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Annual report of the Geobotanical Institute ETH (1996)

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1 Introduction

1996 saw many changes in the Geobotanical Institute. Prof. Dr. Barbara Roy (Davis, California) joined the Institute in mid-February to take up her position as Assistant Professor for Biodiversity. At about the same time the rebuilding of the laboratories in Zürichbergstrasse 38 was completed. Prof. Roy moved quickly to build up her research group and to equip her laboratories for research involving molecular techniques. Several new research projects commenced during 1996 and the group of doctoral and diploma students increased considerably. With all these new activities the atmosphere has been very positive and encouraging. However, it is clear that we are now at the limits of the space and of the facilities available to us, and further expansion is scarcely possible. In addition, the demands placed upon the technical and support staff are growing. 1996 was particularly difficult for the laboratory staff because of the great difficulties caused by the rebuilding. It is a pleasure to acknowledge the constructive role played by the staff members in adapting to the rapidly changing circumstances.

During 1996 there were several changes amongst the staff. Markus Wilhelm and Yvonne Edwards-Widmer resigned from their positions as teaching assistants at Gladbachstrasse 114 after several years of valuable work with practical classes for the Divisions XA and XB. Dr. Dieter Ramseier rejoined the Institute as a teaching assistant, having returned from a two-year post-doctoral period at Harvard University. Anna-Barbara Utelli resigned her position as teach-

ing assistant in Zollikerstrasse 107 and was replaced by Dr. Alex Widmer who will be responsible for teaching plant systematics in the Division XB. In the library Ladina Müller-Pazeller resigned in 1996 to move with her husband to the Engadin. The Institute is very grateful to her for all her work in running the library so efficiently for many years, and playing such an active role in the life of the Institute. Her place will be taken from the beginning of 1997 by Regula Langenauer. Prof. Barbara Roy made two appointments in 1996: Dr. Daniela Brada was appointed as a research technician with special responsibility for molecular techniques, and Dr. Thomas Steinger joined the Institute as a research assistant.

The two libraries in Zürichbergstrasse and Zollikerstrasse maintained the usual exchange and experienced only minor structural changes. The mycological collection increased by 800 new specimens, mainly from USA, Spain, Germany and Switzerland. The collection of phanerophytes received 350 new specimens (mainly from Costa Rica). The collection of grass endophytes now comprises 506 specimens of which 137 are new; there is a regular exchange with other research groups. This is also true for the unique collection of Lemnaceae which has been now reduced to 370 clones as part of a policy of transferring it gradually to other institutions. The complete collection is now maintained by Dr. Anne-Marie Stomp, North Carolina State University, Department of Forestry, Box 8002, Raleigh, N.C. 27695-8002, USA.

The rebuilding of the laboratories at Zürichbergstrasse was completed at the end of February. It is a pleasure to record our thanks to all those involved in this work, which was completed with great speed and efficiency. The new facilities are a great improvement on the previous laboratory, though it must be said that the total area available is scarcely adequate. Considerable changes were made to the experimental garden at Höggerberg during 1996. This included a reorganization of the storage facilities, the setting out of new experimental areas, and a general improvement to the appearance of the area. These developments are welcome since plant growth experiments are increasingly important in our research. The most serious accommodation problem of the Institute continues to be the poor facilities at Zollikerstrasse. However, during 1996 detailed planning commenced with the University to move the Institute out of the Kutscherhaus and into the Villa, Zollikerstrasse 137. This move will be completed during summer 1997.

2 Staff of the Institute

2.1 FOUNDATION BOARD

President

Prof. Dr. Hannes Flühler

Vicepresident

Martin RÜBEL-FUCHS

Secretary

Armin SCHELBERT

Other members of the board

Daniel HUBER-DUMUID

Prof. Dr. Josef NÖSBERGER

Dr. Alexander RÜBEL

Prof. Dr. Franz SCHMITHÜSEN

2.2 STAFF

Director

Prof. Dr. Peter J. EDWARDS

Scientific members of staff (lecturer)*

*Dr. Cyrus ABIVARDI

*Dr. Matthias BALTISBERGER

Dr. Martin BAUERT

Alex GABRIEL (Dr. Alfred BRÜLISAUER)

*Prof. Dr. Andreas GIGON

*Prof. Dr. Egon HORAK

Gisela HORAT

Dr. Christiane JACQUAT

*Prof. Dr. Frank KLÖTZLI

Dr. Johannes KOLLMANN

Prof. Dr. Elias LANDOLT

Regula LANGENAUER

*Dr. Adrian LEUCHTMANN

*Dr. Dieter RAMSEIER

*Prof. Dr. Barbara A. ROY

*Dr. Peter RYSER

Bettina SCHERZ VRACKO

Dr. Thomas STEINGER

*Dr. Alex WIDMER

*Prof. Dr. Krystyna M. URBANSKA

Margot ZAHNER

External lecturers

Dr. Hans-Ulrich FREY

Maja HALDEMANN

Dr. Andreas HASLER

Dr. Bertil KRÜSI

Dr. Urs KUHN

Dr. Fredy LEUTERT

Dr. Bernhard MERZ

PD Dr. Otto WILDI

Doctoral students (lecturer)*

Franziska ANDRES

Giovanni BERARDI

*Bernhard BEYER

*Markus BICHSEL

Urs BLÖSCH
Andreas BOSSHARD
Gian-Pietro CERLETTI
*Yvonne EDWARDS-WIDMER
Marzio FATTORINI
Karl FLEISCHMANN
Daniel FREY
Andreas GRUNDMANN
Sabine GÜSEWELL
Otto HOLZGANG
Jörg IPSEN
Michael KELLER
Kurt KUSSTATSCHER
Gerrit MEIJER
Olivier MERMOD
Nathalie MÜLLER
Monika PFUNDER
Angelika RAIMANN
Neria ROEMER
Peter SCHUMACHER
Thomas WILHALM
Markus WILHELM
Andrea SCHWAB
Karin ULLRICH
Stefan WAHL
Urs WEIBEL

Diploma students 1996

Daniel ARN
Silvia ERDT
Florian FREIMOSER
Thomas GLOOR
Mirjam GRAF
Dominik KÄUFERLE
Barbara SCHNEIDER
Marco SOLIVA
Martina WALSER

Diploma students 1997

Urs ÄSCHLIMANN
Martin BRATTELER
Dominik BREM
Inez COLYN

Ladina FILLI
Fernande GÄCHTER
Andreina GERSTER
Beat HAUENSTEIN
Andreas HEINIMANN
Kathrin KOFLER
Andrea KÖNIG
Christian MARFURT
Danièle MARTINOLI
Katharina MERKEL
Raphael NEUBURGER
Kaspar PFLUGSHAUPT
Bert PRIEST
Naomi PORRET
Bettina SCHMID
Samuel STAHEL
Thomas STÜDELI
Gabi TITGEMEYER
Mario VIELI

Computing system administrator

Roger STUPF

GIS assistant

Barbara SCHNEIDER

Secretaries

Claudia HEINZE
Karin LEE
Katharina RENTSCH

Librarians

Liselotte KÖNIG
Ladina MÜLLER-PAZELLER

Library assistant

Dr. Marianne JEKER

Laboratory assistants

Dr. Daniela BRADA
Elke KARAU (Helen BAILER)
Rose TRACHSLER

Herbarium assistants

Josefine SAXER
Annemarie TANNER

Technical assistants

Anita HEGI
Markus HOFBAUER
Stephan LOCHER
Karin REINHARD

Gardener

Martin FOTSCH

Garden assistants

Zorica EBEID
Raymonde METZGER

Site and building manager

René GRAF

Scientific visitors

Min CAO, Kunming Institute of Ecology,
Chinese Academy of Sciences (18.9.95–
14.3.96)

Dr. Stephan HELFER, Royal Botanic Gar-
den, Edinburgh (15.–21.1.96)

Dr. Vladimir ONIPTCHENKO, Biological Fac-
ulty, Moscow State University (25.4.–
25.5.96)

Dr. Günter MATZKE-HAJEK, Universität
Vechta (13.–15.7.96)

Liina EEK (BSc), Universität Tartu, Estland
(19.7.–10.12.96)

Prof. Dr. Yoshinobu HOSHINO, Laboratory
of Vegetation Management, Tokyo Univer-
sity of Agriculture and Technology (since
16.7.96)

Dr. Abraham GROOTJANS, University of
Groningen (28.10.–3.11.96)

OBITUARY

**Prof. Dr. Dr. h.c. Heinz Ellenberg
(1.8.1913–2.5.1997)**

E. LANDOLT

Heinz Ellenberg was appointed as the first Professor for Geobotany at the ETH Zürich in autumn 1958, and became director of the Geobotanical Institute ETH as successor of Dr. Werner Lüdi. In spring 1966 he left Zürich for a chair in geobotany offered by the University of Göttingen.

In the short time of eight years Heinz Ellenberg turned the Geobotanical Institute, a well known private research institution supported by the Rübél foundation, into an active research institute with an international reputation. He was the first to introduce studies in plant ecology within the ETH, and his lectures inspired many students but also staff members which in turn developed new fruitful research areas. Apart from supervising numerous PhD students he personally organized an international comparison of specific methods in soil and vegetation sciences for surveys and inventories in forestry. The well-known textbook *Vegetation Mitteleuropas mit den Alpen* was developed and written in Zürich; it appeared 1996 in its 5th edition and was translated into English in 1988. Heinz Ellenberg also published a reference book on Swiss forest communities during his time at the Geobotanical Institute. Under his directorship new laboratory facilities, a glasshouse and a modern experimental garden were built.

Heinz Ellenberg will always be remembered as a friend of the Institute, since he stayed in close contact with several members of the staff even after he left Zürich. With gratitude we look back on his unique scientific contribution in general and on his influence on the Institute in particular. We will miss him greatly.

3 Research

3.1 OVERVIEW

The research of the Geobotanical Institute focuses on the ecology, evolution and systematics of plants and fungi; the main interests of the research groups are described in details below.

During 1996 several new research projects were commenced and eight new doctoral students joined the Institute. These included four doctoral students funded by the Swiss National Science Foundation as part of the *SPP Environment and Biodiversity programme*. The new research projects include joint projects with the Federal Institute of Agroecology and Agriculture (FAL) at Reckenholz and with the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) at Birmensdorf. The group of doctoral students increased significantly from 22 in 1995 to 30 in 1996. In addition, the Institute took on a record number of 23 diploma students at the beginning of the academic year 1996/97. We are also pleased to announce that Monika Adam who left the Institute 1995 received the Wiehe award 1996 for her PhD thesis from the Gesellschaft für Ökologie.

An important activity which was successfully repeated in February 1996 was the Institute's research conference at which doctoral students and diploma students presented their research plans and first results.

3.2 RESEARCH FIELDS

SECTION PLANT ECOLOGY

Group 1: Community and Ecosystem Ecology
(Prof. Dr. P.J. Edwards, Dr. C. Abivardi, Dr. J. Kollmann, Dr. P. Ryser)

- Ecosystems on a landscape level and GIS
- Agroecology
- Ecosystem processes: nutrient budgets, herbivory and other biotic interactions

- Ecology of seed dispersal
- Physiological and ecological characters of plants

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 (e.g. tropical forests)
- Succession on landslides
- Dynamics of tropical savannas

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 complex genera (*Ranunculus*, *Stachys*)
- Microevolution and genetic adaptation in a changing environment (*Draba*, *Erigeron*)
- 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 (history of agricultural grasslands and adventitious plants)

3.3 NEW RESEARCH PROJECTS 1996

(title; source of funding; research assistant(s); project leader)

- Evaluation of different management techniques for enhancing biodiversity in arable and grassland systems, and their significance at a landscape scale; Swiss National

Science Foundation; K. ULLRICH, M. DI GIULIO, S. STUDER; P. J. EDWARDS.

- A method for evaluation of eco-management practices in agriculture with regard to plant and animal biodiversity; Swiss National Science Foundation; A. SCHWAB; P. J. EDWARDS.
- Short-term evolution of the ground vegetation in an alpine forest ecosystem under increased nitrogen deposition – Interaction with other environmental factors; WSL; N. MÜLLER; P. J. EDWARDS.
- The impact of Scottish Highland cattle on subalpine pastures; Private funding; G. BERARDI; P. J. EDWARDS.
- Ecological significance of plant tissue structure on biomass turnover; Swiss National Science Foundation; S. WAHL; P. RYSER, P. J. EDWARDS.
- Effect of light intensity on nutrient uptake of two ecologically distinct grass species; Austauschdienst ETH, Ostkontakte; L. EEK; P. RYSER.
- Investigation of restoration measures in former wetlands, Nussbaumer Seen; Seebachtal Foundation; A. GABRIEL (A. BRÜLSAUER); F. KLÖTZLI.
- Genetic structure of fragmented plant populations: a comparison of two arctic-alpine species with contrasting breeding systems; Swiss National Science Foundation; M. BAUERT; M. BALTISBERGER, P. J. EDWARDS.
- Testing hypotheses of coevolution between pathogens and hosts: the roles of geography, host species and ecology; Swiss National Science Foundation; M. PFUNDER; B. ROY.
- Effects of afforestation with conifers on the mycoflora of deciduous forests in Ticino; WSL; N. RÖMER; E. HORAK.

3.4 FIRST INTERNATIONAL CONFERENCE
*RESTORATION ECOLOGY AND SUSTAINABLE
DEVELOPMENT*

From 27 to 29 March 1996 the Geobotanical Institute organized the *First International Conference Restoration Ecology and Sustainable Development* at the ETHZ. About hundred participants from 21 countries attended the meeting. In three main sections 16 invited papers and 54 posters were presented; the sections focused on *Ecology as Basis for Restoration Strategy, Implementation and Assessment of Restoration Schemes*, and *Ecological Restoration, Economics and Sustainability*. A more detailed report of the conference is presented in *Trends in Ecology & Evolution*, 11 (10), 396–397. The results of the conference will be published by Cambridge University Press in 1997. We would like to thank the following organizations for their support: ETHZ, Swiss Academy of Science (SANW), Swiss National Science Foundation, and BUWAL.

4 List of publications 1996

4.1 VERÖFFENTLICHUNGEN DES
GEOBOTANISCHEN INSTITUTES ETH,
STIFTUNG RÜBEL, ZÜRICH, 1996

Volume 127

Graf, H.U. Zur Indikation von Bodennährstoffen in Streuwiesen.

4.2 BULLETIN OF THE GEOBOTANICAL
INSTITUTE ETH, 62 (1996)

Articles

Ryser, P. & Notz, R. Competitive ability of three ecologically contrasting grass species at low nutrient supply in relation to their maximal relative growth rate and tissue density. 3–12.

Joshi, J. & Matthies, D. Effects of mowing and fertilization on succession in an old-field plant community. 13–26.

Mermod, O. Mechanismen der Artabgrenzung bei drei alpinen *Erigeron*-Arten (Asteraceae). 27–34.

Holzgang, O., Achermann, G. & Gigon, A. Productivity and usage by red deer (*Cervus elaphus* L.) of two subalpine grasslands in the Swiss National Park. 35–45.

Erzinger, S. Einfluss von Schottischen Hochlandrindern auf eine montane Weide im Oberen Tösstal. 47–60.

Fleischmann, K., Porembski, S., Biedinger, N. & Barthlott, W. Inselbergs in the sea: vegetation of granite outcrops on the islands of Mahé, Praslin and Silhouette (Seychelles). 61–74.

Research Projects and Notes

Roy, B.A. Floral mimicry, coevolution of hosts and pathogens, and stress tolerance vs. resistance to pathogens. 75–78.

Frey, D. Genetic variability of the invasive *Erigeron annuus* in Europe. 79–81.

Bauert, M.R., Baltisberger, M. & Edwards, P.J. Genetic structure of fragmented plant populations: a comparison of two arctic-alpine species with contrasting breeding systems. 83–88.

Poschlod, P., Matthies, D., Jordan, S. & Mengel, C. The biological flora of Central Europe – an ecological bibliography. 89–108.

4.3 FURTHER PUBLICATIONS

A Publications in refereed journals

Bandala, V.M., Monotoya, L., Guzman, G. & Horak, E. (1996) Four new species of *Phaeocollybia*. *Mycological Research*, 100, 239–243.

Bauert, M.R. (1996) Genetic diversity and ecotypic differentiation in arctic and alpine populations of *Polygonum viviparum*. *Arctic and Alpine Research*, 28, 190–195.

Brülisauer, A.R., Bradfield, G.E. & Maze, J. (1996) Quantifying organizational change after fire in lodgepole pine forest understorey. *Canadian Journal of Botany*, 74, 1773–1782.

Brülisauer, A.R., Bradfield, G.E. & Maze, J. (1996) A thermodynamic interpretation of succession. *Coenoses*, 11, 73–76.

Bucheli, E. & Leuchtman, A. (1996) Evidence for genetic differentiation between choke-inducing and asymptomatic strains of the *Epichloë* grass endophyte from *Brachypodium sylvaticum*. *Evolution*, 50, 1879–1887.

Chung, K.-R., Leuchtman, A. & Schardl, D.L. (1996) Inheritance of mitochondrial DNA and plasmids in the ascomycetous fungus, *Epichloë typhina*. *Genetics*, 142, 259–265.

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- Horak, E., Desjardin, D.E. & Hemmes, D.E. (1996) Agaricales of the Hawaiian Islands. 3. The genus *Galerina* and selected other brown-spored agarics. *Mycologia*, **88**, 278–294.
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- Klötzli, F., Walther, G.-R., Carraro, G. & Grundmann, A. (1996) Anlaufender Biomwandel in Insubrien. *Verhandlungen der Gesellschaft für Ökologie*, **26**, 537–550.
- Kollmann, J. & Reiner, S.A. (1996) Light demands of shrub seedlings and their establishment within scrublands. *Flora*, **191**, 191–200.
- Kollmann, J. & Schill, H.-P. (1996) Spatial patterns of dispersal, seed predation and germination during colonization of abandoned grassland by *Quercus petraea* and *Corylus avellana*. *Vegetatio*, **125**, 193–205.
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- Leuchtman, A. & Clay, K. (1996) Isozyme evidence for host races of the fungus *Atkinsonella hypoxylon* (Clavicipitaceae) infecting the *Danthonia* (Poaceae) complex in the Southern Appalachians. *American Journal of Botany*, **83**, 1144–1152.
- Leuchtman, A., Petrini, O. & Samuels, G.J. (1996) Isozyme subgroups in *Trichoderma* section *Longibrachiatum*. *Mycologia*, **88**, 384–394.
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- Roy, B.A. (1996) A plant pathogen influences pollinator behavior and may influence reproduction of non-hosts. *Ecology*, **77**, 2445–2457.
- Ryser, P. (1996) The importance of tissue density for growth and life span of leaves and roots: a comparison of five ecologically contrasting grasses. *Functional Ecology*, **10**, 717–723.
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