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No. 10

Edited by K. M. Urbanska



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INTERNATIONAL ORGANIZATION OF PLANT BIOSYSTEMATISTS

NEWSLETTER No. 10

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Dear IOPB Members,

Here we are, with an opportunity for celebration: **No. 10** of the Newsletter. Thank you all for continuous interest and cooperation. I hope you like our little blue brochure and am looking forward to receiving further contributions.

The lead article in this issue (p. 3) comes from Fudan University, People's Republic of China. We thank our Chinese colleagues for this most interesting paper on karyotype evolution. Should you have any comments on it, please send them here to have them published in the next issue of the Newsletter.

Profile of a Lab, profile of a scientist ... Your President presents the current research programme of the Alpine Group, Geobotanical Institute SFIT Zürich (p. 6).

We should like to present "profiles" of all IOPB Executive and Council Members and their respective labs in the Newsletter issues to come. Perhaps the IOPB Members (especially the new ones) would like to know more about what we are and what we do. Shall the Editor be heard?

Also in this issue we do have a chromosome number report (p. 11). Please look up p. 15 as well: chromosome numbers will not be published anymore in TAXON. If you or your colleagues have any data on genome to publish, please send them to Dr. Clive Stace, Dept. of Botany, University of Leicester, Leicester LE1 7RH, England, who prepares this column for Newsletter.

New elections of IOPB Executive (Vice-President, Secretary/Treasurer) and Council are slowly approaching (p. 11). Please look up the No. 7 of the Newsletter where we've precised which kind of officers the IOPB does need ... Should you have any suggestions about possible nominees, our Past President Bill Grant will certainly be glad to receive them for consideration.

Very important news from Japan (p. 12). You all received by now the First (beautiful) Circular on IOPB Symposium 1989, but read the column nevertheless, there are some more details. It is now time to begin some planning for your travel to Kyoto as sponsors are hard to come by ...

Should some of you not yet have paid your membership fees for 1987-1989, please try to do it quickly. We need membership fees to assure a regular publication of the Newsletter, especially now since the number of the copies printed has to be increased (many new members). The address of Liv Borgen is given on p. 13.

Interesting publishing news: a new programme package for multivariate analysis is offered for subscription by Dr. Raamsdonk. It also has a very appropriate name; more about this particular species of IRIS on p. 13.

Data for Newsletter Nr. 11 should arrive here before November 30, 1988.

Have a good field season

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.

2. LEAD ARTICLE

By Hsu Pingsheng and Liu Yan, Department of Biology, Fudan University, Handan Lu 220, Shanghai, People's Republic of China.

A study on the mechanism of karyotype evolution in the genus Lycoris

The eastern Asiatic genus Lycoris (Amaryllidaceae) consists of about 20 species. To date, chromosome number determinations and karyotype analyses are known for most of the species. However, it is still unsolved whether a successive decrease in chromosome number as a result of Robertsonian fusion or a gradual increase in chromosome number caused by misdivision of the centromere has been the essential mechanism for karyotype evolution and speciation in the genus Lycoris.

1. The limitations of fusion and fission theories

Two theories, fusion and fission, have been proposed for explaining karyotype evolution in Lycoris. The fusion theory assumes that the karyotype evolution has been a stepwise process of fusion. In the fission theory, centromere misdivision is considered to have played a decisive role in the process of karyotype evolution. It seems, however, that both theories have overlooked an important phenomenon in karyotype alteration: the chromosomes with $2n=22$ are all acrocentric (A), while those of species with $2n=16$, 14, or 12 are all telocentric (T). Neither fusion nor fission theory can account for this phenomenon. If one accepts fusion theory (Fig. 1a), species possessing $2n=22A$ are considered to be primitive; 2 A's are assumed to have combined into one metacentric chromosome (M) through fusion, and the remaining uncombined chromosomes should be A's instead of T's. If this is the case, then how did $2n=16=6M10T$ come about? In the case of fission theory (Fig. 1b), the species with $2n=12=10M2T$ is regarded as the most primitive known so far. As a result of fission, one M splits into 2 T's, and it will not be able to give rise to $2n=22A$. Obviously, there are inadequacies in both fusion and fission theories.

2. The presentation of a new theory

2.1. The starting point of karyotype evolution

There are two different opinions regarding the starting point of karyotype evolution (i.e. the original basic number) in Lycoris: one holds that $x=11$, and the other holds that $x=6$. Three aspects of the problem should be considered. First, among the 12 normal diploid species of Lycoris, 5 have $n=11$ (41.7%), and only 2 with $n=6$ (16.7%). Second, the basic chromosome number of the outgroups of Lycoris, such as Ungernia, Nerine, Amaryllis, Crinum, etc., is all 11 rather than 6. Moreover, among the 89 genera of Amaryllidaceae, $x=11$ occurs in 91 genera. It may thus be concluded that 11 should be the original basic number of Lycoris, and we have every reason to define $2n=22A$ as the starting point of karyotype evolution of the genus in question.

2.2. Evidence for the existence of fusion process

It is most likely that the process of fusion is the only way that karyotypes possessing M's from the primitive $2n=22A$ could have originated. Both BOSE (1963) and KURITA (1987b) have found through observing the so-

matic chromosomes of *Lycoris radiata* that in addition to $2n=33A$, there are karyotypes of $2n=31A1M1B$. Clearly, the M and the B chromosomes here must have evolved by fusion of two A's. The same situation seems to have occurred in both *L. incarnata* (BOSE 1958) and *L. albiflora* (KURITA 1987a). These data indicate that centric fusion as a mode of chromosome evolution in *Lycoris* is quite probable.

As proposed above, fusion of 2 A's will give rise to one M and one B as well. However, B chromosomes have seldom been observed in the normal diploid species of *Lycoris*. Two explanations are possible: (a) loss of B chromosomes; (b) the transfer of B chromosomes to other chromosomes. The loss of B chromosomes should result in a decrease in nuclear DNA content, but results obtained through measurements of relative nuclear DNA contents of 8 species of *Lycoris* have shown that nuclear DNA levels of species with $2n=14$ or 16 were distinctly higher than those with $2n=22$. It seems therefore that the B chromosomes have probably been transferred rather than lost. An increase in nuclear DNA contents also indicates that duplications or other chromosome aberrations have taken place during the process of fusion, in addition to translocations.

2.3. Evidence for the existence of fission process

A reexamination of the karyotypes in genus *Lycoris* (LIU and HSU, unpubl.) has shown that the chromosomes of all normal diploid species are telocentric. DARLINGTON (1956) and JONES (1978) argued that these T's originated from centromere misdivisions. This possibility should be considered in connection with the origin of T's in *Lycoris*.

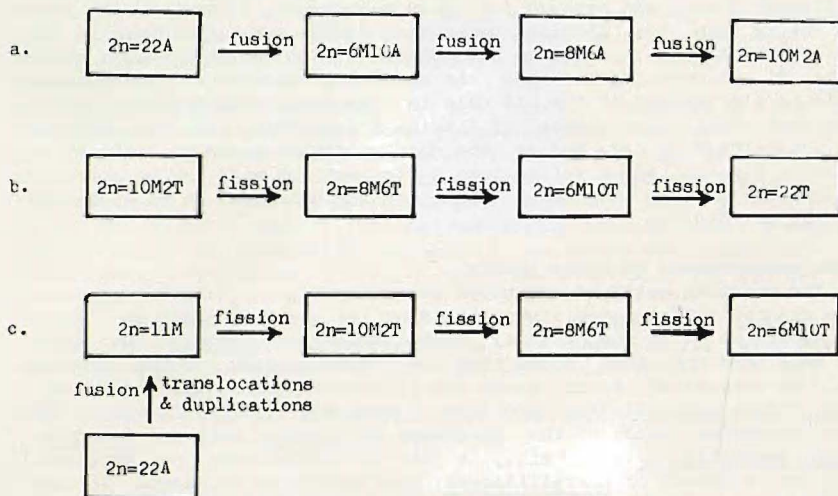


Fig. 1. Theories advanced for explaining the process of karyotype evolution in *Lycoris*.
 a. fusion theory, b. fission theory, c. fusion-fission synthetic theory.

So far, $2n=12=10M2T$ (*L. aurea*) is known to be the karyotype with the highest number of M's. The subsequent ones are $2n=14=8M6T$ and $2n=16=6M10T$. The fact that all chromosomes in these karyotypes are telocentric suggest an ancestral karyotype with all M's (i.e. $2n=11M$). This may be true in view of the mode of vegetative reproduction of *Lycoris* which could stabilize members of such a $2n=11M$ form. It was probably due to the existence of the single unpaired isochromosome that the karyotype soon transformed to $2n=12=10M2T$. Successive fission of 1 to 2 pairs of M's gave rise to $2n=14=8M6T$ and $2n=16=6M10T$.

From an overall analysis of the data given above, a new "fusion-fission synthetic theory" is herewith proposed for explaining the karyotype evolution in *Lycoris*. The theory embodies three central ideas. First, the basic chromosome number of *Lycoris* is $x=11$, and $2n=22$ is the primitive karyotype. Second, both fusion and fission have occurred, at different times during the process of karyotype evolution. Third, duplications, translocations, and other chromosome aberrations must have occurred in the process of fusion.

On the basis of our new theory, we have arrived at a scheme of karyotype evolution in *Lycoris* outlined in Fig. 1c. Taking $2n=22A$ to be the starting point of karyotype evolution, the karyotype first underwent a process of fusion which involved a series of fusion, translocations and duplications, etc. Eventually all the A's were combined into M's and forming $2n=11M$, and no further fusion occurred. The second stage of karyotype evolution involved fission. After one to several instances of fission, the resultant karyotypes would be $2n=12=10M2T$, $2n=14=8M6T$, and $2n=16=6M10T$. So far, $2n=16=6M10T$ is known to be the most advanced karyotype of the genus under study.

References

- BOSE S., 1958: Cytological investigations in *Lycoris*. 3. Chromosome number and karyotype analysis in *Lycoris incarnata*. *Plant Life* 14, 37-41.
- BOSE S., 1963: A new chromosome number and karyotype in *L. radiata*. *Nature* 197, 1229-1230.
- DARLINGTON C.D., 1956: Chromosome botany. Allen and Unwin, London.
- JONES K., 1978: Aspects of chromosome evolution in higher plants. *Recent Advances in Botany* 6, 119-194.
- KURITA S., 1987a: Variation and evolution in the karyotype of *Lycoris*, Amaryllidaceae II. Karyotype analysis of the ten taxa among which seven are native in China. *Cytologia* 52, 19-40.
- KURITA S., 1987b: Variation and evolution in the karyotype of *Lycoris*, Amaryllidaceae IV. Intraspecific variation in the karyotype of *L. radiata* (L'Her.)Herb. and the origin of this triploid species. *Cytologia* 51, 137-149.

Summary

Fusion and fission theories have been proposed by previous authors for explaining the process of karyotype evolution in *Lycoris*, but neither of the theories can account for the phenomenon that all chromosomes of species with $2n=22$ are acrocentric, while those of species with $2n=16$, 14, or 12 are all telocentric. A new "fusion-fission synthetic theory" is therefore proposed which comprises three central points: (1) the basic chromosome number of *Lycoris* is $x=11$, and $2n=22$ is the primitive karyotype; (2) both fusion and fission have occurred during the

process of karyotype evolution; (3) duplications, translocations and other chromosome aberrations have occurred in the process of fusion.

3. PROFILE OF A LAB:

Alpine group at the Geobotanical Institute SFIT Zürich, Switzerland

by Krystyna M. Urbanska

The Alpine Group at the Geobotanical Institute SFIT Zürich consists at the time being of eight scientists and various temporary collaborators who mostly help with the field trials. Our research programme deals with biological erosion control above the timberline and is based on studies in organismic biology and ecology of alpine plant populations. It includes trials in laboratory, greenhouse, experimental garden and in the field. The latter experiments are carried out above timberline in surroundings of Davos (Grisons, NE Swiss Alps). Our research area in the alpine vegetation belt corresponds to an altitude bracket of some 2300-2700 m a.s.l.

The research projects assigned to particular members of our group deal with various life strategies of alpine plants. For instance, the Ph.D. Thesis of F.R. Tschurr focuses on clonal growth and individual regeneration potential, the regeneration concept including recovery and regrowth after damage to plant. B. Tschander works on growth and reproduction strategies paying a special attention to clone mapping, vegetative reproduction by clone fragmentation as well as female reproductive effort and female reproductive efficiency. M. Schütz and R. Flüeler study seed production, germinating behaviour in laboratory, seedling emergence and recruitment in the field as well as the stage-variant differentiation in experimental populations. M. Schütz also works together with K.M. Urbanska on the concept of safe site which we consider as ecosystem-specific. M. Gasser who formerly studied demography in *Biscutella levigata* works now with B. Hefti-Hollenstein and A. Hasler on plants with various growth strategies: they investigate family groups resulting from the single-ramet cloning (SCR) treatment. The SRC technique has been developed in our group and proved successful in numerous trials. K.M. Urbanska studies asexual reproduction in various taxa (agamospermy, clone fragmentation and reproduction by specialized vegetative propagules) and its influence on the population structure.

Various studies of our group are integrated in scientific revegetation trials carried out above the timberline. We use native species only, and establish both seed populations and colonies of clonal modules. Safe site conditions are simulated with biologically degradable matting. Our studies permit to observe behaviour of alpine plants and their population dynamics in new ecological situations. They also demonstrate that revegetation of alpine disturbances is possible when native, adapted plant material is used. This research is of a particular importance to the problem of erosion control in extensive man-made ski runs where alpine vegetation and soil have been destroyed. Commercial revegetation trials in the Swiss Alps are not satisfactory in a long run despite re-

peated treatment, and a recent massive use of sewage sludge-derived fertilizer brings about the danger of heavy-metal contamination of alpine ecosystems. For this reason, a concept of native, self-sustaining plant cover in disturbed high-altitude sites is urgently needed.

Apart from the studies in the Alps, K.M. Urbanska has been carrying out a long-term research on *Antennaria carpatica* s.l. (biosystematics, reproductive strategies, population biology) and *Eschscholtzia mexicana* (genetic polymorphism for cyanogenesis). She is currently working on a book on plant population biology, to be published at G. Fischer Publ., Stuttgart (in German, with a possible option on French and English text).

Selected recent publications:

- GASSER M., 1986: genetic-ecological investigations in *Biscutella levi-gata*. Ph.D.Thesis. Veröff.Geobot.Inst.ETH,Stiftung Rübel,Zürich, 86. 85 pp.
- SCHUETZ M., 1983: Keimverhalten und frühe Lebensphasen alpiner Pflanzen von Silikat- und Karbonatschuttstandorten. Germinating behaviour and early life phases of plants from siliceous and calciferous scree. Diploma Thesis. Geobot.Inst.ETH,Zürich. (Polycopy).
- SCHUETZ M., 1988: Genetisch-ökologische Untersuchungen an alpinen Pflanzenarten auf verschiedenen Gesteinsunterlagen: Keimungs- und Aussaatversuche. Genetic-ecological investigations on alpine plant species on various substrata: germination trials and seeding experiments. Ph. D.Thesis. Veröff.Geobot.Inst.ETH,Stiftung Rübel,Zürich, 99. 88 pp.
- TSCHURR F.R., 1988: Zum Regenerationsverhalten einiger Alpenpflanzen. Regeneration in some alpine plants. Ber.Geobot.Inst.ETH,Stiftung Rübel,Zürich, 54 (in press).
- URBANSKA K.M., 1985. Some life history strategies in asexually reproducing plant. Bot.Helv. 95, 81-97.
- URBANSKA K.M., 1986: High altitude revegetation research in Switzerland - problems and perspectives. Veröff.Geobot.Inst.ETH,Stiftung Rübel, Zürich, 87, 155-167.
- URBANSKA K.M., 1986: Behaviour of alpine plants and high altitude revegetation research. Proc.7th HAR Workshop Fort Collins. 214-226.
- URBANSKA K.M., 1986: Some differentiation patterns within the *Antennaria carpatica* group. Symb.Bot.Ups. 27(2), 207-221.
- URBANSKA K.M., 1987: Disturbance, Hybridization and hybrid speciation: In: VAN ANDEL J. et al. (eds.), Disturbance in grasslands. Junk, The Hague. 285-301.
- URBANSKA K.M., 1988: High altitude revegetation research in the Swiss Alps: experimental establishment and performance of native populations in machine-graded ski runs above the timberline. Proc.8th HAR Workshop Fort Collins. (In press)
- URBANSKA K.M. and SCHUETZ M., 1986: Reproduction by seed in alpine plants and revegetation research above timberline. Bot.Helv. 96, 43-60.
- URBANSKA K.M., HEFTI-HOLENSTEIN B. and ELMER G., 1987: Performance of some alpine grasses in single-tiller clonings (STC) experiments and in the subsequent revegetation trials above the timberline. Ber.Geobot.Inst.ETH,Stiftung Rübel,Zürich, 53, 64-90.
- URBANSKA K.M., SCHUETZ M. and GASSER M., 1988: Scientific revegetation trials above the timberline - an exercise in experimental population ecology. Ber.Geobot.Inst.ETH,Stiftung Rübel,Zürich, 54 (in press).

4. RESEARCH NEWS

ANDERSSON Eva, Ph.D-student., Uppsala University, Dept. of Systematic Botany, P.O.Box 541, S-75121 Uppsala, Sweden.

Projects started:

Patterns of variation within the *Dactylorhiza traunsteineri* complex.

ANZALONE Bruno, Prof., Università degli Studi di Roma "La Sapienza", Dpto. di Biologia vegetale, Città Universitaria, Largo Cristina di Svezia 24, I-00100 Roma, Italy.

Recent publications:

1986:

- La flora vascolare spontanea delle rive del Tevere e suoi affluenti entro Roma. *Ann.Bot.(Roma)* 44(suppl.4), 1-46.

1987:

- Sistematica e corologia di *Pastinaca sativa* L. in Italia. *Arch.Bot. e Biogeogr.Ital.* 63(1-2), 1-21.

- *Micromeria fruticosa* (L.) Drce in Italia. *Webbia* 41(1), 39-43 (with LATTANZI E.).

- *Vicia tenuifolia* Roth, *V. elegans* Guss. e *V. dalmatica* A. Kerner in Italia. *Ann.Bot.(Roma)* 45 (suppl.5).

Projects completed:

Studio di *Seseli montanum* L. (s.l.) e *S. tortuosum* L. in Italia.

Studio della flora vascolare spontanea della tenuta di Castelporziano (Roma).

Projects started:

Rettifiche e aggiunte al "Prodromo della Flora Romana".

Studio sistematico e fitochimico di *Ferula communis* L. (s.l.) (with ALTRI).

APELGREN Karin, Ph.D-student., Uppsala University, Dept. of Systematic Botany, P.O.Box 541, S-75121 Uppsala, Sweden.

Recent publications:

1987:

- *Galium elongatum* - an overlooked taxon in Sweden. (In Swedish with abstract in English). *Svensk Bot.Tidskr.* 81, 99-102.

- *Valeriana baltica* and other entireleaved variants of *Valeriana* in Sweden. (In Swedish with abstract in English). *Svensk Bot.Tidskr.* 81, 195-200.

Projects started:

"Relations between coast and inland taxa in the Baltic lunduplift-area". Taxa included in the study are the *Valeriana officinalis* complex, *Galium palustre* s.l. and *Myosotis laxa* s.l.

BALKWILL Kevin, Dr., Curator of the C.E. Moss Herbarium, Department of Botany, University of the Witwatersrand, P.O. Wits, 2050, Republic of South Africa.

Projects completed:

Revision of the acanthaceous genera *Peristrophe* and *Dicliptera* in southern Africa.

Projects started:

Revision of *Rhinacanthus* and *Chaetacanthus* in southern Africa. Taxonomic Studies in *Barlevia*.

BAYER Randall J., Dr., Curator of the Vascular Plant Herbarium (ALTA), Dept. of Botany, University of Alberta, Edmonton, Alberta, Canada T6G 2E9.

Research on the genus *Antennaria* (Asteraceae), which focuses on evolutionary relationships among the polyploid, agamic complexes and their sexual relatives. Cytology, phenetics, and biomechanical genetics (enzyme electrophoresis) are being used to assess relationships among *Antennaria alpina*, *A. parvifolia*, and *A. rosea*. He is collaborating with K.M. Urbanska, in studying the relationships among two chromosomal races of *A. pulcherrima* ($2n=28$, $2n=56$). Population genetic studies, which evaluate outcrossing rates and population substructuring in *Antennaria* are also being conducted. Graduate student, Lebedyk Daniel is currently working on niche diversification in *A. rosea* and related taxa.

Recent publications:

1987: Evolution and phylogenetic relationships of the *Antennaria* (Asteraceae: Inuleae) polyploid agamic complexes. *Biol.Zent.bl.* 106, 683-698.

FAVARGER Claude, Prof., Institut de Botanique, Université de Neuchâtel, 9, Chemin de Chantemerle, CH-2000 Neuchâtel 7, Switzerland.

Recent publications:

DUCKERT M.M. and FAVARGER C., 1987: Contribution à la cytotaxonomie et à la Cytogéographie des Poa de la Suisse. *Mém.S.H.S.N.* 100.

LI Shiyou, Assistant Professor, Botanical Institute, Northeast Forestry University, Harbin, P.R. China.

Selected recent publications:

LI S.Y., 1987: Buckthorn (*Rhamnus* L.) resources in Northeast China. *Intern.Symp. on Grassland in Forest Area (ISGFA)*, Harbin, China.

LI S.Y., 1988: Cytotaxonomy of *Rhamnus* L. in Northeast China. *Bull.Bot. Res.* 8(3).

LI S.Y. and NING Z.H., 1988: Morphology, taxonomy and distribution of the genus *Rhamnus* L. (Rhamnaceae) in Northeast China. *Bull.Bot.Res.* 8(2).

NING Z.H. and LI S.Y., 1988: Two new varieties of *Caragana* Lam. in Northeast China. *Bull.Bot.Res.* 8(3).

Further four articles are being published.

Projects completed:

Studies on pollen morphology of *Caragana* Lam. in Northeast China.
Systematic position of the genus *Sambucus* L.

"Flora Heilongjiangensis" VI (Rosaceae, Saxifragaceae).

Projects started:

Floristic similarity between eastern Asia and eastern North America.
Biosystematic studies in the genus *Rhamnus* L. in China.

MACIOR Lazarus Walter, Professor, Department of Biology, The University of Akron, Akron, Ohio 44325, U.S.A.

Personal news:

Currently planning project in pollination ecology of *Pedicularis* species in the Himalaya.

Selected recent publications:

1986:

Floral resource sharing by bumblebees and hummingbirds in *Pedicularis* (Scrophulariaceae) pollination. *Bull.Torrey Bot.Club* 113, 101-109.

Pollination ecology and endemic adaptation of *Pedicularis howellii* Gray (Scrophulariaceae). *Plant Species Biology* (Kyoto) 1, 163-172.

Pollination ecology and endemism of *Pedicularis pulchella* Pennell (Scro-

phulariaceae). Plant Species Biology (Kyoto) 1, 173-180.

1988:

A preliminary study of the pollination ecology of Pedicularis (Scrophulariaceae) in Japan. Plant Species Biology (Kyoto) (in press)

MARTINSSON Karin, Ph.D-student, Uppsala University, Dept. of Systematic Botany, P.O.Box 541, S-75121 Uppsala, Sweden.

Recent publications:

1987: Gallbildningar på Callitriche. Fungal galls caused by Sorodiscus callitrichus. Svensk Bor.Tidskr. 81, 334-336.

Projects started:

Biosystematic studies of the genus Callitriche in Fennoscandia.

POWELL A. Michael, Professor, Department of Biology, Sul Ross State University, Alpine, Texas 79832, U.S.A.

Recent publications:

1988: Trees and shrubs of Trans-Pecos Texas. Big Bend Natural History Assoc. 536 pp. (including keys, descriptions, and distributions of ca. 450 spp. of woody plants native to the Texas mountain and desert region; most species illustrated).

Projects started:

Cytogenetic studies of certain Cactaceae of the northern Chihuahuan Desert region.

PUECH S. (Mrs.), Dr., Maître de conférences, Laboratoire de Systématique et Ecologie méditerranéennes, Université des Sciences et Techniques du Languedoc, Institut de Botanique, 163, rue Auguste Broussonet, F-34000 Montpellier, France.

Recent publications:

PUECH S., 1987: Fertility, germinal aptitudes and karyotype into two populations of Plantago albicans (Plantaginaceae) of Tunisia. Bull.Soc. Bot.Fr. 134(2), 145-154.

ANDARY C., RASCOL J.P., PUECH S., 1988: The coffeoyl esters and chimio-taxonomy of Teucrium section Polium (Labiatae). Can.J.Bot. (in press).

Projects completed:

Biosystematic study of Teucrium (Labiatae) section Polium of the western mediterranean region (France, Iberian peninsula and Tunisia). Publications and some chromosome numbers are still needed.

Biosystematic study of Plantago albicans L. (Plantaginaceae) of Tunisia.

Projects started:

Biosystematic study of the Teucrium section Polium in Morocco and Algeria.

Biosystematic study of Plantago albicans in Morocco.

QUINN James A., Dr., Prof., Department of Biological Sciences, Rutgers University, Piscataway, New Jersey 08855, U.S.A.

Recent publications:

QUINN J.A., 1987: Relationship between synaptospermy and dioecy in the life history strategies of Buchloe dactyloides (Gramineae). Amer.J.Bot. 74(8), 1167-1172.

CHEPLICK G.P. and QUINN J.A., 1987: The role of seed depth, litter and fire in the seedling establishment of amphicarpic peanutgrass (Amphicarpum purshii). Oecologia (Berlin), 73, 459-464.

CHEPLICK G.P. and QUINN J.A., 1988: Quantitative variation of life history traits in amphicarpic peanutgrass (Amphicarpum purshii) and its evolutionary significance. Amer.J.Bot. 75(1), 123-131.

Missouri Botanical Garden, P.O.Box 299, St. Louis, Missouri 63166, USA,
Director: Peter H. Raven.

Most of the 28 reprints received deal with various facets of biosystematics and evolution in Onagraceae. A few examples:

CARR B.C., GREGORY D.P., RAVEN P.H. and TAI W., 1986: Experimental hybridization, chromosomal diversity, and phylogeny within *Gaura* sect. *Itopogaura* (Onagraceae). *Amer.J.Bot.* 73(8), 1144-1156.

WAGNER W.L., 1986: New taxa in *Oenothera*. *Ann.Miss.Bot.Garden* 73, 475-480.

RAMAMOORTHY T.P. and ZARDINI E.M., 1987: The systematics and evolution of *Ludwigia* sect. *Myotocarpus* s.l. (Onagraceae). *Monographs in Syst. Bot. Missouri Bot.Garden.* 120 pp.

5. CHROMOSOME NUMBER REPORT

by LI Shiyu, Assistant Professor, Botanical Institute, Northeast Forestry University, Harbin, People's Republic of China.

All species studied are diploid.

Rhamnus arguta Maxim. (Rhamnaceae), $2n=24$, Liaoning, S.Y. Li 85911.

Rhamnus davurica Pall., $2n=24$, Harbin, S.Y. Li 959109

Rhamnus davurica Pall. var. *nipponica* Makaino, $2n=24$, Harbin, S.Y. Li 859107

Rhamnus dalianensis S.Y. Li et Z.H. Ning, $2n=24$, Dalian, Lianing, S.Y. Li 859025

Rhamnus globosa Bunge var. *meyeri* (Schn.) S.Y. Li et Z.H. Ning, $2n=24$, Xiongyiao, Liaoning, S.Y. Li 859011

Rhamnus bungeana Bunge, $2n=24$, Xiangshan, Beijing, S.Y. Li 859800

Caragana bicolor Kom. (Fabaceae), $2n=16$, Harbin, S.Y. Li and Z.H. Ning 856246

Caragana microphylla Lam., $2n=16$, Harbin, S.Y. Li and Z.H. Ning 856100

Elaeagnus angustifolia L. (Elaeagnaceae), $2n=28$, Gansu, Wang 008

For further details, please contact the author.

6. IOPB EXECUTIVE AND COUNCIL ELECTIONS 1989

New officers of IOPB Executive (Vice-President, Secretary/Treasurer) and Council are to be elected next summer. It is time to consider possible candidates; should you have any suggestions, please contact our Past President Prof. Dr. William F. Grant or any other Member of the present Executive. Please remember that the Council Members are eligible for re-election (IOPB Constitution, Sect. 3, Art. 7).

7. THE IOPB SYMPOSIUM 1989, JAPAN: NEWS FROM THE ORGANIZING COMMITTEE

The IOPB Symposium on "Biological Approach and Evolutionary Trends in Plants" will be held in Kyoto, Japan, on July 10-14, 1989. By now the First Circular has been distributed and the Organizing Committee would appreciate an early response. A preliminary list of Invited Speakers and suggested titles:

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

WARWICK S.: Genetic variation in weeds.

VAN RAAMSDONK L.W.D.: Evolutionary aspects of cultivated plants and their wild relatives.

KOBAYASHI H. and SAKAMOTO S.: Weed-crop complex in millet.

ITO K. and MATSUNAKA S.: Parapatric differentiations of paraquat resistant races in *Erigeron philadelphicus* L.

BLOM C.W.P.M.: The biology of some species under flooded conditions.

2. Molecular Approaches in Plant Biosystematics

OLMSTEAD R.: Chloroplast DNA and phylogenetic studies in Angiosperms.

ZIMMER E.A.,: Ribosomal DNA variation and its biosystematic uses.

WADA K.: Molecular approach to plant biosystematics from protein sequence comparisons.

RAINA S.N.: Genome organization and evolution in the genus *Vicia*.

3. Population Biology and Life History Evolution

a. Reproductive Biology of Plants

IWASA Y.: Leaf phenology of perennials as the optimal growth schedule.

ICHIMURA T.: Mating systems and speciation in algae: Morphological diversity vs. reproductive isolation.

ARROYO M.T.K.: Relationships between plant breeding systems and plant pollination.

SOLTIS D. and SOLTIS P.: Reproductive biology of ferns and fern-allies.

URBANSKA K.M.: Biology of asexually reproducing plants.

BIERZYCHUDEK P.: The demographic consequences of sexuality and apomixis in *Antennaria*.

WYATT R.: Reproductive biology of milkweeds (*Asclepias*).

b. Demography and Life History Evolution in Plants

KEDDY P.A.: Evolutionary biology meets predictive community ecology: Functional groups of plants.

WATKINSON A.R.: Life history variation among annual plants: A population analysis.

KACHI N.: Evolution of size-dependent reproduction in biennial plants: A demographic approach.

For more information, please contact the Chairman of the Organizing Committee for IOPB 1989 Symposium, Prof. Dr. Shoichi Kawano, Dept. of Botany, Faculty of Science, Kyoto University, Sakyo-ku, Kyoto 606, Japan.

8. OUTSTANDING MEMBERSHIP FEES FOR 1987-1989

Writes Dr. Liv Borgen, Secretary/Treasurer of IOPB, Botanical Garden and Museum, University of Oslo, Trondheimsveien 23B, N-0562 Oslo, Norway: All the Members who have not yet paid their fees for the period of 1987-1989 (US dol. 20.-) are kindly requested to do so as soon as possible, at the address given above.

9. MEETINGS

Binna Burra Lodge, August 26-28, 1988

"Pollination Workshop '88 will be held jointly with the 7th International Palynological Congress, and it is the fourth in a series of biennial workshops acting as a focus for research in pollination, fertilization, and seed setting in the Southern hemisphere. Emphasis will be given to manipulation of pollen-pistil interactions i.e., biotechnology in the control of fertilization.

The workshop is limited to the first 50 delegates; no limits for accompanying members.

Papers of 20-30 minutes duration as well as posters will be presented in an informal environment.

For more information, please contact the Organizer: Prof. Dr. R.B. Knox, School of Botany, University of Melbourne, Parville, Victoria 3052, Australia

10. PUBLISHING NEWS

IRIS (Information Regrouping in Order to Identify Structures): programme package for multivariate analysis.

A maximum of user friendliness was achieved by developing a completely menu-driven programme structure. More than 50 menus are arranged in a tree-like structure with four levels. Indications of menu name, current level and, if necessary, a brief preview of the subsequent menu, are given. Most menus display a status-block with relevant information like name of data set, preliminary choices and selections made.

All common multivariate methods are included; a wide choice of additional techniques is also available (descriptive statistics, linear analysis, uni- and multivariate data transformation, ANOVA, Kruskali-Wallis test, etc.). An editor forms part of the package.

IRIS can be used in various disciplines for a quick and easy analysis of data.

IRIS is running on a VAX computer because of the large memory capacity. The programme will be available in English for a reasonable price including manual, tape and postage, provided a sufficient number of potential users subscribe.

For information, please write to the author: Dr. L.W.D. Raamsdonk, Institute for Horticultural Plant Breeding, P.O. Box 16, NL-6700 AA Wageningen, The Netherlands.

11. REQUEST FOR MATERIAL AND INFORMATION

BALWILL Kevin, Dr., Curator of the C.E. Moss Herbarium, Dept. of Botany, University of the Witwatersrand, P.O. Wits, 2050, Republic of South Africa, would appreciate material of the Acanthaceae.

BAYER Randall J., Dr., Curator of the Vascular Plant Herbarium (ALTA), Dept. of Botany, University of Alberta, Edmonton, Alberta, Canada T6G 2E9, would appreciate duplicata specimens of all *Antennaria* species from other herbaria.

FAVARGER Claude, Prof., Institut de Botanique, Université de Neuchâtel, 9, Chemin de Chantemerle, CH-2000 Neuchâtel 7, Switzerland, would appreciate living material or recent seeds of *Minuartia regeliana* (Trautv.) Mattf.

LI Shiyou, Assistant Professor, Botanical Institute, Northeast Forestry University, Harbin, People's Republic of China, would appreciate viable seeds and specimens of *Rhamnus L.* from America and Europe, and papers on the floristic similarity between eastern Asia and eastern North America.

MACIOR Lazarus Walter, Professor, Department of Biology, The University of Akron, Akron, Ohio 44325, U.S.A., would appreciate seeds of European and Asiatic *Pedicularis* species.

POWELL A. Michael, Professor, Department of Biology, Sul Ross State University, Alpine, Texas 79832, U.S.A., would appreciate seeds of *Tylosema fassoglense* in particular, and other *Tylosema* species including *T. esculentum*; seeds of *Bauhinia persiana* subsp. *mucronata* and related species.

Mrs. S. PUECH, Dr., Maître de conférences, Laboratoire de Systématique et Ecologie méditerranéennes, Université des Sciences et Techniques du Languedoc, Institut de Botanique, 163, rue Auguste Broussonet, F-34000 Montpellier, France, would appreciate infrutescences and seeds of *Teucrium* section *Polium* and of *Plantago albicans* for fertility and karyological studies and the correspondent herbarium samples from North African countries.

12. MISCELLANEOUS NOTES

News from the IAPT

Prof. Dr. W. Greuter reports in his letter to the Editor that the column "Chromosome Number Reports" appearing in TAXON and edited by Dr. A. Löve will be discontinued after the 100th issue that is due to appear soon; the IAPT headquarters have been transferred from Utrecht to Berlin; the IAPT membership dues may be now paid directly to a Swiss bank account rather than to be sent as a check in US dollars to Washington.

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INTERNATIONAL ORGANIZATION OF PLANT BIOSYSTEMATISTS

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1987-1989

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Judy West, The National Herbarium of Australia, CSIRO, Division of Plant Industry, P.O.Box 1600, Canberra City, ATC 2601, Australia

CONFIDENTIAL - SECURITY INFORMATION

MEMORANDUM FOR THE DIRECTOR

DATE: 10/15/54

RE: [Illegible]

1. [Illegible]

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15. [Illegible]

RESEARCH NEWS

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

(Tyewritten or in capital letters)

.....
Last name First name Title

Address:

Personal news (promotions etc.)

Publications during the year:

Current projects:

Projects completed:

Projects started:

Requests for research material and information:

Articles and longer reports should be attached

To be sent to:
Prof. Dr. Krystyna M. Urbanska, Geobotanisches Institut ETH,
Zürichbergstrasse 38, CH-8044 Zürich, Switzerland

THE UNIVERSITY OF CHICAGO
DEPARTMENT OF CHEMISTRY

REPORT OF RESEARCH

1. INTRODUCTION

2. EXPERIMENTAL PROCEDURE

3. RESULTS AND DISCUSSION

4. CONCLUSIONS

5. REFERENCES

6. APPENDICES

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M E M B E R S H I P A P P L I C A T I O N F O R M

I N T E R N A T I O N A L O R G A N I Z A T I O N O F P L A N T B I O S Y S T E M A T I S T S

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 arranging 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. The history and past activities of IOPB have been given in Taxon 31, 386-387, 1982.

An IOPB Newsletter is sent to all members. Such items as current research, requests for materials and information, meeting reports, publications, etc. are reported. The Editor is Prof. Krystyna M. Urbanska, Geobotanisches Institut ETH, Zürichbergstr. 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 1987-1989: US dol. 20.00

Make cheques or money orders payable to the International Organization of Plant Biosystematists (IOPB)

Send payment to: Dr. Liv Borgen, Secretary-Treasurer, IOPB
Botanical Garden and Museum, Tronheimsveien 23B, N-0562 Oslo 5, Norway

Send the form to: Dr. Liv Borgen, Secretary-Treasurer, IOPB
Botanical Garden and Museum, Tronheimsveien 23B, N-0562 Oslo 5, Norway

IOPB - Membership application form

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

Address

Date

Signature

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PHYSICS 551

LECTURE 1

1.1

1.2

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