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Edited by K. M. Urbanska

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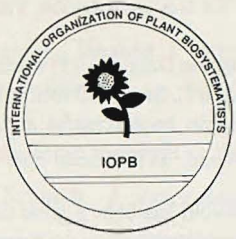


Contents

Dear IOPB Members,

Another year comes to close and it is time for our Newsletter to appear. Thank you cordially for good cooperation - I hope you enjoy this issue which is full of news.
The Lead Article (p. 3) we have here deals with intriguing patterns of variation and evolution in *Symphytum officinale* and has been contributed by Professor T. Gadella. Thank you, Theo, for this interesting article giving many new insights on plant behaviour.
Profile of a Lab (p. 10) comes this time from West Germany; Professor F. Albers and his group are busy in plant biosystematics and their results are based on various modern approaches. Thank you very much for this contribution, I'm convinced it will be of great interest to our readers.
Our new column "IOPB Chromosome Data" (p. 15) starts definitely with this issue. Please read carefully the entry by Professor C. Stace and follow these instructions when preparing your contributions. May the column be successful and bring lots of information to all Members. The data are to be sent to Professor Stace who prepares this column for print (thank you, Clive).
The IOPB Symposium 1989 in Kyoto has been a great success. Those who have been unable to attend will find here some information on the Symposium highlights (p. 22).
There is also a reports on IOPB Business Meeting held in Kyoto (p. 24). Please don't oversee these minutes because there are some details important to Members, e.g. the raised membership fee, changes of the Executive and Council etc. The full list of addresses of the New Execution and Council is printed on p. 31.
Flora Nordica committee is working hard (p. 27). Don't forget the deadline for your own contribution to this project.
A new Directory of the IOPB Membership is scheduled for the next Newsletter issue (see the detailed information on p. 29). Please verify your mailing address, if possible add the Fax number (very important), mail the whole card to our Secretary Dr. Hans den Nijs (his address is given on p. 31) so that your name and address are spelled correctly in the Directory and the mailing list. Please don't forget to send in your Membership fee (new rate is US$ 25.00 for 1990-1992), the regular publication of the Newsletter depends on your financing.
Now a very important item: when you send us your contribution to the IOPB Newsletter (e.g. Lead article, Profile of a Lab, Chromosome Data) please mail not only the manuscript but also the corresponding disk, ASCI File on 3 1/2' disk) so that we are able to adjust your text for the layout. The disk will be sent back to you.
Data for Newsletter No. 14 should arrive here before May 31, 1990.
I'm afraid that this issue will not reach you before your Xmas holiday is finished because the mail delivery in this period is notoriously slow, but anyway

Wish you the best for 1990
The Editor

NOTE: Please write in **capital** letters or use **typewriter** while preparing your 'Research News' sheet for the Newsletter. You don't want to have some words misspelled in print, do you?
Please only use the new form. Only **three** recent publications should be given.

2. Lead Article

By Th.W.J. Gadella, Department of Population and Evolutionary Biology, State University of Utrecht, The Netherlands.

Intraspecific variation, hybridization and introgression in *Symphytum officinale* L.

1. Infraspecific variation

Symphytum officinale L. inhabits a larger part of lowland Europe and lives in damp places, rich in nitrogen, i.e. in orchards, osier-beds, on dikes, by roadsides, in hedgerows and at the edges of forests, but does not seem to be salt-tolerant and avoids much shade. The species, as conceived here, includes the taxa *S. bohemicum* Schmidt, *S. lanceolatum* Weinm. and *S. tanaicense* Steven.

S. officinale contains 3 cytotypes:

a. white-flowered diploids (2n=24);

b. white- or purple-flowered tetraploids (2n=48);

c. (dark) purple-flowered plants with 2n=40.

In Europe the tetraploid plants have white or purple flowers (Gadella & Kliphuis, 1967), in Russia there are no white-flowered plants (Popov, 1953). In West Europe the tetraploid populations are either unicoloured or the interfertile white- and purple-flowered plants grow intermingled.

The plants with 2n=40 occur in open vegetations, on peaty soils, generally under very moist conditions. Compared with these 2n=40-plants, the 2n=48-plants are usually found in dryer places. The two races differ in flower-colour, plant-height, number of inflorescences and in indumentum, especially of the leaves and sepals and in the size of floral parts (**fig. 1**). All 3 infraspecific races share the same pyrrolizidine alkaloid and triterpene pattern and can be distinguished from hybrids between *S. officinale* and the introduced blue-flowered mountainous Caucasian species *S. asperum* Lepech.

Pure *S. officinale* plants lack echimidine (Huizing *et al.*, 1982; Gadella *et al.*, 1983) but the other pyrrolizidine alkaloids mentioned in **fig. 2** are present. Digestion of purified chloroplast DNA of the 3 infraspecific races and of various other *Symphytum* species with 8-10 different restriction enzymes yielded identical fragments (Sandbrink, unpublished). Apparently the

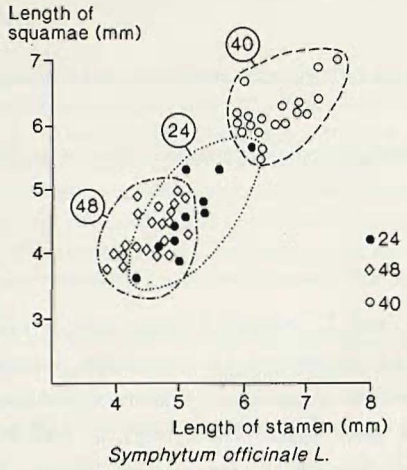
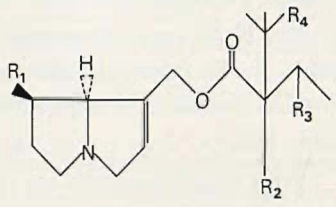


Fig. 1. Scatter diagram showing the relationship between the length of the stamen and the length of the squamae (both in mm) of the three cytotypes (2n=24,48,40).



Pyrrolizidine alkaloid

	R_1	R_2	R_3	R_4
Lycopsamine	OH	OH	OH	H
Ac. lycopsamine	CH_3COO	OH	OH	H
Symphytine	$CH_3CH{=}C(CH_3)COO$	OH	OH	H
Echimidine	$CH_3CH{=}C(CH_3)COO$	OH	OH	OH

Fig. 2. Pyrrolizidine alkaloids of *Symphytum officinale* (echimidine absent), of *S. asperum* (lycopsamine and acetyl-lycopsamine absent) and their interspecific hybrid *S.* x *uplandicum* (all compounds present).

morphological evolution in the genus *Symphytum* proceeded at a much faster rate than the molecular evolution.

2. Infraspecific hybridization

Crossing experiments between the 3 races showed that the diploids are reproductively isolated from the other two races. Occasional hybrids are completely sterile. However, diploids may occur in the same habitat as plants with 48 chromosomes. They are morphologically indistinguishable from the white-flowered tetraploids. An analysis of pollinator foraging behaviour demonstrated that bumblebees do not differentiate between the cytotypes and flower colour. The lack of natural triploids is presumably a consequence of the fact that homoploid pollen grows faster.

Plants with 2n=40 and 2n=48 are fully interfertile, but they do not normally hybridize in view of differences in ecological requirements. The primary hybrids (2n=44) may be succesfully backcrossed to either parent, resulting in hybrid swarms with chromosome numbers ranging from 2n=40 to 2n=48. Crossing experiments made it clear that these hybrids produce a heterogeneous array of gametes with different chromosome numbers, in different but constant proportions. The primary hybrid 2n=44, e.g., produces the following gamete types: 20(:)21(:)22(:)23(:)24 = 1(:)4(:)6(:)4(:)1. The number 2n=40 probably found its evolutionary origin in the number 2n=24, first by polyploidization to 2n=48, followed by 4 successive centric fusions.

An alternative explanation is that 2 centric fusions occurred first (2n=24 → 2n=20), followed by polyploidization (2n=20 → 2n=40). The first hypothesis is favoured by the combined study of DNA-content, chromosome banding and segregation of gametic types with different chromosome numbers.

3. Introgression

Infraspecific hybridization and introgression between the races with 40 and 48 chromosomes was studied in a large population of about 3000 plants along the border of a small lake (Kinselmeer), North of Amsterdam. Three zones can be distinghuised:

a. The very moist peaty bank-zone, covered with tall herbs, in a ruderal drift zone, containing 70 % of the plants. Some plants are partly inundated.

b. A somewhat dryer dike-zone.

c. A dry clayey dike-zone.

The frequency of the white-flowered plants is highest in the dike-zone, lowest in the bank zone. Most plants in the moist bank-zone had chromosome numbers between 2n=40 and 2n=44, those on the dike between 2n=44 and 2n=48 **(table 1)**.

Table 1. The percentage of white-flowered plants in the three zones along the border of lake Kinselmeer. The proportion of plants with low, intermediate or high chromosome numbers is indicated.

Zone	Number of flowering plants	white-flowered plants %	chromosome number of plants %		
			40-43	44	45-48
Bank (moist)	1538	12.0	55.8	28.4	15.8
Meadow (intermediate)	260	34.2	19.7	11.5	68.8
Dike (dry)	176	49.4	11.9	18.8	69.3

Since most plants of the bank-zone have low chromosome numbers, back-crossing to the purple-flowered 40-parent seems likely. On the dike, on the other hand, backcrossing to the white- or purple-flowered 48-parent took place. This means that introgression works in two differrent directions. Instead of a hybridized habitat (Anderson, 1949), there are two adaptive peaks. It seems likely that only the adaptively coherent genotypes are fit to survive and reproduce. Plants showing most of the genes of the 40-cytotype are fittest in the bank-zone, those with many genes in common with the 48-cytotype are fittest in the dike-zone. Both Anderson's hybrid index **(figure 3)** and the distance diagram according to Wells (1980) were employed. The hybrid index value increases when the chromosome number decreases. The distance diagram method, in which the Euclidean distance of each hybrid plant to the reference points 40 and 48 was determined, proved to be in good agreement with the results obtained by Anderson's method. Along the borders of lake Kinselmeer

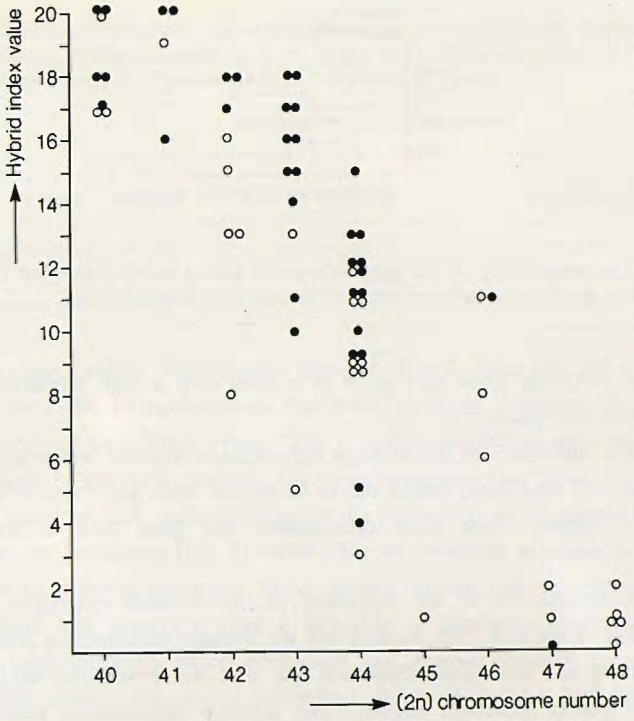


Fig. 3. Hybrid index according to Anderson for the plants of *Symphytum officinale* of the Kinselmeer population.
Each dot represents one plant. Solid dots: purple-flowered plants; open dots: white-flowered plants. Ten characters were scored, each character scores 2 in the 2n=40 cytotype, 0 in the 2n=48 cytotype. Intermediate plants score 1 for an intermediate character.

some rare white-flowered plants with 2n=40 were found. Such plants are completely absent from pure 40-populations. They must be regarded as end-products of introgressive hybridization. Their genes for the white flower colour are ultimately derived from the 48 cytotype by the process of introgression.

Mericarps of cytologically marked plants were collected in the field and grown in the experimental garden. Both the flower colour and the chromosome number markers demonstrated that most interbreeding takes place between neighbouring or closely adjacent individuals.

In the field the proportion of purple-flowered plants in the bank- and dike-zone differed most when the distance between the bank and the dike was largest (**fig. 4**). Purple-flowered plants produce a higher percentage of purple-

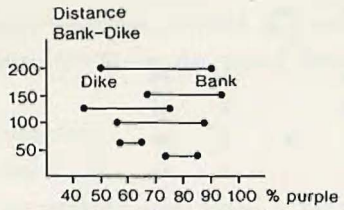


Fig. 4. The proportions of the purple-flowered plants in the dike- and bank-zone differ most when the distance between these subpopulations is smallest.

flowered offspring when they grow in a zone with a high proportion of other purple-flowered plants.

The difference in the average chromosome number between plants from the bank- and dike-zone, turned out to be largest when the distance between the zones is largest. These facts demonstrate that gene flow is restricted by distance.

A comparison of the frequency of the different cytotypes during the years 1971, 1984 and 1985 showed that the average chromosome number of the plants from the bank-zone increased and that the proportion of the purple-flowered plants decreased slightly. The average chromosome number of the plants of the Kinselmeer population increased from 1971 to 1984. The plants from the meadow and dike, on the other hand, had on average a lower chromosome number in 1984. The increase of the average chromosome number of the plants from the bank-zone may be a consequence of gene flow from the plants growing in the meadow- and dike zones, which have higher chromosome numbers. The decrease of the average chromosome number of the meadow- and dike plants can be explained as a consequence of gene-flow from plants growing in the bank-zone.

A comparison of the adult population of the bank-zone in 1984 with a seedling population, grown from a representative sample of seeds, shows that gene flow produces fewer plants with low chromosome numbers (**table 2**). This seems to indicate that selection and gene-flow work in an opposite direction in the bank-zone. Gene flow produces variability, but natural selection sorts out this variability.

Table 2. The average chromosome number of the plants growing in three different zones along the border of of lake Kinselmeer in the years 1971, 1984 and 1985 (= F_1 grown from a representative sample of plants, collected in nature in 1984).

Population/zone / year	Average chromosome number		
	1971	1984	F_1 1985
Population Kinselmeer	43.56	43.75	43.49
Bank-zone	43.08	43.21	42.98
Meadow and dike-zone	46.06	45.71	45.28

The intermediate chromosome number 2n=44 decreased in frequency from 1971 to 1984. Introgression to the 2n=40 cytotype increased slightly and to the 48-cytotype to a larger extent. This is understandable in view of the fact that the plants in the bank zone are far more numerous than those on the dike and in the meadow. The slight decrease of the proportion of the purple-flowered plants from the bank-zone (**fig. 5**) shows that the influence of zones with more white-flowered plants is not large. These studies made it convincingly clear that both selection and gene-flow play a key role in introgressive hybridization. Therefore, experimentally based ecological and genetic research provides the most reliable information about the relationships of pattern and process of introgression.

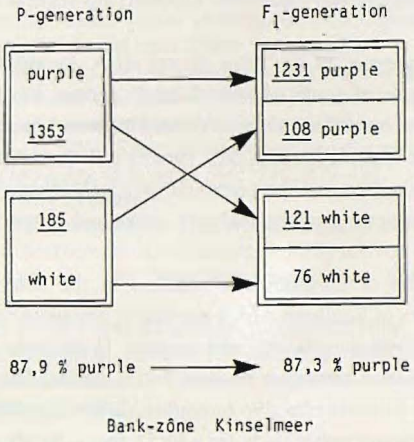


Fig. 5. A representative sample of seedlings, grown from mericarps collected in the bank-zone of lake Kinselmeer. The proportion of purple-flowered plants decreased slightly as a consequence of gene flow from white-flowered plants of the dike zone.

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WELLS H., 1980: A distance coefficient as a hybridization index: an example using *Mimulus longiflorus* and *M. flemingii* (*Scrophulariaceae*) from Santa Cruz island, California. Taxon *29*, 53-65.

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3. Profile of a Lab

Profiles of the Biosystematics Group at the Institute of Botany, by Prof. Focke Albers, Westfälische Wilhelms Universität Münster, Schlossgarten 3, D-4400 Münster, FRG

The Biosystematics Group is one of eight working groups at the Institute of Botany, University of Münster. The group leader, Prof. F. Albers, shares the scientific direction of the Botanical Garden with the head of the Department of Geobotany. In addition, he is a member of the multidisciplinary Ecology Working Group. In the Biosystematics Group doctoral, postgraduate and teaching-exam candidates are studying various aspects of the following three plant groups:

1. Grasses. Now the karyotypes of the grass genera *Aira*, *Avenella*, *Corynephorus*, *Deschampsia*, as well as those of some additional small genera, have been identified, the present studies concentrate on differentiations of chromosomal morphology by means of Giemsa banding technique (population analyses, species differentiation). Especially the evolution of the annual genus *Aira* and the perennial genus *Deschampsia* are being investigated, including morphological, geographical and ecological criteria, as well as observations on meiosis.

2. *Asclepiadaceae*. Studies of chromosome numbers in the succulent *Asclepiadaceae* within the area of the Flora of Southern Africa are nearly complete and are being extended to other areas. Studies of stem morphology and anatomy in different succulent genera will lead to insights into adaptation strategies in semi-arid climates. The complex floral morphology of the *Stapelieae* exhibits effective biological differentiations. The genera *Duvalia* and *Piaranthus* are at present under study for a Ph.D. thesis by Mr. U. Meve, M.Sc.

Along with the many international research contacts already existing, the election of Prof. Albers as co-ordinator for succulent *Asclepiadaceae* by the IOS will enhance Münster's position as a research center of *Asclepiadaceae*. So far, investigations into the widespread

and poorly known subtribe *Cynanchinae* (mainly the genera *Sarcostemma* and *Cynanchum*) by Dr. S. Liede (at present in MBG, St. Louis, USA) have been initiated. Centered in the Old World, these studies also try to elucidate the links between the Old and New World taxa.

3. *Geraniaceae*. Chromosome numbers and morphology of the genera *Sarcocaulon*, *Monsonia*, *Geranium* and *Pelargonium* are studied and the meiotic behaviour of the chromosomes is observed. Close co-operation exists in this field with Prof. Van der Walt, University of Stellenbosch, RSA, Dr. Mary Gibby, British Museum, UK and P. Yeo, Cambridge University, UK. The investigations center around processes of speciation, phylogenetic correlations and general evolutionary tendencies. The latter are extraordinarily clearly perceptable within the genus *Pelargonium* with its approximately 250 species.

DNA-contents of the nuclei, variable in size because of dysploidy, polyploidy and chromosomal changes, are determined by Mr. D. Marschewski, M.Sc. as a Ph.D. thesis. Furthermore, different flavonoid-patterns of individual species are studied. Moreover, crossing experiments and studies of pollen/stigmata interaction are planned in order to obtain a more clearcut picture of the *Pelargonium*-complex.

Especially for the grasses and *Asclepiadaceae*, superordinate, non-systematical aspects such as life form, life cycle and survival strategies are studied, aside from the investigations outlined above.

Recent publications:

ALBERS F., 1988: Strategies in chromosome evolution in *Pelargonium* (*Geraniaceae*). Monogr.Syst.Bot.Missouri Bot.Gard. *25*, 499-502.

ALBERS F., AUSTMANN M. and MEVE U., 1988: Chromosome number report. *Asclepiadaceae*. IOPB Newsletter *11*, 10-12.

ALBERS F., DELFS W., KUSCH G. and MEVE U., 1989: Lebensformen der *Ceropegieae* und *Stapelieae* (*Asclepiadaceae*) in ariden Zonen Afrikas. Beitr.Biol.Pflanzen *64*, 59-74.

MEVE U., 1988: *Duvalia vestita* Meve (*Asclepiadaceae/Stapelieae*) - Eine neue Art der südwestlichen Kapprovinz. Kakt.and.Sukk. *39*, 194-197.

MEVE U., 1988: The differing status of varieties in the *Stapelieae*. Asklepios *44*, 2-7.

MEVE U., 1989: *Tromotriche thudichumii* (Pillans) Leach - eine bemerkenswerte *Stapelieae* mit unsicherer generischer Position. Kakt.and.Sukk. *40*, 74-76.

SYLLA T. und ALBERS F., 1989: Samenentwicklung und Samenmorphologie krautiger und sukkulenter *Asclepiadaceae*. Bot.Jahrb.Syst. *110*, 479-492.

Further papers currently in press:

GIBBY M., ALBERS F. and PRINSLOO B.: Karyological studies in *Pelargonium* sects. *Ciconium*, *Dibrachya* and *Jenkinsonia* (*Geraniaceae*). Pl.Syst.Evol.

MEVE U. and ALBERS F.: Die Stipularrudimente der *Stapelieae* (*Asclepidiaceae*). Beitr.Biol.Pflanzen.

MEVE U. and ALBERS F.: The species concept in *Duvalia* Haw. (*Asclepidiaceae*) - A preliminary revision of the genus. AETFAT Proceedings. Mitt.Inst.Allg.Bot.Hamburg.

MEVE U., ALBERS F. and KUSCH G.: The outer epidermal wall structure of African *Stapelieae* (*Asclepiadaceae*). Nordic J.Bot.

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4. Research News

AESCHIMANN D., Conservatoire et Jardin botaniques, case postale 60, CH-1292 Chambésy.
Recent publication:
AESCHIMANN D. and BURDET H.M., 1989: Flore de la Suisse. Ed. du Griffon, Neuchâtel. 597 p.

CARDONA M.A., Departament de Botanica. Facultat de Ciencies. Universitat Autonoma de Barcelona. 08193 Bellaterra (Barcelona), Spain.
Recent publication:
CARDONA M.A., CONTANDRIOPOULOS J. and SIERRA RAFOLS E., 1986: Etude biosystématique de l'*Anthyllis hystrix* de Minorque et d'*A. hermannia* de la Méditerranée orientale et centrale. Orsis 2, 5-25.

EHRENDORFER F., Institute of Botany, University of Vienna, Rennweg 14, A-1030 Vienna.
Recent publications with order No. to be sent to Exchange of Publications
EF 201: EHRENDORFER F., 1988: Biologische Evolutionsforschung: Gesicherte Ergebnisse und offene Probleme. In: HORVAT M. (Hrsg.), Das Phänomen Evolution. Literas Univ.verlag. 1-5.
EF 204: EHRENDORFER F., 1988: Stability versus change, or how to explain evolution. In: GREUTER W. and ZIMMER B. (eds.), Proc. 14th Int.Bot.Congr. Berlin 1987. Koeltz, Königstein. 317-333.

GREILHUBER J., Institute of Botany, University of Vienna, Rennweg 14, A-1030 Vienna.
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GH 44: GREILHUBER J., 1988: "Self-tanning" - a new and important source of stoichiometric error in cytophotometric determination of nuclear DNA content in plants. Pl.Syst. Evol. *158*, 87-96.
GH 45: GREILHUBER J., 1988: Critical reassessment of DNA content variation in plants. Kew Chromosome Conf. III. HMSO, London. 39-50.
GH 47: GREILHUBER J., 1988: On karyotype evolution in *Cyclamen* L. subgen. *Psilanthum* Schw. (*Primulaceae*). Tagungsber. 3. Oesterr.Bot.Tagung 1985, Salzburg. Sauteria *1*, 211-222.

HALBRITTER H., Institute of Botany, University of Vienna, Rennweg 14, A-1030 Vienna.
Recent publications:
HALBRITTER H., 1988: *Bromeliaceae*: Pollenmorphologie und Systematik. Die Entwicklung des Pollens von *Tillandsia sinuosa* L.B. Smith. Diss.Univ.Wien. 176 p.

HONG De-yuan, Professor of Laboratory and Systematic and Evolutiuonary Botany, and Herbarium, Institute of Botany, Chinese Academy of Sciences, Xiangshan, Beijing 1000093, P.R. China.
Publications in press:
HONG D.Y.: China Red Data Book (Chinese rare and endangered plants). Vol. *1*
HONG D.Y. : Studies on the genus *Paeonia*. The characters of leaf epidermis and their systematic significance. Chin.J.Bot. 2
HONG D.Y.: A biosystematic study on *Ranunculus* subgen. *Batrachium* in Southern Sweden. Nord.J.Bot.
HONG D.Y.: Plant cytotaxonomy. (In Chinese). Science Press, Beijing.
HONG D.Y. and MA L.-M.: Systematics of the genus *Cyananthus* Royle (*Campanulaceae*). Acta Phytotax.Sin.

HONG D.Y. and ZHU X.-Y.: Cytotaxonomical studies on *Liliaceae* (s.l.). 3. Report on karyotypes of 7 species in 4 genera of the tribe *Polygonateae*. Acta Phytotax.Sin.
FU C.-X. and HONG D.Y.: Cytotaxonomical studies on *Liliaceae* (s.l.). 2. Report on karyotypes of 8 species in 8 genera from Zheijiang Province. Acta Phytotax.Sin.
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QIU J.-Z. and HONG D.Y., 1989: Notes of two species of the genus *Adenophora* from Liaoning and their chromosome numbers. Acta Phytotax.Sin. (in press)

HULTGARD Ulla-Maj, Ph.D., Department of Systematic Botany, Uppsala University, P.O.Box 541, S-751 21 Uppsala, Sweden, is a Member of the Flora Nordica project - the chromosome number committee.
Current projects: Biosystematic studies on *Primula farinosa* L. and related taxa in Northwest Europe. Studies on polyploidy and distribution patterns in European *Parnassia palustris* L.
Recent publication:
HULTGARD U.-M., 1987: *Parnassia palustris* L. in Scandinavia. Symb.Bot.Ups. *28(1)*, 128 p.

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KG 14: KARRER G., 1988: Quantitative Analyse von Arealgrösse und Disjunktionsgrad an Artengarnituren von Pflanzengesellschaften des Alpenostrandes. Sauteria *1*, 89-134.

LI Lin-Chu, Department of Biology, Fudan University, Shanghai
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LI L.-C. and ZHANG Q., 1988: The chromosome of *Taxodium ascendens* Brongn. (*Taxodiaceae*). Nature *81(1)*, 72-73.

LOIDL J., Institute of Botany, University of Vienna, Rennweg 14, A-1030 Vienna.
Recent publication with order No. to be sent to Exchange of Publications
LO 22: LOIDL J., 1988: SC-formation in some *Allium* species, and a discussion on the significance of SC-associated structures and of the mechanism for presnaptic alignment. Pl.Syst.Evol. *158*, 117-131.

McNEILLY Thomas, Dr., Department of Environmental and Evolutionary Biology, The University, B.O.Box 147, Liverpool L69 3BX, U.K.
Recent publications:
AL-HIYALI S.A., McNEILLY T. and BRADSHAW A.D., 1988: The effects of contamination from electricity pylons-evolution in a replicated situation. New Phytol. *110*, 571-580.
ASHRAF M., McNEILLY T. and BRADSHAW A.D., 1988: The potential for evolution of tolerance to NaCl, $CaCl_2$, $MgCl_2$ and seawater in four grass species. New Phytol. *112*, 245-254.
AZHAR F.M. and McNEILLY T., 1988: The genetic basis of variation in salt tolerance in *Sorghum bicolor* L. (Moench) seedlings. Plant Breeding *101*, 114-121.
BILLINGTON H.L., MORTIMER A.M. and McNEILLY T., 1988: Divergence and genetic structure in adjacent grass populations. I. Quantitative genetics. Evolution *42*, 1267-1277.
McHUGH S., HUMPHREYS M.O., McNEILLY T. and JOHNSON M.S., 1988: Variation in cold tolerance in *Festuca rubra* L. Grass and Forage Science *43*, 305-312.
McNEILLY T., 1988: Plant adaptations to hostile environments. Proc. 14th Australian Mining Industry Council Conf., Darwin, Australia. *2*, 177-187.

SCHWEIZER D., Institute of Botany, University of Vienna, Rennweg 14, A-1030 Vienna.
Recent publication with order No. to be sent to Exchange of Publications
SZ 48: SCHWEIZER D. und AMBROS P., GRÜNDLER P. und VARGA F., 1987: Attempts to relate cytological and molecular chromosome data of *Arabidopsis thaliana* to its genetic linkage map. Arabidopsis Information Service *25*, 27-34.

SHURKAL Anatoly, Ph.D., N.I. Vavilov Institute of General Genetics , Academy of Sciences of the USSR, Gubkin Street 3, 117809 Moscow B-333, USSR.
Current projects: Biosystematics study of genus *Pinus* on different molecular characters - allozyme loci, patterns of IEF and SDS protein spectra.
Projects completed: Genetic differentiation in pine species of congeneric level. Intra- and interspecies genetic differentiation of grapes.
Projects started:
Genetic differentiation of conifers (intergeneric level).
Recent publications:
SHURKAL A., 1988: Study of genetic variability of crimean pine (*Pinus pallasiana*). (In Russian). Genetica *24(2)*, 311-315.
SHURKAL A., 1989: The comparative study of molecular variability on single and multiple substitutions on intra- and interspecific levels. (In Russian). Dok.Acad.Nauk USSR *26(1)*, 221-225.
SHURKAL A., 1989: Biosystematics of genus *Pinus* by electrophoresis of abundant proteins and allozyme loci. Abstracts of the 4th Intern.Symp. IOPB, Kyoto.
SHURKAL A., 1989: Genetic differentiation in genus *Pinus*. Proc.Intern.Symp. Forestry Genetics IUFRO, Voronezh, USSR (in press).

SHURKAL A., 1989: Allozyme polymorphism of larch (*Larix sibirioca*). (In Russian). Genetica *25(10)* (in press).

WANG Fengehun, Vice-professor, Head of Botanical Research and Teaching Section, Department of Biology, Harbin Teachers University, Harbin, Heilongziang Province 150080, P.R. China.
Projects completed: Taxonomical study on Chinese *Trifolium*.
Projects started: *Medicago* in biosystematics.Recent publications:
WANG F., 1989: Biosystematics on *Trifolium pratense* L. in the East Mountains in Heilongziang Province, China. Wuhan Bot.Res. *1(4)* (in press).
WANG F., 1989: The ontogeny of plant and the evolution of characteristics. Nat.Sci.J. (Harbin Normal Univ.) *5(2)* (in press).

WEBER A., Institute of Botany, University of Vienna, Rennweg 14, A-1030 Vienna.
Recent publication with order No. to be sent to Exchange of Publications
WE 66: WEBER A., 1988: Contributions to the morphology and systematics of *Klugieae-Loxonieae* (*Gesneriaceae*). X. Development and interpretation of the inflorescence of *Epithema*. Beitr.Biol.Pflanzen *63*, 431-451.

WEBER M., Institute of Botany, University of Vienna, Rennweg 14, A-1030 Vienna.
Recent publication with order No. to be sent to Exchange of Publications
WM 3: WEBER M., 1988: Unusual sperm cells in *Apiaceae*. Pl.Syst.Evol. *159*, 273-276.
WM 4: WEBER M., 1988: Formation of sperm cells in *Galium mollugo* (*Rubiaceae*), *Trichodiadema setuliferum* (*Aizoaceae*), and *Avena sativa* (*Poaceae*). Pl.Syst.Evol. *161*, 53-64.

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5. IOPB Chromosome Data 1

edited by Clive A. Stace, Professor, Department of Botany, University of Leicester, Leicester LE1 7RH, England.

This series is intended to fill the gap left by discontinued Chromosome Number Reports published in TAXON, and to provide the opportunity to publish other kinds of chromosome data as well, e.g. banding patterns, RFLPs and DNA measurements, so long as the information can be kept brief.
For chromosome counts, the format below should be **closely** followed. Items acceptable are first counts for a species, first counts for a new number for a species, or counts from a significantly new area of a species. Counts should be stated sporophytic (2n) or gametophytic (n); the latter should not be converted to the former by doubling. Citation of a locality and a voucher is essential.
Please send contributions to Professor Clive A. Stace, Department of Botany, University of Leicester, Leicester LE1 7RH, England, stating whether you are a member of IOPB. Neither proofs nor reprints will be made available, but the editor will acknowledge receipt of contributions and raise queries with authors if necessary.

Reports by J.P. BAILEY and C.A. STACE, Department of Botany, University of Leicester, Leicester LE1 7RH, England. Vouchers in LTR unless otherwise stated.

POACEAE

Brachypodium distachyon (L.) Beauv. 2n=30. Spain: Malaga: near Gaucin. Stace B360.

Catapodium rigidum (L.) var. *majus* (C. Presl) M. Lainz. 2n=14+1-2B. Spain: Malaga: near Gaucin. Stace C90.

Cutandia maritima (L.) W. Barbey. 2n=14. Portugal: Beira Litoral. Hort.Bot.Coimbra CUT 2.

Eremopoa songorica (Schrenk) Roshev. 2n=28. Turkey: B5 Kayseri: Erciyasdag, 2350 m. F. Sorger 77-38-13.

Festuca boissieri Janka. 2n=14. Spain: Cadiz: south slopes of Sierra del Nino, Los Barrios. Stace s.n. 2n=14. Spain: Malaga: 400 m on Sierra Bermeja. Stace s.n.

Micropyrum tenellum (L.) Link. 2n=14. France: Gard: By Gardon d'Anduze, Anduze. Stace N16. 2n=14. France: Puy de Dome: on lava of Tartaret, Murol. Stace N17. 2n=14. France: Var: Maquis at Ramatuelle, near St Tropez. Stace N23. 2n=14. Portugal: Beira Alta: Sao Pedro do Sul. D.H. Valentine N19. 2n=14. Spain: Cuidad Real: Despenaperros. D.H. Valentine s.n. 2n=14. Spain: Orense: N.N.E. slopes of Pena Trevinca at 4000 ft. Stace 52.

Narduroides salzmannii (Boiss.) Rouy. 2n=14. Spain: Malaga: 3800 ft on Sierra Bermeja. Stace N32.

Sphenopus divaricatus (Gouan) Reichb. 2n=28. Turkey: Corum: 24 km S.W. of Sungurlu, 670 m. Sorger 77-63-7.

Vulpia alopecuros (Schousboe) Dumort. 2n=14. Spain: Cadiz: dunes at Palmones. (Both var. *alopecuros* and var. *lanata* Boiss.). Stace V467.

V. australis (Nees) Blom. 2n=14. Uruguay: Lavalleja: Aguas Blancas. Rosengurtt s.n. 2n=14. Argentina: San Luis: 8 km W. of Buena Esperanza. Anderson 3746.

V. bromoides (L.). S.F. Gray. 2n=14. Brazil: Rio Grande do Sul: Santana do Livramento, Cerro Munhoz. Longi 756 (BLA 12483). 2n=14. Brazil: Rio Grande do Sul: Uruguaiana, Barra do Quarai. Longhi 620 (BLA 12629). 2n=14. Brazil: Rio Grande do Sul: Santana do Livramento, km 91 para Rosario. Longhi 744 (BLA 12478). 2n=14. Peru: Junin: 35 km N. of Huancayo at 3320 m. Blair 601 (K). 2n=14. South Africa: S.W. Cape: west of Tulbagh. Smook 3675.

V. ciliata Dumort. subsp. *ciliata*. 2n=28. Spain: Malaga: Sierra do Alcoparain, near Carratraca. Stace s.n.

V. ciliata Dumort. subsp. *ambigua* (Le Gall) Stace & Auquier. 2n=28. Belgium: Flandre Occidentale: Adinkerke. Auquier 3143.

V. fasciculata (Forsskal) Samp. 2n=28. Jugoslavia: Budva. T.C.G. Rich s.n.

V. muralis (Kunth) Nees. 2n=14. Colobia: Cundinamarca: Sabana de Bogota. Hawkes & Lopez 6749. 2n=14. South Africa: S.W. Cape: S. of Heidelberg. Smook 3737. 2n=14+2B. South Africa: Cape: Clanwilliam Dam. Smook 3577. 2n=14. Spain: Cadiz: hill behind Los Barrios. Stace s.n. 2n=14. Spain: Malaga: dunes at Chullera beach, Estepona. Stace s.n.

V. myuros (L.) C.C. Gmelin f. *myuros*. 2n=42. South Africa: Natal: Cobham Forest Reserve, Underberg. Hilliard 8181.

V. myuros (L.) C.C. Gmelin f. *megalura* (Nutt.) Stace & Cotton. 2n=42. Peru: Cuzco: S. of Cuzco. Knize s.n. 2n=42. South Africa: S.W. Cape: Piketburg to Porterville. Smook 3654.

V. unilateralis (L.) Stace. 2n=14. Spain: Malaga: Sierra de Alcoparain, near Carratraca. Stace N33.

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Reports by Lynn **BOHS**, Pringle Herbarium, Marsh Life Science Building, University of Vermont, Burlington, VT 05405, U.S.A. Vouchers in GH.

SOLANACEAE

Cyphomandra acuminata Rusby. 2n=24. Bolivia: Dept. La Paz, Prov. Nor Yungas, below Chuspipata on road to Yolosa. Bohs 2338.

C. cajanumensis (Kunth) Sendtn. ex Walp. 2n=24. Ecuador: Prov. Loja, near Loja. Bohs 2281.

C. corymbiflora Sendtn. 2n=24. Southeastern Brazil. Bohs 2343.

C. diploconos (Mart.) Sendtn. n=12. Brazil: Prov. Parana, Curritiba. Bohs 2335.

C. diversifolia (H. & B. ex Dunal) Bitter. n=12. Venezuela: Aragua, Parque Nacional Henri Pittier. Bohs 2341.

C. hartwegii (Miers) Sendtn. ex Walp. subsp. *ramosa* Bohs. 2n=24. Colombia: Dept. Huila, Fundacion Merenberg. Bohs 1644.

C. uniloba Rusby. 2n=24. Bolivia: Malaga: Prov. La Paz, Dept. Larecaja, between Consata and Mapiri. Bohs 2284.

Solanum allophyllum (Miers.) Standley. n=12. Panama: Prov. San Blas, in front of Ustupo. Bohs 2339.

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Reports by E.R. **FORNI-MARTINS**, C.A.F. **PINTO-MAGLIO** & N.D. **da CRUZ**, Secao de Citologia, Instituto Agronomico, Caixa Postal 28, 13020-Campinas, SP, Brazil. Localities in Brazil. Vouchers in UEC.

ERYTHROXYLACEAE

Erythroxylum campestre St. Hill. 2n=24. Sao Carlos - Sp, Represa do Broa. UEC 25473.

FABACEAE

Acosmium subelegans (Vog.) Yak. 2n=18. Moji-Guacu - SP, Fazenda Campininha. UEC 7421.

MALPIGHIACEAE

Banisteriopsis sp. 2n=40. Moji-Guacu - SP, Fazenda Campininha. UEC 9627.

Byrsonima coccolobifolia (Spr.) Kunth. 2n=24. Moji-Guacu - SP, Fazenda Campininha. UEC 9686.

B. intermedia A. Juss. 2n=24. Sao Carlos - SP. UEC 25.451.

B. verbascifolia (L.) Rich. ex Juss. 2n=24. Moji-Guacu - SP, Fazenda Campininha. UEC 9771.

Peixotoa sp. 2n=30. Moji-Guacu - SP, Fazenda Campininha. UEC 32733.

MYRTACEAE

*Campomanesia cambesse*eana Berg. 2n=22. Moji-Guacu - SP, Fazenda Campininha. UEC 11665.

RUBIACEAE

Alibertia sessilis (Vell.) Schum. 2n=22. Moji-Guacu - SP, Fazenda Campininha. UEC 13.399.

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Reports by L.M. **HILL**, Department of Biology, Bridgewater College, Bridgewater, Virginia 22812, U.S.A. All localities in Virginia, U.S.A. Vouchers in VPI.

ACERACEAE

Acer negundo L. 2n=26. Hill 7211.

A. platanoides L. n=13. Hill 8327.
A. nigrum Michaux f. 2n=26. Hill 3341.
A. rubrum L. n=13. Hill 3726.
A. saccharinum L. n=26. Hill 7221.

AMARYLLIDACEAE

Hypoxis hirsuta (L.) Coville. 2n=28. Hill 6651.

APIACEAE

Osmorhiza claytonii (Michaux) Clarke. 2n=22. Hill 3232.
Zizia aurea (L.) Koch. 2n=22. Hill 7514.

APOCYNACEAE

Apocynum cannabium L. n=11. Hill 1241.
Vinca minor L. 2n=46. Hill 4912.

ASTERACEAE

Anthemis arvensis L. 2n=18. Hill 1762.
Erigeron canadensis L. 2n=18. Hill 7264.
E. philadelphicus L. 2n=18. Hill 9666.
E. pulchellus Michaux. 2n=18. Hill 3167.
Galinsoga quadriradiata Ruiz Lopez & Pavon. 2n=16. Hill 8813.
Hieracium pilosella L. 2n=36. Hill 2971.
H. venosum L. n=9. Hill 8271.
Senecio aureus L. 2n=44. Hill 2612.
S. obovatus Willd. n=22. Hill 6327.
Tussilago farfara L. 2n=60. Hill 5627.

BERBERIDACEAE

Podophyllum peltatum L. n=12. Hill. s.n.

BORAGINACEAE

Mertensia virginica (L.) Persoon. n=12. Hill. s.n

BRASSICACEAE

Alliaria officinalis Andrz. ex D.C. 2n=42. Hill 7962.
Arabis laevigata (Willd.) Poiret. n=7. Hill 5128.
Barbarea vulgaris R. Br. 2n=16. Hill 4692.
Cardamine hirsuta L. n=7. Hill 4582.
Hesperis matronalis L. n=14. Hill 3152.

CAPRIFOLIACEAE

Lonicera morrowii A. Gray. n=9. Hill 9162.

CARYOPHYLLACEAE

Lychnis alba Miller. 2n=24. Hill 7615.
L. coronaria (L.) Desr. 2n=24. Hill s.n.
Saponaria officinalis L. 2n=28. Hill 3276.
Silene vulgaris (Moench) Garcke. 2n=24. Hill 5312.
Stellaria media (L.) Villars. n=22. Hill 6927.

CHENOPODIACEAE

Chenopodium album L. 2n=54. Hill 5612.

FABACEAE

Cercis canadensis L. n=7. Hill 1786.
Lespedeza cuneata (Dumont) G. Don. 2n=20. Hill 3959.
Lotus corniculatus L. 2n=12. Hill 2712.
Lupinus perennis L. n=24. Hill 4521.

GERANIACEAE

Erodium cicutarium (L.) Aiton. n=20. Hill 2221. n=40. Hill 2222.
Geranium molle L. 2n=26. Hill 7932.

HYPERICACEAE
Hypericum perforatum L. 2n=32. Hill 7814.
HYDROPHYLLACEAE
Hydrophyllum virginianum L. n=9. Hill 4152.
LAMIACEAE
Glechoma hederacea L. 2n=36. Hill 4326.
Leonurus cardiaca L. n=9. Hill 7555.
Lamium purpureum L. 2n=18. Hill 2863.
LILIACEAE
Smilacina racemosa (L.) Desf. n=36. Hill 5199.
MAGNOLIACEAE
Liriodendron tulipifera L. 2n=38. Hill 2899.
PAPAVERACEAE
Chelidonium majus L. n=6; 2n=12. Hill 2922.
Papaver dubium L. n=14. Hill 8732.
Sanguinaria canadensis L. n=9; 2n=18. Hill 6231.
PORTULACACEAE
Claytonia virginica L. n=11. Hill 1968.
RANUNCULACEAE
Aquilegia canadensis L. n=7. Hill 7126.
Hepatica americana (D.C.) Ker. 2n=14. Hill 7199.
Ranunculus bulbosus L. n=8. Hill 2233.
Thalictrum dioicium L. 2n=14. Hill 1291.
ROSACEAE
Duchesnea indica (Andrews) Focke. 2n=84. Hill 9427.
Potentilla canadensis L. 2n=28. Hill 4327.
P. norvegica L. 2n=56. Hill 8237.
P. recta L. 2n=28. Hill 8236.
RUBIACEAE
Houstonia caerulea L. 2n=16. Hill 2998.
SAXIFRAGACEAE
Saxifraga virginiensis Michaux. 2n=20. Hill 8312.
SCROPHULARICAEAE
Verbascum blattaria L. n=15. Hill 5127.
V. thapsus L. 2n=36. Hill 3784.
Veronica officinalis L. n=18. Hill 3627.
V. persica Poiret. n=14. Hill 9738.
SOLANACEAE
Physalis virginiana var. *subglabrata* (M. & B.) Walter. n=12. Hill 6542.
Solanum caroliense L. 2n=24. Hill 4562.
S. dulcamara L. n=12. Hill 8221.
VIOLACEAE
Viola rostrata Pursh. 2n=20. Hill 6578.

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Reports by W. **HUBER** and M. **BALTISBERGER**, Geobotanisches Institut, Universitätstr. 2, CH-8092 Zürich, Switzerland. Vouchers in ZT.

Polygonaceae
Oxyria digyna (L.) Hill. 2n=14. CH: ct. of Wallis, N.W of the station of Sorebois, N.W. of Zinal, 2550 m a.s.l. (No. 11802, cult. 11666).

Rumex acetosa L. 2n=14,15. CH: ct. of Wallis, between Alesse and Combe, 6 km N.N.W of Martigny, 1000 m a.s.l. (No. 32951). 2n=15. CH: ct. of Zürich, Robenhausen at the lake of Pfäffikon, 540 m a.s.l.

R. acetosella L. 2n=14. CH: ct. of Tessin, N.E. bank of the river of Maggia, S. of Locarno, 200 m a.s.l. (No. 23871).

R. alpinus L. 2n=20. CH: ct. of Freiburg, N. of Le Sori, 3.5 km N.E. of Mount Vanil Noir, 1450 m a.s.l. (No. 10100). 2n=20. CH: ct. of Wallis, Sommet de Proz, 4 km N.E. of the pass of Gr. St. Bernhard, 1940 m a.s.l. 2n=20. CH: ct. of Wallis, Bifigjini, 1 km N.W. of Zwischbergen, 1830 m a.s.l. 2n=20. CH: ct. of Graubünden, Sur, 9 km N.W. of the pass of Julier, 1600 m a.s.l. (No. 84013).

R. angiocarpus Murb. 2n=42. CH: ct. of Aargau, Birrhard at Brugg, 370 m a.s.l. (No. 11751).

R. arifolius All. 2n=15. CH: ct. of Solothurn, Bettlachberg, 3 km N. of Grenchen, 1150 m a.s.l. 2n=14, 15. CH: ct. of Wallis, S of Zinal in the Val d'Anniviers, 1820 m a.s.l. (No. 27718a, cult. 12020). 2n=14, 15. CH: ct. of Graubünden, Pisciadel, 5 km S.E. of the pass of Bernina, 1430 m a.s.l.

R. conglomeratus Murray. 2n=20. CH: ct. of Tessin, 1 km S.E. of Tenero at Locarno, 200 m a.s.l. (No. 23881).

R. maritimus L. 2n=40. CH: ct. of Jura, E of Neuf Etang, 1 km S.E. of Bonfol, 440 m a.s.l. (No. 23896).

R. obtusifolius L. 2n=40. CH: ct. of Schaffhausen, Grafenwiesen at the river of Wutach, 1 km N.E. of Wunderklingen, 420 m a.s.l.

R. pulcher L. 2n=20. CH: ct. of Tessin, S. of Locarno, 200 m a.s.l. (No. 23875). 2n=20. I: Sassella, 2 km W. of Sondrio in the valley of Veltlin, 350 m a.s.l.

R. sanguineus L. 2n=20. CH: ct. of Aargau, between Gupf and Binzen S. of Scherz at Brugg, 430 m a.s.l. (No. 10050). 2n=20. CH: ct. of Schaffhausen, Grafenwiesen at the river of Wutach, 1 km N.E. of Wunderklingen, 420 m a.s.l. (No. 10335).

R. scutatus L. 2n=20. CH: ct. of Wallis, S.E. of the lake of Emosson, W. of Martigny, 1980 m a.s.l. (No. 11889, cult. 11667). 2n=20. CH: ct. of Wallis, Baltschiedertal, N. of Eggerberg, 900-950 m a.s.l. (No. cult. 12021).

*

Reports by Kevin B. JENSEN, Forage and Range Research, Utah State University, Logan, Utah 84322-6300, U.S.A., and K. HIGHNIGHT & K.J. WIPFF, Soil and Crop Science Department and Department of Range Science, Texas A & M University, College Station, Texas 77843, U.S.A. Vouchers in TAES and UTC.

POACEAE

Anthaenatia villosa (Michx.) Beauv. 2n=20. Texas, Trinity County. Northrup 041.

Elymus agropyroides K. Presl. 2n=28. Argentina. PI-204186.

E. atratus (Nevski) Hand.-Mazz. 2n=42. China: "Northwestern". Dewey 2785.

E. breviaristatus (Hitchc.) A. Love. 2n=42. China: "Northwestern". Dewey 2786.

E. donianus (T.B. White) A. Love & D. Love. 2n=28. Scotland. Schaeffer. s.n.

E. jacquemontii (Hook. f.) Tzvelev. 2n=42. India: Kashmir. Kerguelen. s.n.

E. longearistatus (Boiss.) Tzvelev. 2n=28. Iran. PI-401276.

E. pendulinus (Nevski) Tzvelev. 2n=42. USSR: Altai. Dewey 2736.

Erianthus contortus Baldw. 2n=30. Texas, Rusk County. Wipff 682.

E. giganteus (Walt.) Muhl. 2n=60. Texas, Orange County. Wipff 633.

E. strictus Baldw. 2n=18. Texas, Newton County. Wipff 642.

Glyceria septentrionalis Hitchc. 2n=20. Texas, Brazos County. Wipff 072.

Pennisetum ciliare (L.). Link. 2n=45. South Africa. PI-409704.

P. ciliare (L.). Link. 2n=63. South Africa. PI-409704 O.T.
P. ciliare (L.). Link. 2n=90. South Africa. PI-409704 O.T.P.
P. mezianum Leeke. 2n=32. India. PI-214061.
P. sphacelatum (Nees) Th. Dur. & Schinz. 2n=18. South Africa. PI-410316.
Psathyrostachys huashanica Keng. 2n=14. China: Shaanxi Province. Dewey 3377, and Dewey 3430.

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Reports by Neiva I. PIEROZZI & Neusa D. da CRUZ, Secao de Citologia, Instituto Agronomico, Campinas, SP, Brazil 13020. Vouchers in UEC.

LYTHRACEAE
Lafoensia densiflora Pohl. 2n=16+1 or 2B chromosomes. Campinas, Sao Paulo State, Brazil. UEC 20981.
RUBIACEAE
Genipa americana L. 2n=20. Campinas, Sao Paulo State, Brazil. UEC 20983.

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Reports by WANG Guangxi & WANG Huiquin, Department of Biology, Wuhan University, Wuchang 430072, Hubei, P.R. China. Vouchers in WH.

PONTEDERIACEAE
Eichhornia crassipes (Mart.) Solms. 2n=32. Hubei. G.X. Wang 1032.
Monochoria hastata (L.) Solms. 2n=28. Hubei. G.X. Wang 1045.
M. korsakowii Regel et Maack. 2n=52. Liaoning. G.X. Wang 1042.
M. vaginalis (Burm. f.) Presl ex Kunth. 2n=52. Hubei. G.X. Wang 1012.

*

Reports by YOU JUN, Department of Biology, Wuhan University, Wuchang 430072, Hubei, P.R. China. Vouchers in WH.

NAJADACEAE
Najas ancistrocarpa A.Br. ex Magnus. 2n=12. Hubei. You Jun 8701.
N. browniana Rendle. 2n=12. Guangxi. You Jun 8706.
N. foveolata A.Br. ex Magnus. 2n=12. Yunnan. You Jun 8802.
N. gracillima (A.Br.) Magnus. 2n=12. Yunnan. You Jun 8809.
N. graminea Del. 2n=12. Yunnan. You Jun 8804.
N. graminea Del. 2n=36. Hubei. You Jun 40.
N. marina L. 2n=12. Hubei. You Jun 19.
N. minor All. 2n=24. Hubei. You Jun 18.
N. marina Miki. 2n=60. Hubei. You Jun 41.

*

Reports by ZHANG Shouzhou & MA Yuchuan, Department of Biology, Inner Mongolia University, Huhhot, P.R. China. All localities in Inner Mongolia, China except the one from Xinjiang. Vouchers in HIMC.

FABACEAE
Astragalus discolor Bge. 2n=16. Helan Shan. S.Z. Zhang 8857.

A. hoanthy Franch. 2n=16. Helan Shan. Y. Tian. 8840.
A. grubovii Sancz. 2n=32. Sinid Zuoqi. Y.C. Ma 9.
A. junatovii Sancz. 2n=16. Urad Houqi. S.P. Yong 119.
A. kurtschamusis Bge. 2n=16. Helan Shan. Y.C. Ma 88.
A. mahoschanicus Hand.-Mazz. 2n=16. Helan Shan. S.Z. Zhang 8856.
A. melilotoiodes Pall. var. *tenuis* Turcz. 2n=32. Daqing Shan. S.Z. Zhang 8888.
A. monophyllus Bge. 2n=16. Yabrai Shan. Alxa. Z.Y. Guo 0127.
A. lioui Tsai et Yu. 2n=16. Ejin Qi. Z.Y. Zhu 139.
A. scaberrimus Bge. 2n=16. Horqin Youyi Qianqi. Y.C. Ma 2036.
A. tatarius Franch. 2n=16. Helan Shan. S.Z. Zhang 8844.
A. variabilis Bge. 2n=16. Inggen, Alxa. S.R. Liu 221.
Caragana erinaceae Kom. 2n=32. Cultivated in Huhhot. S.Z. Zhang 8709.
C. camilli-schneideri Kom. 2n=32. Yili, Xinjiang. B.R. Pan 84014.
Halimodendron halodendron (Pall.) Voss. 2n=16. Tengger desert. Y.C. Ma s.n.
Oxytropis aciphylla Ledeb. 2n=16. Urad Houqi. Y.Z. Zhao 1079.
O. deflexa (Pall.) D.C. 2n=16. Helan Shan. S.Z. Zhang 8854.
O. diversifolia Pet. Stib. 2n=16. Urad Houqi. Y.Z. Zhao 10135.
O. filiformis D.C. 2n=32. Xi Ujimqin Qi. B.S. Ruo 125.
O. glabra D.C. 2n=16. Bayan Hot, Alxa Zuoqi. S.Z. Zhang 8843.
O. gracilima Bge. 2n=16. Tumd Zuoqi. S.Z. Zhang 88119.
O. grandiflora (Pall.) D.C. 2n=32. Horqin Youyi Qianqi. J.R. Wu 1326.
O. hirta Bge. 2n=16. Tumd Zuoqi. S.Z. Zhang 8860.
O. latibracteata Jurtz. 2n=16. Helan Shan. Y. Tian. 8822.
O. leptophylla (Pall.) D.C. 2n=16. Wolong Shan Jining. E.R. Shen 77.
O. mandshurica Bge. 2n=16. Daqing Shan. S.Z. Zhang 8817.
O. squmulosa D.C. 2n=16. Darhan Muminggan Lianheqi. Y.C. Ma 158.
O. tragacanthoides Fisch. 2n=32. Langshan, Urad Houqi. S.Z. Zhang 8859.

ORCHIDACEAE

Cypripedium shanxiense S.C. Chen. 2n=20. Daqing Shan. Y. Tian. 88601.

PINACEAE

Picea crassifolia Kom. 2n=24. Helan Shan. S.Z. Zhang 8855.

PLUMBAGINACEAE

Plumbagella micrantha (Ledeb.) Spach. 2n=12. Helan Shan. S.Z. Zhang 8858.

THYMELAEACEAE

*S*tellera chamaejasme L. 2n=18. Zhuozi County. Y.C. Ma 45.

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6. IOPB Symposium 1989, Kyoto: Highlights

by William F. Grant, Department of Plant Science, P.O. Box 4000, Macdonald College of McGill University, Ste. Anne de Bellevue, Quebec, Canada H9X 1CO.

Participants from 23 different countries attended the five day IOPB symposium "Biological Approaches and Evolutionary Trends in Plants", July 10 to 14, 1989, organized under the Chairmanship of Shoichi Kawano, Kyoto University, and held at the Kyoto Municipal Hall, Kyoto. Highlights of the Symposium included 22 papers by invited speakers: three

poster sessions with a total of 102 posters, a full day field trip to Nara and a three day post-symposium excursion to Tateyama. In addition, there was a banquet and an open business meeting of IOPB.

The authors and titles of the 22 Invited Papers were as follows:

Session 1. Biology and Evolution of Weeds and Weed-Crop Complexes

S.I. WARWICK, Agriculture Canada, Ottawa: Genetic variation in weeds.

H. HURKA, University of Osnabruck, FRG: Population biology of *Capsella*.

K. ITOH, Tropical Agriculture Research Center, Tsukuba, and S. MATSUNAKA, Kobe University: Parapatric differentiations of paraquat resistant biotopes in some *Compositae* species.

L.W.D. van RAAMSDONK, Institute for Horticultural Plant Breeding, The Netherlands: Biosystematics of cultivated plants and their wild relatives.

H. KOBAYASHI, Yamaguchi University, and S. SAKAMOTO, Kyoto University: Weed crop complex in cereal cultivation.

C.W.P.M. BLOM, Catholic University of Nijmegen, The Netherlands: Responses to flooding in weeds from river areas.

Session 2. Molecular Approaches in Plant Biosystematics

D.E. SOLTIS ans P.S. SOLTIS, Washington State University, Pullman: Chloroplast DNA variation: Insights into autopolyploidy and allopolyploid evolution.

R. OLMSTEAD, University of Michigan, Ann Arbor: Chloroplast DNA and phylogenetic studies in angiosperms.

C. KNAAK, R.K. HAMBY, M.L. ARNOLD, M.D. LeBLANC and E.A. ZIMMER, Louisiana State University, Baton Rouge: Ribosomal DNA variation and its use in biosystematics.

K. WADA, H. SAKAI, S. MORIGASAKI, Y. SANADA and H. MATSUBARA, Kanazawa University: Molecular approach to plant biosystematics from protein sequence comparisons.

P.G. MARTIN and J.M. DOWD, University of Adelaide, Australia: Plant amino acid sequence data in biosystematics.

S.N. RAINA, University of Delhi, India: Genome organization and evolution in the genus *Viola*.

Session 3. Population Biology and Life History Evolution

1) Reproductive Biology of Plants

M.T.K. ARROYO, University of Chile, Santiago: Relationship between plant breeding systems and pollination.

S.C.H. BARRET, University of Toronto, Canada: Variation in plant mating systems: Causes and consequences.

R. WYATT and S.B. BROYLES, University of Georgia, U.S.A.: Reproductive biology of milkweeds (*Asclepias*): Recent advances.

K.M. URBANSKA, Swiss Federal Institute of Technology, Zurich, Switzerland: Biology of asexually reproducing plants.

P. BIERZYCHUDEK, Pomona College, U.S.A.: The demographic consequences of sexuality and apomixis in *Antennaria*.

T. ICHIMURA, University of Tokyo and F. KASAI, National Institute for Environmental Studies, Tsukuba: Mating systems and speciation in algae, the *Closterium ehrenbergii* species complex.

2) Demography and Life History Evolution Plants

Y. IWASA, Kyushu University: Optimal growth schedule of perennials.

A.R. WATKINSON, University of East Anglia, U.K.: Life-history variation among annual plants: A population analysis.

N. KACHI, National Institute for Environmental Studies, Tsukuba: Evolution of size-dependent reproduction in biennial plants: A demographic approach.

P.A. KEDDY, University of Ottawa, Canada: The use of functional as apposed to phylogenetic systematics: A first step in predictive community ecology.

An excellent feature of the meeting was the time set aside solely for the posters so that the presenter and the participants could have time to carry out useful discussions on research in progress. Like the preceeding IOPB Symposia, the 1989 Symposium helped to weld friendships and initiate collaboration in research, especially between field and laboratory oriented workers. This meeting certainly showed that "Biosystematics" is very much alive. Our most sincere thanks go to the Japanese hosts who made the meeting most enjoyable both scientifically and socially.

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7. Minutes of the IOPB Business Meeting, July 1989, Kyoto

by Hans C.M. den NIJS, Hugo de Vries Laboratory, University of Amsterdam, Kruislaan 318, NL-1098 SM Amsterdan, The Netherlands

Report of the President

IOPB president Prof. Dr. Krystyna M. Urbanska opens the meeting and welcomes all members. After the closing of the scientific part of the symposium she expresses her gratitude and very many thanks to all the Japanese colleagues, and Prof. Kawano especially, for having organized a perfect congress of a high scientific quality. The success of the Kyoto meeting once again demonstrates the vitality of the IOPB as a forum of important discussions on all aspects of plant biosystematics.

Reports of the Secretary/Treasurer

Dr. Liv Borgen states that the financial situation of IOPB is as follows:

Calculated to US$, the total credit now reaches the amount of about US$ 4.800.-. The editing of the Newsletter costs about US$ 900.- per issue. It is important to note that the ETH Zürich (Swiss Federal Institute of Technology) still is paying all the postage expenses. The assembled members give a warm applause for this generous service.

Membership fees: The Executive proposes to fix the **personal** membership fee for the period from 1990 to 1992 at US$ 25.00.

A separate fee of US$ 10.- **each year** is proposed for **institutions**.

The assembly agrees on both the proposals. (You will find detailed information on payment possibilities elsewhere in this issue).

Report of the Editor

Dr. Urbanska mentions the continuous need for copy from the members and their institutes and calls for contributions. A special point in her report concerns the decision of the IAPT journal Taxon to stop the publication of the Lists of Chromosome Counts, which lists have been an important source of cytotaxonomic information for many years. The IOPB Executive proposes to insert these lists in our Newsletter. There, however, should be a certain regulation, in order to restrict the financial consequences of the proposal: IOPB members

can offer their data free of charge, non-members can publish only their first page of data free, additional pages will be charged by US$ 10.00 each. The assembly agrees on both aspects of the proposal.

IOPB Symposium 1992

Dr. P. Raven has offered to organize the next symposium in St. Louis, Missouri, U.S.A. in 1992. More detailed information will be published in one of the forthcoming Newsletters.

Arctic-Boreal-Alpine Plant Biology Group

Given the situation that there are a lot of colleagues from diverse institutes working on biology of species in the high northern and alpine habitats, Dr. Urbanska has proposed to start an informal working group within the existing IOPB frame on this topic. The Executive enjoys this initiative, but emphasizes the fact that this group will really be an informal one, with no other intention than to concentrate and promote the investments in this field of research, within the formal structure of the IOPB. The assembly enjoys and welcomes the development.

Dr. Urbanska promises to give further detail on the ABAP via the Newsletter.

Election of Executive and Council

Dr. Bill Grant, Past President in charge of the voting procedures, reports that the response to the voting ballot was about 50%.

The new Executive and Council list is given on a separate page of the Newsletter (p. 31).

Dr. Urbanska hands the presidency over to Dr. Kawane. The new chairman thanks the assembly for giving the credit to him as a new chairman, and continues with expressing, on behalf of the whole IOPB, his sincere gratitude to Dr. Urbanska, who served the organization so well as president. This holds the more, because she will continue the editorship of the Newsletter. Dr. Kawano also thanks Dr. Liv Borgen for serving so well as the secretary/treasurer for six years. The assembly gives standing applause.

Motions from the floor

Our Scandinavian colleagues Dr. Borgen and Dr. Jonsell offer the preliminary possibility of organizing the 1995 symposium in the high northern region of Europe. Part of this (or the whole) meeting could probably be held in a field station, so that direct experience with arctic-boreal plant biology could be integrated. The assembly greatly welcomes this suggestion.

At the end of the meeting, Dr. Kawano once again thanks Dr. Urbanska for her guidance of the past years, thanks also everybody who attend the meeting and the symposium as a whole and promises that he will do his very best to increase the number of members and to develop the activities of the IOPB furthermore.

He closes the meeting and the symposium by saying: "See you again in 1992 in St. Louis".

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8. Meetings, Past and Future

Report on the US-Japan Seminar "Evolutionary Studies on Sexual Systems in Plants" held at the National Institute of Genetics, Mishima, Japan, July 18-21, 1989, by D.E. Soltis, Washington State University, Pullman, U.S.A, and W.F. Grant, McGill University, Montreal, Canada.

The co-organizers were Dr. Iwatsuki, Botanical Gardens Tokyo, and Dr. D.E. Soltis, Washington State University, Pullman, U.S.A. and the Secretary, Dr. T. Yahara, Botanical Gardens, Nikko, Japan.

Approximately 50 invited participants/observers attended. The authors and titles of paper presented are:

P.S. SOLTIS and D.E. SOLTIS, Washington State University, Pullman, U.S.A: Evolution of inbreeding and outbreeding in ferns and fern-allies.

S. MASUYAMA, Tokyo Women's Christian University and Y. WATANO, Kanazawa University: Trends for inbreeding in polyploid ferns.

Y. IWASA, Kyushu University: Evolution of selfing rate and resource allocation model.

D. WALLER, University of Wisconsin, Madison: A general model for the evolution of self-fertilization, with application to the cleistogamous annual, *Impatiens capensis*.

H. MORISHIMA an P. BARBIER, National Institute of Genetics, Mishima: Mating system and population structure in wild rice *Oryza rufipogon*.

S.C.H. BARRETT, University of Toronto, Canada: Evolutionary genetics of mating system variation in heterostylous plants.

K. IOUE, Shinshu University: Evolution of breeding system in island populations of *Campanula microdonta*.

I. FUKUDA, Tokyo Women's Christian University: Population structure and breeding system in *Trillium*.

M. OHARA, Hokkaido University and F.H. UTECH, Carnegie Museum of Natural History, Pittsburgh: Differentiation patterns of reproductive systems in the genus *Trillium*.

S. WELLER and S. SAKAI, University of California, Irvine: Evolution of dioecy in the endemic Hawaiian *Caryophyllaceae*.

S. KAWANO and H. TAKASU, Kyoto University: Specio-temporal changes in reproductive parameters of the plant over environmental gradients.

M. KAKEHASHI, Hiroshima University and E. KINOSHITA, Kyoto University: Application of sex allocation theory for plants.

R. WYATT and S. BROYLES, University of Georgia, Athens: Plants parenthood in milkweeds: a direct test of the pollen donation hypothesis.

D.L. MARSHALL, University of New Mexico, Albuquerque: Nonrandom mating in wild radish.

J. HAMRICK, University of Georgia, Athens: Breeding systems of tropical forest trees.

T. MORITA, Niigata University: Paternal role of agamospermous polyploids in *Taraxacum*.

N. MURAKAMI, Botanical Gardens, Nikko and K. IWATSUKI, Botanical Gardens, Tokyo: Origin and genetic variation of agamosporous ferns.

T. YAHARA, Botanical Gardens, Nikko: Evolution of agamospermous races in *Boehmeria* and *Eupatorium*.

Within the broad range of papers presented, there were also some important general themes:

- Several authors attempted to quantify inbreeding depression and it was also the topic of theoretical study.
- Cleistogamous vs. chasmogamous seed production was discussed and the relative investment and returns of these methods of seed production considered.
- Several papers illustrated that pollen flow is often greater than which has traditionally been maintained based on pollinator flight distances. The data suggested that considerable pollen carryover often occurs.
- The tremendous insights that paternity analysis can provide was illustrated in studies of milkweeds, tropical forest trees, and wild radish.
- The important role of resource allocation in determining reproductive processes was discussed.
- The important role that stochastic factors can play in mating system evolution was also well illustrated.

XV International Botanical Congress Tokyo, 1993

writes Dr. Brunio Iwatsuki, Secretary General of the XV International Botanical Congress: The Organizing Committee of the XVth International Botanical Congress wishes to announce that the XV IBC will be held in Tokyo area during August and September, 1993: nomenclature session 23-27 August, general session 28 August - 3 September. The first circular will be prepared in 1990 and distributed to those who are interested in the Congress. Request for information and other questions and comments may be sent to the Secretariat: XV International Botanical Congress Tokyo, Department of Botany, Faculty of Science, The University of Tokyo, 7-3-1 Hongo Bunkyo-ku, Tokyo 113, Japan.

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9. News on Flora Nordica

The Editorial Committee of Flora Nordica met June 9-11, 1989 at Granavollen, Norway. Some of the topics discussed:

Flora layout. Maps, other illustrations, typography and layout in general were discussed. A test print should be made in autumn. Vol. I will contain some general chapters treating among other topics plant geography of the area and exploration history.

Flora Nordica notes. under this title, articles and short notes with relevance for Flora Nordica will be published in Nordic Journal of Botany or, like note No. 1, in Annales Botanici Fennici. Contributions to the precursor series should be sent to the editor.

Vols II-IV planned. Vol. II will include the families *Brassicaceae* to *Apiaceae* (sequence as Flora Europaea). It will come out in 1994, and deadline for manuscripts is October 1, 1992. The editor will contact autors during autumn.

Vol. III will include *Ericaceae* to *Asteraceae*, and vol. IV the monocots.

Next editorial committee meeting is planned for April 1990 in Finland.

The following items may be sent for from the secretariat:
Guidelines for authors (GUI 881220)
Principles and examples for the use of interspecific categories (Checklist A 890301)
Chromosome cytology, "principles and examples" (Chrom A 890307)
Chromosome cytology form (Chrom A 890301)
Map forms: Map and instruction for map forms (Map forms A 890307)
Flora Nordica provinces (Map forms B 890307)
Nordic Herbaria (contact persons and collections) (Map forms C 890217)
Distribution Documentation form (Map forms D 890223)
Specimen form (Map forms E 890302)
Projektkatalog januari 1988

The following items are being prepared:
Check-list vol. I (will be distributed to authors of vol. I in August)
Ecological terminology (draft version to authors of vol. I in August)
Labels seen for Flora Nordica (for herbarium work)
Morphological terminology
Check-list vols II, III and IV

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10. Publishing News

P.S. Hsu (ed.), 1989: Cryptogamic Flora of the Yangtze Delta and adjacent regions. (In Chinese). Shanghai Scientific and Technical Publ. 573 p. (Hard cover, US$ 40.00, including postage). The persons interested should contact Shanghai Museum of Natural History, 1102 Longwu Road, Shanghai 200232, P.R. China. The book which is the first of its kind comprises altogether 1100 species of algae, fungi, lichens, bryophytes and ferns basing upon a rich collection of data and results of scientific research obtained during the recent decades.

In January 1990 a "List of taxonomical projects concerning the Carpathian and Pannonian Flora" will be published by the Institute of Experimental Biology and Ecology of the Slovak Academy of Sciences, Bratislava. This list contains basic information about 246 projects of scientists from Austria, Bulgaria, Czechoslovakia, the Federal Republic of Germany, the German Democratic Republic, Hungary, Poland, Rumania, the Soviet Union and Yugoslavia.
The list will be obtained on request from the following address: Dr. Karol Marhold, Institute of Experimental Biology and Ecology CBES SAS, Department of Systematic Botany, Dubravska cesta 14, CS-814 34 Bratislava, Czechoslovakia. The proceedings of the International Workshop "Carpathian flora", 1988, can also be requested.

Y.H. Savidan and Charles F. Crane, eds.:Apomixis Newsletter No. 1 appeared, No. 2 in preparation.
Please contact ORSTOM, Institut Français de Recherche Scientifique pour le Développement en Coopération, and the Department of Plant Science, Utah State University, Logan UT, U.S.A.

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11. Requests for Material and Information

SHURKAL Anatoly, Ph.D., N.I. Vavilov Institute of General Genetics , Academy of Sciences of the USSR, Gubkin Street 3, 117809 Moscow B-333, USSR, would appreciate material and information of seeds of *Pinus coraiensis* and *Pinus armandii* to check genetic distance. Information about genetic differentiation of conifers, species and population level. Information about schools, seminars etc.

WANG Fengehun, Department of Biology, Harbin Teachers University, Harbin, Heilongziang Province 150080, China, would appreciate fruits of *Medicago*.

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12. Miscellaneous News and Notes

IOPB Directory 1990

Writes the Editor: A new Directory of the IOPB is scheduled to appear in the June issue of the Newsletter. Please verify your mailing address and send a correct version to our Secretary **before** May 1990, so that he is able to revise the whole Membership list before the deadline for the Newsletter expires. Thank you.
Please look up the new address of the IOPB Secretariat (important for correspondence and membership fees payment). As usual, at the end of the Newsletter (p. 31).

Notice of move

Writes Dr. John McNeill: This is to let you know that I have resigned as Regius Keeper of the Royal Botanic Garden Edinburgh effective 15 October 1989, in order to take up the position of Associate Director Curatorial at the Royal Ontario Museum, Toronto, Canada.
Although there are personal factors that encourage a move to Toronto at this time, my one reason for leaving the Royal Botanic Garden Edinburgh is that retirement policy for senior staff throughout the public sector in UK effectively makes 60 a mandatory retirement age.
The Board of Trustees of the RBG Edinbuirgh are taking immediate steps to select a new Regius Keeper with a view to completing the selection process before or only shortly after I move to Toronto.
From 15 October 1989, my new address will be: Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario, M5S 2C6, Canada. Phone (+1) 416-586-5515, Fax: (+1) 416-586-5863.

Errata to the Lead Article from the Newsletter No. 12

Writes the Editor: In the Article by Dr. Hardy Eshbaugh published in the last issue of IOPB Newsletter, Table 4 has been erroneously transmitted by Fax. We apologize for the error and print now the correct version (p. 30). Please past it over the wrong one in your Newsletter, so that you have the right information completed. Thank you.

Corrigenda
Table 4
C.D. MITCHELL et al., 1989: Lead Article. Newsletter *12*, p. 9.

Table 4. Estimated divergence per nucleotide pair between pairs of Capsicum species, calculated by several different equations as given in the footnotes.

Equation: C. ann. vs. C. bacc.	C. ann. vs. C. cil.	C. bacc. vs. C. cil.
Brown et al. .0030	.0210	.0238
Engels .0015	.0105	.0119
Nei,Li [8] .0015	.0109	.0124
Nei,Li [9] .0016	.0110	.0122
Nei,Li [20] .0015	.0108	.0164

Brown et al. (1979): [1] $s = z/(x + y - z)$; [3] $p = (-\ln s)/n$

Engels (1981): [6] $p = [c - n(m-k)]/jc$

Nei and Li (1979): [8] $\delta = -(\ln \bar{S})/r$

[10] $\bar{S} = (2n_{xy})/(n_x + n_y)$ in which n = sites

[9] $\delta = -(3/2)\ln[(4\bar{S}^{1/(2r)} - 1)/3]$

[20] $\bar{F} = P^4/(3 - 2P)$; see Nei, 1987

[21] $\bar{F} = 2n_{xy}/(n_x + n_y)$ in which n=fragments

IOPB Executive and Council

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MEMBERSHIP APPLICATION FORM

International Organization of Plant Biosystematists

The International Organization of Plant Biosystematists (IOPB) was founded in 1960 to promote international cooperation in the study of biosystematics. The IOPB acts on several levels, from coordinating and publishing information on biosystematics to organizing conferences. The IOPB is open to all persons working or interested in biosystematics which is interpreted in a broad sense (see symposium volume "Plant Biosystematics", edited by W.F. Grant, 1984).

An IOPB Newsletter is sent to all members. Such items as current research, requests for material and information, meeting reports, publications, etc. are reported. The Editor is Prof. Krystyna M. Urbanska, Geobotanisches Institut ETH, Zürichbergstrasse 38, CH-8044 Zürich, Switzerland.

At present, Membership is for the three year period between Symposia. The next Symposium will be held in Japan in 1989.
Membership fee 1990-1992: US$ 25.00.
Make cheques or money orders payable to the International Organization of Plant Biosystematists (IOPB).
Send the form and payment to the Secretary/Treasurer: Dr. Hans C.M. den Nijs, Hugo de Vries Laboratory, University of Amsterdam, Kruislaan 318, NL-1098 SM Amsterdan, The Netherlands

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IOPB - Membership application for

.....	.....	.....
Last name	First name (Mr., Mrs.)	Title

Address

Date

Signature

Research News

for the International Organization of Plant Biosystematists Newsletter
(IOPB Newsletter)

Typewritten or in capital letters

....
Last name First name Title

Address:

Personal news (Promotions etc.)

Publications during the year (max. **three** publications):

Current projects:

Projects completed:

Projects started:

Requests for research material and information:

Articles and reports should be attached

To be sent to Krystyna M. Urbanska, Geobotanisches Institut ETH, Stiftung Rübel, Zürichbergstrasse 38, CH-8044 Zürich, Switzerland