Evolution in Man-made Habitats". We shall examine the evolutionary adaptation of plants to a man-made environment either as crops under artificial selection or as opportunists able to thrive under new conditions. We aim to bring together colleagues from a wide spectrum of disciplines from basic and applied research on wild and cultivated plants. This is reflected by the themes around which the invited lectures have been organized in a series of half-day symposia.

We will deal with the effects of invasive species upon the natural ecosystems and their evolutionary units, of which we increasingly realize their crucial future function as genetic resources. We also will identify the genetical

and reproductive systems that enable these species to be invasive. On the other hand, there will be series of lectures presenting the cutting edge of progress in the field of domestication, and of mapping of traits, that ultimately will give us the clue to their genetic structure. Last but not least, there will be the topic of crop-wild complexes, where attention will particularly focus on introgression and risk assessment of release of genetically modified crop races.

Elsewhere in this issue you will find the program as it stands now (end March). It is evident that a series of important invited speakers will set out the main line through the topics of the half-day symposia. At present many abstracts of offered contributed papers and posters are coming in. The response to the first circular showed a broad interest among colleagues from basic research institutes and plant breeders as well. There were intentions for joining the meeting from over 250 persons from more than 50 countries. Should you not have registered yet, there is still time to do so. We look forward to meeting you in Amsterdam.

Hans den Nijs

On behalf of the Organizing Committee 7th IOPB International Symposium

Preliminary Program

PLANT EVOLUTION IN MAN-MADE HABITATS

The meeting is meant to cover the evolution of plants in all sorts of habitats influenced by mankind, from marginally disturbed to completely anthropogeneous habitats like those in advanced agricultural areas. The symposium is organized around the specific themes listed below, and the titles of the invited lectures illustrate the questions to be discussed.

Contributed papers and posters dealing with subjects related to one of these themes may be submitted. According to IOPB symposium tradition, we intend to schedule all sessions fully plenary.

MONDAY, 10 AUG.

AFTERNOON

16.00–18.00 hours

Registration at the Auditorium of the Universiteit van Amsterdam

18.30–19.30 hours

Official welcome reception at the Amsterdam Historical Museum

TUESDAY, 11 AUG.

MORNING SESSION

08.30 hours

General Plenary Lecture

- **Bengt Jonsell**, President IOPB
(Bergius Botanical Garden, Stockholm, Sweden):
Opening Address

Symposium 1: EVOLUTION IN DISTURBED HABITATS

Chairman: **Herbert Hurka**

University of Osnabrück, Germany

- **Barbara Neuffer**
University of Osnabrück, Germany
“*Capsella bursa-pastoris*: world-wide distribution and adaptation”

- **Krystyna Urbanska**

ETH Zürich, Switzerland

“Man-influenced hybrid speciation in *Cardamine* at Urnerboden (Switzerland)”

- **W. H. O. Ernst**

Free University Amsterdam, The Netherlands

“Evolution on soils polluted by heavy metal”

Contributed papers: to be selected

AFTERNOON SESSION

Symposium 2: EVOLUTION OF CROPS. DOMESTICATION: SIMULATING EVOLUTION

Chairman: **Paul Gepts**

University of California, Davis, CA, USA

- **Paul Gepts**

“Domestication in *Phaseolus*”

- **Ludmilla Khrustaleva**

CPRO-DLO, The Netherlands/Moscow State University, Russia

“Introgression of *Allium fistulosum* in onion: molecular cytogenetic evidence”

- **Jonathan F Wendel**

Iowa State University, Ames Iowa, USA

“Reconstructing the evolution of cotton”

Contributed papers: to be selected

EVENING

Optional:

Free guided tour through the historical Hortus Botanicus, the famous botanical garden of Amsterdam. In this garden Hugo de Vries, one of the founding fathers of plant biosystematics, cultivated and studied his collections of *Oenothera*. Hugo de Vries was highly influential in developing biology in the beginning of the century, he was one of the rediscoverers of Mendel's laws and the proponent of his famous “Mutationstheorie”. The Hortus Botanicus and the Faculty of Biology will cel-

celebrate Hugo de Vries' 150th birthday anniversary in 1998. Part of his experimental garden will be reconstructed and several expositions will illustrate his work. During the visit to the Hortus Botanicus these experimental grounds will be visited.

WEDNESDAY, 12 AUG. MORNING SESSION

08.30 hours

Symposium 3: EVOLUTION OF CROPS. MAPPING OF SPECIAL TRAITS

Chairman: **Andreas Boerner**

IPK Gatersleben, Germany

• **John Doebley**

University of Wisconsin, Madison WI, USA

"Evolution of Maize"

• **Andreas Boerner**

"Mapping in Triticeae"

• **Renate Schmidt**

Max-Delbrück-Laboratorium Köln, Germany

"Comparative Mapping in Brassicaceae"

Contributed papers: to be selected

AFTERNOON SESSIONS

Poster session 1

Symposium 4: EVOLUTION OF INVASIVE PLANT SPECIES: ADAPTATION AND LIFE CYCLES

Chairman: **Joachim Kadereit**

University of Mainz, Germany

• **Suzanne I. Warwick**

Biosystematics Research Centre, Ottawa, Canada

"Invasive plant species: a perspective"

• **Shoichi Kawano**

University of Kyoto, Japan

"Life history traits in naturalized populations of *Arabidopsis thaliana* in Japan"

• **Joachim Kadereit**

"The evolution of invasive species in *Senecio*"

Contributed papers: to be selected

EVENING

Optional:

Hortus Botanicus tour, as on Tuesday

THURSDAY, 13 AUG.

ALL DAY

Scientific excursions

There will be a choice from four alternative options. Excursions include lunch & beverages; arrival back in Amsterdam approximately 18.00 hours.

1. Calcareous dunes with ecological restoration projects (Castricum, Province of North Holland).
2. Non-calcareous dunes and inland salt-marshes (Schoorl, Province of North Holland).
3. River valley system, including forelands, under ecological restoration and revegetation ("Blauwe Kamer" near Wageningen, Province of Utrecht).
4. Guided visit to the laboratories and grounds of the CPRO-DLO, the Dutch research institute for plant breeding and plant reproduction. A visit to the gene bank (Centre for Genetic Resources, The Netherlands, CGN) is included.

FRIDAY, 14 AUG.

MORNING SESSION

08.30 hours

Symposium 5: EVOLUTION OF CROP-WILD RELATIVE COMPLEXES

Chairman: **Klaus Ammann**

Botanical Garden Berne, Switzerland

- **Klaus Ammann & Pia Rufener Al Mazyad**
"The *Medicago falcata/sativa* complex, crop-wild relative introgression in Switzerland"

• **Henk van Dijk**

Université de Lille 1, Villeneuve d'Ascq, France
"European *Beta*: crops and wild relatives"

Contributed papers: to be selected

LUNCH

IOPB General Assemblée Business Lunch meeting

AFTERNOON SESSIONS

Poster session 2

Symposium 6: EVOLUTION OF INVASIVE PLANT SPECIES - APOMIXIS: CLONAL VS. SEXUAL SPECIATION

Chairman: **Christopher S. Campbell**

University of Maine, Orono ME, USA

• **Christopher S. Campbell**

"Hybridization and the evolution of agamic complexes"

• **Michael D. Hayward**

IGER, Aberystwyth

"The Genetics of Apomixis"

Contributed papers: to be selected

EVENING

19.30 hours

Conference dinner at the village of Volendam

SATURDAY, 15 AUG. MORNING SESSION

08.30 hours

Symposium 6 (continued)

• **Randall J. Bayer**

CSIRO, Canberra, Australia

"Polyploidy and the evolution of agamic complexes"

• **Timothy Dickinson**

Royal Ontario Museum, Toronto, Canada

"Species concepts in agamic complexes"

• **Ron van der Hulst & Hans C. M. den Nijs**

University of Amsterdam, The Netherlands

"Evolution of agamic complexes in European *Taraxacum* (Asteraceae)"

Contributed papers: to be selected

Closing Session

SATURDAY, AUG. 15 AFTERNOON

- WEDNESDAY, AUG. 19 EARLY AFTERNOON

A four-days Post-symposium Excursion from Saturday 15 - Wednesday 19 August will visit a series of dune habitats along the Dutch coast, nearly all in nature reserves. The dune area comprises the most species rich nature reserves in The Netherlands. In these wind blown sand deposits, plant species from the Atlantic region meet species from the Mediterranean and from the Boreal regions in Europe. The excursion will include visits to ecological rehabilitation programmes set up in regionally deteriorated parts of the dune ecosystem on different substrata.

PROCEEDINGS

Proceedings of the symposium will be published by the Research Institute Rijksherbarium/Hortus Botanicus, Leiden University, comprising fully elaborated versions of the opening address and all invited lectures. Publication date will be 1999.

Delegates and non-attending members of IOPB can subscribe to the proceedings. The price of the book will be DFL 70.-. Symposium attendants can order by filling in the relevant form.

Those who are IOPB members, but will for some reason not attend the meeting, can order directly from Hans den Nijs. Due to bank

handling costs, the price will then be DFL 90.-. Send your order to Hans den Nijs as soon as possible, you will get payment instructions as a confirmation of your order.

This offer only is valid to August 15, later orders will show a substantially higher price.

WEBSITE

All information concerning the symposium is also available at Internet <http://www.bio.uva.nl/conferences/iopb98.htm>. This information will be updated regularly.

INFORMATION ABOUT THE SYMPOSIUM

Correspondence concerning all matters of the symposium should be addressed to:

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E-mail NIJS@bio.uva.nl



PUCCINELLA MARITIMA

Other meetings

Oslo, Norway

Panarctic Flora Project Gains New Support.
Oslo, 28 September – 2 October 1998.

Earlier in these pages Murray and Yurtsev (1990) proposed establishing Panarctic Flora Project as interest in the study of biodiversity was rapidly growing and as new opportunities appeared for joint work between the USA and Russia. The National Science Foundation (USA) and the Academy of Sciences (Russia) funded workshops in Moscow (1991) and St. Petersburg (1992) at which agreements were reached on how to proceed. Early emphasis was on developing electronic databases based on specimen data from ALA and LE, especially the latter which is renowned for its very rich collections of arctic plants. A checklist of arctic plants was high on our list of priorities for which Russia has taken the lead. Additionally, we sought to establish a list of rare arctic plants and to develop a synthesis of the major zonation for the arctic flora.

As it turned out, these same interests of the Panarctic Flora were met through our participation, with others, in the Conservation of Arctic Flora and Fauna (CAFF) inventory of rare plants and in the Circumpolar Arctic Vegetation Map project (CAVM) for which establishing the major zonation is a major component. Ancillary activities consisted of field work on the Seward Peninsula, Alaska, in 1992 and 1993 by a US-Russia team of botanists involving the Komarov Botanical Institute, Colorado College, and the University of Alaska Museum. As reported in these pages, Bente Eriksen spent a post-doctoral year at Fairbanks to begin her work on the arctic-alpine potentillae, motivated in part by her desire to provide a systematic

treatment of the genus for the Panarctic Flora.

We knew from the outset that the bilateral beginnings, US and Russia, were just that – a beginning, for, clearly, a full, panarctic view of the flora is impossible without participation from the Nordic countries. Happily, important connections with Nordic colleagues were established during the 1995 IOPB meeting in Tromsø (“Variation and evolution in Arctic Alpine plants”). Discussions there inspired a small, informal “Arctic-Alpine Workshop” at the University of Oslo in October 1996, with Murray and Scandinavian botanists and their M.Sc. and Ph.D. students. Evident from the activity at Oslo was not only the capacity to contribute to the project, but also the ability to lead it. Hence Murray asked Inger Nordal and her colleagues to become one of the centers of Panarctic Flora activity.

The Panarctic Flora project needs both circumpolar participation and considerable funding. As a first step the Norwegian team decided to compete for “A year” at the Norwegian Center for Advanced Study (CAS – under the Norwegian Academy of Science). After rather intense competition with physicists, geologists and others, a project called “A Panarctic Flora project – a species concept in the far north” was granted financial support! On this background Reidar Elven and Inger Nordal were granted sabbatical years by the University of Oslo to allocate their time during the autumn 1998 and the spring 1999 to work on the Arctic flora, including organizing the CAS year.

These funds now enable us to sponsor a mini-symposium at the Norwegian Academy of Science, as the startup of the Panarctic Year at the Center. This will be held from Monday 28. Sept. through Friday 2. Oct. 1998 at which the topic will be “The species concept

in the Arctic Flora”.

Following this Symposium a smaller group will continue the work on various aspects of the Flora such as format, delimitation, exchanging and combining electronic data, identifying problems needing joint efforts etc. Thereafter working groups for case studies are planned, starting with *Potentilla* and *Papaver*, before a break in December to January, and continuing with *Cerastium*, *Draba*, *Saxifraga*, selected genera of grasses etc. until we finalize the Year in April 1999.

The mini-symposium and other activities are still in the planning stages, therefore we would like potential symposium participants to provide the organizers with the following information:

- Would you like to participate in the Symposium?
- Does your participation depend on funding? – or
- Will you participate even if funding cannot be granted?
- Would you like to present a paper? (Please be certain to show its relevance to the Panarctic Flora Project and the theme of the symposium.)

Responses should be sent by e-mail to inger.nordal@bio.uio.no not later than 15. May 1998 or as soon as possible thereafter.

Dave Murray, Boris Yurtsev, Reidar Elven & Inger Nordal

GLASGOW, U.K.

Advances in Plant Molecular Systematics, Glasgow, 13–15 August 1997.

This international meeting held under the auspices of the systematics association and the Linnean Society of London covered molecular approaches to a broad array of the most actual problems in systematic botany of today, presented by leading scientists for each topic. As examples of the scope might be mentioned population differentiation, origins of polyploids, structure of apomicts, biogeographical problems, phylogenetic reconstructions as well as methodological questions. The symposium had gathered about 150 participants. Proceedings, covering invited papers, will be published in Advances in Plant Molecular systematics edited by Hollingworth, P. M., Bateman, R. & Gornall, R. J. in the Systematics Association special volume series. Anticipated winter 1998/99. Chapman & Hall.

Vilnius, Lithuania

Nordic-Baltic *in situ* Symposium, Vilnius, 8–14 June 1998.

A symposium treating problems of *in situ* conservation of both cultivated and wild plants will be held in the capital of Lithuania in June, initiated and partly organized by the



PUCCINELLIA PHRYGANODES

Nordic Gene Bank Organization in Alnarp, Sweden. It is one example of the closer growing connections across the Baltic with the three countries to the southeast now much involved in Nordic cooperation in a lot of fields. The symposium will include an excursion to the coast of Lithuania.

Kirstenbosch, South Africa

Vth International Botanic Gardens Conservation Congress, Kirstenbosch, 14–18 September 1998.

The motto of this conference held in the leading botanical garden in South Africa close to Cape Town is "Plants, People and Planet Earth – role of botanical gardens in sustain-able living". It will obviously be of special importance for all scientists who in their research make use of spontaneous as well as cultivated material from countries abroad, since new and future legislation dealing with the distribution of such material over the frontiers, within the framework of CITES or otherwise, will be considered.

Ponta Delgada, Açores, Portugal

III Symposium "Fauna and Flora of the Atlantic Islands", Ponta Delgada, 21–25 September 1998.

The symposium is hosted by the Department of Biology of the University of the Açores. It is open to researches from all countries, which aims to cover all aspects of the flora and fauna of the Atlantic islands, focusing on island ecology and evolution. Information is available through the internet: <http://www.pl/nova/inf/gpl/eventos/congres.htm>



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International Organization of Plant Biosystematists

The International Organization of Plant Biosystematists, founded in 1960, acts on several levels from coordinating and publishing information on biosystematics to organizing international conferences in a triennial time schedule. The IOPB is open to all persons working or interested in biosystematics which is interpreted in a broad sense. The more recent volumes from the conferences held in Zürich (K. M. Urbanska, ed., 1987, *Differentiation Patterns in Higher Plants*), Kyoto (S. Kawano, ed., 1990, *Biological Approaches and Evolutionary Trends in Plants*), and St. Louis (P. C. Hoch & A. G. Stephenson, eds, 1995, *Experimental and Molecular Approaches to Plant Biosystematics*) give extensive insight in the field IOPB deals with.

The IOPB Newsletter is published twice a year and mailed to all Members. It includes reports on

current research, requests for material and information, announcements of meetings, etc. Two permanent features in the Newsletter are *IOPB Chromosome Data* and *News from Molecular Biosystematists*, respectively edited by Prof. Dr. Clive A. Stace, Dept. of Botany, University of Leicester, Leicester LE1 7RH, UK., and Prof. Dr. Dan J. Crawford, Dept. of Botany, Ohio State University, Columbus, Ohio 43210-1293, USA. The Newsletter Editors are Prof. Dr. Liv Borgen and Prof. Dr. Bengt Jonsell (addresses given on Research News Form). IOPB Members automatically have free publishing right of their data and news.

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Any inquiries about joining IOPB, membership fees, Newsletter subscription, etc., as well as the application form, should be mailed to the Secretary/Treasurer
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