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Annual report of the Geobotanical Institute ETH (1999)

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1 Introduction

For the Geobotanical Institute 1999 was a very busy year with a full programme of teaching, research and other activities. It was also the year which saw the retirement of two senior colleagues, Prof. Frank Klötzli and Prof. Krystyna M. Urbanska. An appreciation of their work is given later in this report.

In February, the Institute was responsible for organising the annual joint meeting of the Swiss Botanical and Zoological Societies (*Zoologia et Botanica* 99), which had the theme "Genes, populations and politicians: issues in conservation biology". The meeting was attended by over 200 participants. In August, many members of the Institute attended the *International Botanical Congress* in St. Louis, USA, and presented paper and posters about their work. In December, members of the Institute were involved in the *2nd Symposium of the Competence Centre for Plant Sciences Zurich*. The theme of the meeting was "Plant stress and gene-environment interactions". This meeting is part of a process of developing a major new, interdisciplinary research programme at the ETH and University of Zürich which bridges the traditional divide between ecology and evolution on the one hand, and cell and molecular biology on the other.

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Michael JUDEX-RATHI
Philipp KÄSTLI
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Konrad OSTERWALDER
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Scientific visitors

Prof. Dr. Ken SATO, Hokkai-Gakuen University, Faculty of General Education, Sapporo, Japan (1.1.–31.7.99)

Dr. Kristjan ZOBEL, Universität Tartu, Estland (16.–30.1.99)

Annemarie HOENDERBOOM, Hogeschool Larenstein, Niederlande (23.7.–6.8.99)

Pille URBAS, Universität Tartu, Estland (2.8.–12.9.99)

Prof. Dr. Z. BANIHASHEMI, Department of Plant Protection, College of Agriculture, Shiraz Univ., Shiraz, Iran (17.11.–25.11.99)

Prof. Dr. Hans LAMBERS, University of Western Australia, Nedlands, Australia and Utrecht University, Niederlande (9.12.99)

2.3 RETIREMENTS

In 1999, two colleagues left the Institute, who have been very active for a long time and have had an important influence on the Institute. With gratitude the members of the Institute appreciate the contribution both have made.

Prof. Dr. Frank Klötzli

Frank Klötzli, born 7 February 1934, has been a member of the Institute for 40 years. In 1959 he joined the Institute as a PhD student of the late Prof. Dr. H. Ellenberg. His PhD thesis was concerned with the herbivory of roe deer in forest and grassland communities in the Swiss midlands. In 1962 he became assistant of the Institute, in 1969 his habilitation was submitted, and a long and successful period of teaching followed. His interests have been diverse, including community ecology, plant ecology and nature conservation. He has been advisor of numerous diploma and PhD projects in Switzerland as well as in the tropics. The focus of his teaching was on vegetation science and its applications; most popular was his lecture on the "Vegetation of the Earth". Frank Klötzli is author of numer-

ous publications and several books. He was also very active in various commissions and societies both at the national and the international level. We expect that the status of a "retired" member of the Institute will not really mean a reduced work load for Frank Klötzli.

Prof. Dr. Krystyna Urbanska

Krystyna Urbanska, born 6 June 1935, came from the University of Krakau and became an assistant of the Institute in 1969. She submitted her habilitation in 1971, and has been since a teacher in biosystematics, ecological genetics, population biology and restoration ecology. During 30 years she has supervised numerous diploma and PhD projects, many of them in the alpine zone near Davos, where she initiated a long-term project on restoration of machine-graded ski runs. Krystyna Urbanska developed a method of aided restoration which is designed for the harsh environment of the alpine zone, and soon became internationally known as an expert in this area. Well known are also her studies on the origin of two new *Cardamine* species in central Switzerland. Krystyna Urbanska will continue her research for the years to come.

3 Research

3.1 OVERVIEW

The research of the Geobotanical Institute is focused on four main directions: plant ecology, plant evolution and systematics, mycology and archaeobotany; the main interests of the research groups are described in details below.

3.2 RESEARCH FIELDS

SECTION PLANT ECOLOGY

Group 1: Community and Ecosystem Ecology

(Prof. Dr. P.J. Edwards, Dr. C. Abivardi, Dr. S. Güsewell, Dr. J. Kollmann, Dr. P. Ryser)

- Ecosystem processes: nutrient budgets, herbivory and other biotic interactions
- Ecosystems on a landscape level and GIS
- Agroecology
- Physiological and ecological characters of plants
- Ecology of seed dispersal

Group 2: Plant Ecology and Conservation Biology

(Prof. Dr. A. Gigon, Dr. D. Ramseier)

- Ecological stability: concepts and case studies
- Competition, positive biotic interactions, and coexistence of plants
- Biodiversity and nature conservation

Group 3: Restoration Ecology

(Prof. Dr. K.M. Urbanska)

- Population processes and their relevance for restoration
- Primary and secondary safe sites above the timberline
- Seed dispersal and seedbanks in disturbed and undisturbed grassland above the timberline

Group 4: Vegetation Science

(Prof. Dr. F. Klötzli)

- Resilience and dynamics of nutrient-poor wetlands
- Patterns and processes of forest communities (including tropical forests)
- Dynamics of tropical savannas
- Succession on landslides

SECTION EVOLUTION AND SYSTEMATICS

Group 1: Evolutionary Ecology

(Prof. Dr. B.A. Roy)

- Which role play pathogens in structuring plant populations and communities?
- Is there a trade-off between resistance to pathogens and tolerance to physical stress?

- Investigation of hypotheses on coevolution between pathogens and hosts: the roles of host species, their distribution and ecology.

Group 2: Plant Systematics and Evolution

(Dr. M. Baltisberger, Prof. Dr. E. Landolt, Dr. A. Widmer)

- Speciation and population genetics in *Draba*, *Ranunculus*, *Ophrys* and *Viscum*
- Microevolution and genetic adaptation in a changing environment
- Plant–pollinator interactions
- Monographic revision of the Lemnaceae
- Project *Flora der Stadt Zürich*

Group 3: Evolutionary Mycology

(Dr. A. Leuchtmann)

- Biodiversity and population biology of *Epichloë* and *Acremonium* grass endophytes
- Sexual systems of *Epichloë* species in the context of the evolution of symbioses between grasses and endophytes

Group 4: Systematic Mycology

(Prof. Dr. E. Horak)

- Plants and fungi (ectomycorrhiza, saprophytes) in various habitats of the northern and southern hemisphere
- Monographic revision of several genera of the Agaricales (*Crepidotus*, *Galerina*) and Boletales (*Boletellus*)

SECTION ARCHAEOBOTANY

(Dr. C. Jacquat)

- Investigation of fossil plants in archaeological excavations in Switzerland and Jordan (history of agricultural grasslands and adventitious plants)

3.3 NEW RESEARCH PROJECTS 1999

(Title. Source of funding. Research assistant(s); project leader)

- Indigenous knowledge on storage pest

management in Nepal – Implications for integrated pest management. CIMBRIA Foundation Zürich and DEZA Bern. A. BJÖRNSSEN-GURUNG; P.J. EDWARDS & C. ABIVARDI.

- Schafberg Amden. BUWAL. R. FANKHAUSER; P.J. EDWARDS.
- Reproduction, demography and genetic structure in small and isolated populations of a vertebrate-dispersed shrub: a comparison between two European regions. ETHZ. K. PFLUGSHAUP; J. KOLLMANN & B.A. ROY.
- Arctic-alpine Mycobiota (Agaricales): Rocky Mountain Tundra, USA. US NSF Project 9971210 (1999–2001). E. HORAK & C. CRIPPS.

4 List of publications 1999

4.1 PERSPECTIVES IN PLANT ECOLOGY, EVOLUTION AND SYSTEMATICS, 2 (1999)

The second volume of the new journal *Perspectives in Plant Ecology, Evolution and Systematics* appeared in two issues in June and December 1999. This volume contains 12 monographic contributions and reviews. The background and the aims of the journal were described in the first issue in 1998; a more general introduction is given under <http://www.urbanfischer.de/journals/ppees/>. Dr. Karl Fleischmann serves as Managing Editor, and Prof. Peter J. Edwards is Editor-in-Chief of the journal. The Editorial Board consists of six scientists from the ETH Zurich and the Universities of Zurich and Bern, the editors are supported by an international Advisory Board of about 20 ecologists and systematists.

Issue 1/99

Grace, J.B. The factors controlling species density in herbaceous plant communities: an assessment. 1–28.

- Mulder, C.P.H. Vertebrate herbivores and plants in the Arctic and subarctic: effects on individuals, populations, communities and ecosystems. 29–55.
- Braendle, R. & Crawford, R.M.M. Plants as amphibians. 56–78.
- Cook, C.D.K. The number and kinds of embryo-bearing plants which have become aquatic: a survey. 79–102.
- Leuschner, C. & Rode, M.W. The role of plant resources in forest succession: changes in radiation, water and nutrient fluxes, and plant productivity over a 300-yr-long chronosequence on NW-Germany. 103–147.

Issue 2/99

- Sprent, J.I. Nitrogen fixation and growth of non-crop legume species in diverse environments. 149–162.
- Van Bel, A.J.E. Evolution, polymorphology and multifunctionality of the phloem system. 163–184.
- Goulson, D. Foraging strategies of insects for gathering nectar and pollen, and implications for plant ecology and evolution. 185–209.
- Looijen, R.C. & van Andel, J. Ecological communities: conceptual problems and definitions. 210–222.
- Mountford, E.P., Peterken, G.F., Edwards, P.J. & Manners, J.G. Long-term change in growth, mortality and regeneration of trees in Denny Wood, an old-growth wood-pasture in the New Forest (UK). 223–272.

4.2 BULLETIN OF THE GEOBOTANICAL INSTITUTE ETH, 65 (1999)

Articles

- Brem, D. & Leuchtmann A. High prevalence of horizontal transmission of the fungal endophyte *Epichloë sylvatica*. 3–12.
- Bill, H.-Ch., Poschlod, P., Reich, M. & Plachter H. Experiments and observations on seed dispersal by running water in an Alpine floodplain. 13–28.
- Emig, W., Hauck, I. & Leins, P. Experimentelle Untersuchungen zur Samenausbreitung von *Eranthis hyemalis* (L.) Salisb. (Ranunculaceae). 29–41.
- Schaffner, R. Regeneration of vegetation on stabilising and eroding slopes in eastern Nepal: an evaluation 14 years after the first survey. 43–58.

Research projects and notes

- Hooftman, D.A.P., Diemer, M., Lienert, J. & Schmid, B. Does habitat fragmentation reduce the long-term survival of isolated populations of dominant plants? A field design. 59–72.
- Edwards, P.J., Kollmann, J., Tockner, K. & Ward, J.V. The role of island dynamics in the maintenance of biodiversity in an Alpine river system. 73–86.
- Lee, K., Fleischmann, K., Walther, G.-R., Kollmann, J. & Edwards, P.J. (1999) Excursion of the Geobotanical Institute ETH to the Seychelles 1998 – a travel report. 107–114.

4.3 FURTHER PUBLICATIONS

A Publications in refereed journals

- Abivardi, C., Weber, D.C. & Dorn, S. (1999) Effects of carbaryl and cyhexatin on survival and reproductive behaviour of *Cydia pomonella* (Lepidoptera: Tortricidae). *Annals of Applied Biology*, **134**, 143–151.
- Bloesch, U. (1999) Fire as a tool in the management of a savanna/dry forest reserve in Madagascar. *Applied Vegetation Science*, **2**, 117–124.
- Buyck, B. & Horak, E. (1999a) New taxa of pleurotoid Russulaceae. *Mycologia*, **91**, 532–537.
- Buyck, B. & Horak, E. (1999b) New species of *Russula* (Basidiomycotina) associated with *Anisoptera* (Dipterocarpaceae) in Papua New Guinea. *Australian Systematic Botany*, **12**, 727–742.
- Desjardin, D.E. & Horak, E. (1999) Agaricales from Indonesia. 1. A new cyphelloid genus (*Lecanocybe lateralis* gen. et spec. nov.) from Java and the Hawaiian Islands. *Sydowia*, **51**, 20–26.
- Dorn, S., Schumacher, P., Abivardi, C. & Meyhöfer, R. (1999) Global and regional pest insects and their antagonists in orchards: spatial dynamics. *Agriculture, Ecosystems & Environment*, **73**, 111–118.
- Edwards, P.J., Kollmann, J., Gurnell, A.M., Petts, G.E., Tockner, K. & Ward, J.V. (1999) A conceptual model of vegetation dynamics on gravel bars of a large Alpine river. *Wetlands Ecology and Management*, **7**, 141–153.
- Fallah, P.M., Shearer, C.A. & Leuchtmann, A. (1999) Freshwater ascomycetes: *Phaeosphaeria vilasensis* (Pleosporales), a new species from a lake in Wisconsin. *Nova Hedwigia*, **68**, 399–404.

- Gigon, A., (1999) Agricultural sustainability does not imply biocenotic sustainability. *Applied Vegetation Science*, **2**, 89–94.
- Grubb, P.J., Kollmann, J. & Lee, W.G. (1999) A garden experiment on susceptibility to rabbit-grazing, sapling growth and age at first reproduction for eleven European woody species. *Plant Biology*, **1**, 226–234.
- Güsewell, S. & Edwards, P.J. (1999) Shading by *Phragmites australis*: a threat for species-rich fen meadows? *Applied Vegetation Science*, **2**, 61–70.
- Güsewell, S., Pfadenhauer, J. & van der Maarel, E. (1999) From basic to applied ecology – vegetation science for nature conservation: Introduction. *Applied Vegetation Science*, **2**, 2–6.
- Gurnell, A.M., Edwards, P.J., Petts, G.E. & Ward, J.V. (1999) A conceptual model for alpine proglacial river channel evolution under changing climatic conditions. *Catena*, **38**, 223–242.
- Horak, E. (1999) New genera of Agaricales. 1. *Rapacea* gen. nov. *Kew Bulletin*, **54**, 789–794.
- Horak, E. & Moreno, G. (1999) *Rhodogaster calongei* sp.n. (Basidiomycota), first European record of the secoticeous entolomatoid genus from northern Spain. *Sydowia*, **50**, 187–191.
- Jackson, R.V., Kollmann, J., Grubb, P.J. & Bee, J.N. (1999) Insect herbivory on European tall-shrub species: the need to distinguish leaves before and after unfolding or unrolling, and the advantage of longitudinal sampling. *Oikos*, **87**, 561–570.
- Jacquat, C. & Martinoli, D. (1999) *Vitis vinifera* L.: wild or cultivated? Study of the grape pips found at Petra Jordan; 150 B.C.–A.D. 40. *Vegetation History and Archaeobotany*, **8**, 25–30.
- Jacquat, C. & Studer, J. (1999) L'âge du Bronze, naturellement. Le monde végétal et animal à Hauterive-Champréveyres NE. *Archéologie Suisse*, **22**, 22–26.
- Keller, M. & Kollmann, J. (1999) Effects of seed provenance on germination of eight weeds and grassland species. *Agriculture, Ecosystems and Environment*, **72**, 87–99.
- Keller, M., Kollmann, J. & Edwards, P.J. (1999) Palatability of weeds from different European origins to the slugs *Deroceras reticulatum* Müller and *Arion lusitanicus* Mabille. *Acta Oecologica*, **20**, 109–118.
- Kirchner, J.W. & Roy, B.A. (1999) The evolutionary advantages of dying young: Epidemiological implications of longevity in metapopulations. *American Naturalist*, **154**, 140–159.
- Kollmann, J. & Grubb, P.J. (1999) Recruitment of fleshy-fruited species under different shrub species: Control by under-canopy environment. *Ecological Research*, **14**, 63–75.
- Kollmann, J., Vieli, M., Edwards, P.J., Tockner, K. & Ward, J.V. (1999) Interactions between vegetation development and island formation in the Alpine river Tagliamento. *Applied Vegetation Science*, **2**, 25–36.
- Kollmann, J. & Schneider, B. (1999) Landscape structure and diversity of fleshy-fruited species at forest edges. *Plant Ecology*, **144**, 37–48.
- Landolt, E. (1999) Beiträge zur Flora der Stadt Zürich. VIII. Dicotyledonen 6 (Compositae). *Botanica Helvetica*, **109**, 1–20.
- Landolt, E. (1999) Beiträge zur Flora der Stadt Zürich. IX. Gattungen *Rubus* und *Oenothera*; Nachträge; zusammenfassende Resultate; Ausblick. *Botanica Helvetica*, **109**, 121–137.
- Landolt, E. (1999) Pleustonic communities with Lemnaceae in South America. *Applied Vegetation Science*, **2**, 7–16.
- Meijer, G. & Leuchtmann, A. (1999) Multistrain infections of the grass *Brachypodium sylvaticum* by its fungal endophyte *Epichloë sylvatica*. *New Phytologist*, **141**, 355–368.
- Peitner, U. & Horak, E. (1999) *Lepiota* and *Cystolepiota* (Agaricales) in arctic-alpine habitats. *Österreichische Zeitschrift Pilzkunde*, **8**, 19–34.
- Roy, B.A. & Stanton, M.L. (1999) Asymmetry of wild mustard, *Sinapis arvensis* (Brassicaceae) in response to severe physiological stresses. *Journal of Evolutionary Biology*, **12**, 440–449.
- Roy, B.A. & Widmer, A. (1999) Floral mimicry: a fascinating yet poorly understood phenomenon. *Trends in Plant Science*, **4**, 325–330.
- Roy, B.A., Stanton, M.L. & Eppley, S.M. (1999) Effects of environmental stress on leaf hair density and consequences for selection. *Journal of Evolutionary Biology*, **12**, 1089–1103.
- Ryser, P. & Aeschlimann, U. (1999) Proportional dry mass content as an underlying trait for the variation in relative growth rate among 22 Eurasian populations of *Dactylis glomerata* s.l. *Functional Ecology*, **13**, 473–482.
- Schardl, C.L. & Leuchtmann, A. (1999) Three new species of *Epichloë* symbiotic with North American grasses. *Mycologia*, **91**, 95–107.

- Schleppi, P., Muller, N., Edwards, P.J. & Bucher, J.B. (1999) Three years of increased nitrogen deposition do not affect the vegetation of a montane forest ecosystem. *Phyton*, **39**, 197–204.
- Soliva, M. & Widmer, A. (1999) Genetic and floral divergence among sympatric populations of *Gymnadenia conopsea* s.l. (Orchidaceae) with different flowering phenology. *International Journal of Plant Sciences*, **160**, 897–905.
- Urbanska, K.M., Fattorini, M., Thiele, K. & Pflugshaupt, K. (1999) Seed rain on alpine ski runs in Switzerland. *Botanica Helvetica*, **109**, 199–216.
- Utelli, A.-B., Roy, B.A. & Baltisberger, M. (1999) History can be more important than “pollination syndrome” in determining the genetic structure of plant populations: the case of *Aconitum lycoctonum* (Ranunculaceae). *Heredity*, **82**, 574–584.
- Walther, G.-R. (1999) Distribution and limits of evergreen broad-leaved (laurophyllous) species in Switzerland. *Botanica Helvetica*, **109**, 153–167.
- Walther, G.-R., Klötzli, F. & Gassmann, F. (1999) On the application of chaos theory to analyse fluctuations in wet meadows: preliminary results. *Annali di Botanica*, **57**, 31–40.
- Ward, J.V., Tockner, K., Edwards, P.J., Kollmann, J., Bretschko, G., Gurnell, A.M., Petts, G.E. & Rossaro, B. (1999) A reference river system for the Alps: the ‘Fiume Tagliamento’. *Regulated Rivers: Research and Management*, **15**, 63–75.
- Widmer, A. & Baltisberger, M. (1999) Molecular evidence for allopolyploid speciation and a single origin of the narrow endemic *Draba ladina* (Brassicaceae). *American Journal of Botany*, **86**, 1281–1289.
- Widmer, A. & Baltisberger, M. (1999) Extensive intraspecific chloroplast DNA (cpDNA) variation in the alpine *Draba aizoides* L. (Brassicaceae): haplotype relationships and population structure. *Molecular Ecology*, **8**, 1405–1415.
- Widmer, A. & Schmid-Hempel, P. (1999) The population genetic structure of a large temperate pollinator species, *Bombus pascuorum* (Scopoli), (Hymenoptera: Apidae). *Molecular Ecology*, **8**, 387–398.
- B Publications in other scientific journals, book chapters and books**
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- Baltisberger, M. (1999) Chromosome numbers. *IOPB Chromosome Data* 15 (ed. C.A. Stace). *IOPB Newsletter*, **31**, 11–12.
- Baltisberger, M. & Ryser, P. (1999) Chromosome numbers. *IOPB Chromosome Data* 15 (ed. C.A. Stace). *IOPB Newsletter*, **31**, 12.
- Carraro, G., Klötzli, F., Walther, G.-R., Gianoni, P. & Mossi, R. (1999) *Observed Changes in Vegetation in Relation to Climate Warming*. Vdf Hochschulverlag, Zürich.
- Edwards, P.J., Abivardi, C. & Richner, W. (1999) The effects of alternative tillage systems upon biodiversity in agroecosystems. *Agrobiodiversity: Characterization, Utilization and Management* (eds. D. Wood & J. Lenné), pp. 305–330. CAB International, Wallingford.
- Edwards, P.J., Kollmann, J. & Wood, D. (1999) The agroecosystem in the landscape: implications for biodiversity and ecosystem function. *Agrobiodiversity: Characterization, Utilization and Management* (eds. D. Wood & J. Lenné), pp. 183–210. CAB International, Wallingford.
- Gigon, A. (1999) Case studies of success in nature conservation in Europe. *Perspectives in Ecology – A Glance from the VII International Congress of Ecology* (ed. A. Farina), pp. 143–150. Backhuys Publishers, Leiden.
- Gigon, A. (1999) Positive Interaktionen in einem alpinen Blumenpolster. *Bericht der Reinhold-Tüxen-Gesellschaft*, **11**, 321–330.
- Gigon, A. & Langenauer, R. (1999) Blaue Listen: ein neues Naturschutzinstrument und Hinweise für die Erarbeitung und Anwendung. *Nord-deutsche Naturschutzakademie, NNA-Berichte*, **12**, 113–120.
- Gigon, A., Gerster, A., Güsewell, S., Marti, R. & Stenz, B. (1999) *Kurzpraktikum Terrestrische Ökologie*. Vdf Hochschulverlag, Zürich.
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