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Annual report of the Geobotanical Institute ETH (1997)

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1 Introduction

1997 was a busy year for the Geobotanical Institute. The institute was remarkably successful in attracting research grants, and several new projects commenced (section 3.3). Amongst these new grants were no fewer than four awarded to Egon Horak to study the basidiomycete flora in various parts of the world. Two of them were awarded by the National Science Foundation of the USA and are held jointly with colleagues from North America. Research in the Geobotanical Institute is increasingly interdisciplinary or transdisciplinary and involves collaboration with other institutes (see the Preface for a comment on this development). One example is the grant awarded to Peter Edwards and Cyrus Abivardi together with colleagues from the Institute of Plant Sciences at ETH and the Faculty of Agriculture in Tokyo University. It is funded under the umbrella of the Alliance for Global Sustainability – a research partnership between ETH, Tokyo University and the Massachusetts Institute of Technology. The grant was a “pump-primer” to develop longer term project concerned with sustainable management of cereal fields. As a result of all these new projects, the number of doctoral students in the Institute increased to 37. With this high level of activity, the laboratory facilities and technical services have been more than fully used.

It is pleasing to say that during 1997 the difficult accommodation problem at Zollikerstrasse was resolved. In July the group which had been housed in very cramped and simple conditions in the Kutscherhaus could move

into the Villa (Zollikerstrasse 137). Although this building does not have modern laboratory facilities, it is a fine old house set in the botanic gardens of the University of Zürich and provides a much more comfortable working environment. To celebrate this event, the Institute held a reception in the Villa in October.

A significant event for plant sciences in Zürich was the decision by the University of Zürich and ETH to establish a *Kompetenzzentrum Pflanzenwissenschaften*. The purpose of this new structure is to coordinate the teaching and research activities, and long-term planning of plant sciences in the two institutions. The first important decision of the Kompetenzzentrum was to appoint a visiting group of experts which came to Zürich in November. Their report sets out ideas about how the plant sciences in Zürich can develop in the future.

During 1997 Dr. Daniela Brada left the Institute to take up a permanent position in a laboratory of Organic Chemistry at ETH. Dr. Gerhard Eichenberger, formerly deputy director of WSL, joined the Institute with an *ad hominem* research position. He plans to develop a research programme aimed at understanding and improving the transfer of scientific knowledge from the research community to the public in general.

In the summer there was a successful excursion to the Engadin which was organised by Ladina Filli, Kaspar Pflugshaupt, Roger Stupf and Anna-Barbara Utelli, and attended by 37 members of the Institute.

2 Staff of the Institute

2.1 FOUNDATION BOARD

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Martin RÜBEL-FUCHS

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DR. Martin BAUERT

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Alex GABRIEL

Andreina GERSTER

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*Prof. Dr. Krystyna M. URBANSKA

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Ursula BOLLENS

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Otto HOLZGANG

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Olivier MERMOD

Marco MORETTI

Nathalie MÜLLER

Monika PFUNDER
Angelika RAIMANN
Neria RÖMER
Andrea SCHWAB
Sibylle STUDER
Karin ULLRICH
Anna-Barbara UTELLI
Helene WAGNER
Stefan WAHL
Gian-Reto WALTHER
Urs WEIBEL
Ralf ZIMMER

Diploma students 1997

Urs AESCHLIMANN
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 PIEST
Naomi PORRET
Bettina SCHMID
Samuel STAHEL
Thomas STÜDELI
Gabi TITGEMEYER
Mario VIELI

Diploma students 1998

Ulrich FAIGLE
Rahel GESSLER
Sabine HERZOG
Kathrin MÄRKI

Martin LANDOLT
Stéphanie SCHÜRCH
Karin THIELE
Jutta WALTER
Richard ZWEIFEL

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Kaspar PFLUGSHAUPT (Roger STUPF)

GIS assistant
Roger STUPF

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Stephan LOCHER
Karin REINHARD

Gardener
Martin FOTSCH

Garden assistants

ZORICA EBEID
RAYMONDE METZGER

Site and building manager

RENÉ GRAF

Scientific visitors

Prof. Dr. Yoshinobu HOSHINO, Laboratory of Vegetation Management, Tokyo University of Agriculture and Technology, Japan (1.1.–13.2.97)

Ursula KORZENIAK, Botanical Institute, Polish Science Academy, Krakau, Poland (24.1.–24.3.97)

Dr. Kristjan ZOBEL, University Tartu, Estonia (30.5.–22.6.97)

Dr. Ulrich PEINTNER, Microbiological Institute, University Innsbruck, Austria (20.–24.6.97)

Prof. Dr. Johannes C.M. DEN NIJS, University of Amsterdam (1.–31.7.97)

V. GONZALES & F. ARENAS, University Alcalá, Madrid (29.8.–7.9.97)

Liina EEK (BSc), Universität Tartu, Estonia (17.9.–13.10.97)

Dr. Robyn JACKSON, James Cook University of North Queensland, Australia (24.–31.10.97)

3 Research

3.1 OVERVIEW

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

During 1997 several new research projects were commenced and eight new doctoral students joined the Institute. These include joint projects with the Federal Institute of Agro-

ecology 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 30 in 1996 to 37 in 1997. In addition, the Institute had a record number of 23 diploma students during 1997.

An important activity which was successfully repeated in January 1997 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 (including 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. Leuchtman)

- 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 1997

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

- Ecological and agricultural implications of innovative systems for cereals; Alliance for Global Sustainability; P.J. Edwards & C. Abivardi.
- Influence of light and nutrient availability on competition, coexistence and diversity in experimental swards; ETHZ; P. Ryser jointly with K. Zobel & L. Eek (University Tartu, Estonia).
- Seed dispersal of fleshy-fruited species along forest edges – a link between landscape structure and genetic diversity of plant populations; ETHZ; J. Kollmann & B.A. Roy.
- Biodiversity and its disturbance by eutrophication in lake shore ecotones: processes, effects, restoration. Schweizerischer Nationalfonds; U. Bollens; F. Klötzli.
- Grenzlagen der Laurophyllierung in der Schweiz. Schweizerischer Nationalfonds; G.-R. Walther; F. Klötzli.
- An investigation of the evolution of mating systems in plants: the causes and consequences of inbreeding in *Aconitum*.

- Schweizerischer Nationalfonds; A.-B. Uetli; B.A. Roy.
- Systematics and Ecology of *Entoloma* in the southern Appalachians (USA); Hesler Fund, University of Tennessee, Knoxville, TN (USA); E. Horak.
 - Agaricales of the Hawaiian Islands: Entolomataceae, Cortinariaceae; USA NSF Project, DEB-93300874 (1996–1998), Part 1: *Entoloma*, *Galerina* and allied genera, <http://www.galerina.entoloma.s.l.sfsu.edu/hawaiian/Agaricales.html>, Part 2: (in prep.); E. Horak.
 - Basidiomycetes of the Greater Antilles: Entolomataceae, Cortinariaceae; USA NSF Project 94-66 (1996–2000). Monograph of *Pluteus* (Agaricales) (in prep.); E. Horak.
 - Biodiversidad en el NW de Patagonia: Mycota (Agaricales, Boletales); Consejo Nacional de Investigaciones, Argentina, Proyecto 25852-97 (1997–1998); E. Horak.

***Perspectives in Ecology, Evolution and Systematics* – the launch of a new journal**

Peter J. EDWARDS, Johannes KOLLMANN & Barbara A. ROY

Perspectives in Ecology, Evolution and Systematics is a new, international refereed journal which publishes reviews and monographs. It has been launched by the Rübél Foundation, a private trust associated with the Geobotanical Institute of the Swiss Federal Institute of Technology, in association with the publishing firm Gustav Fischer Verlag. We set out here how this journal came into being, and what we hope it will achieve.

HOW PERSPECTIVES CAME INTO BEING ...

In 1918, Eduard Rübél (1884–1960) established a private research institute (Geobotani-

sches Institut Stiftung Rübél) in Zürich to promote the study of geobotany (the name “geobotany” is widely used in continental Europe and encompasses plant ecology, vegetation history and plant geography). Eduard Rübél was one of the pioneers of geobotany in Europe and, together with his colleague Josias Braun Blanquet (1884–1980), he developed an approach which became known as the Zürich-Montpellier school of phytosociology (Braun-Blanquet worked in the Geobotanical Institute from 1915–1926 before moving to Montpellier). This “school” was enormously influential and dominated European plant ecology for several decades. In 1958, not long before Rübél’s death, the Institute was incorporated into the Swiss Federal Institute for Technology. However, the trust (Stiftung Rübél) continues to exist and manages funds which are used to support its publication activities.

The main publication of the Stiftung Rübél was the *Veröffentlichungen des Geobotanischen Institutes*. This was a series of monographic volumes of which over 120 have been published since the first issue in 1922. During this long publishing history many classic works in the field of geobotany have appeared by such authors as Rübél himself, Braun-Blanquet, Tüxen, Ellenberg, and Landolt.

The *Veröffentlichungen* is one of many similar series published by universities and private foundations in Europe. Despite its distinguished history, it is increasingly clear that “in-house” journals and monographs of this kind are becoming outmoded. Certainly, research published in this form has less impact than if it were published in one of the mainstream ecological journals. Rather than keep its publications in their traditional form simply for the sake of continuity, the Stiftung Rübél decided that it was necessary to adapt them to the changing needs of the scientific

community. For this reason, it was decided to discontinue the *Veröffentlichungen* and replace it with a new publication. The first issue of this new journal, *Perspectives in Ecology, Evolution and Systematics*, appeared in June 1998.

... AND WHAT WE HOPE IT WILL ACHIEVE

Twenty years ago scientific journals could be simply classified into two main kinds: there were those which presented the results of original scientific research, and there were those, the review journals, which aimed to present in a digested form the state of knowledge on a particular topic. Although this division still remains, it is interesting to see how journals have diversified in the last two decades. The boundaries between the original research article and the review have become much less sharp. Many journals have introduced new types of article which are aimed at presenting opinion or stimulating discussion. For example, the *Journal of Ecology* has introduced a Forum section and an Essay Review – the latter is significantly different in content from the traditional review, and presents much a more personal view of a selected theme. Similarly *Oikos* has Minireviews, Forum and Opinion pieces.

It seems that there is a real demand in the scientific community for more than plain facts, whether presented for the first time as original research, or in a digested form as reviews. With the enormous growth of research activity, readers need more guidance through the jungle of scientific literature. The mature opinions of respected scientists about the development of their subject are particularly valued. Sometimes such opinions have a dramatic effect upon scientific thinking and the future direction that a subject takes. A good example is the seminal paper of Gould & Lewontin (1979) – *The spandrels of San Marco and the Panglossian paradigm: a critique of the*

adaptationist programme. (*Proceedings of the Royal Society of London, B series*, 1979, **205**, 581–598) – which deeply influenced the thinking of ecologists and evolutionary biologists.

This recognition of the need for mature, critical opinion is one of the impulses for *Perspectives in Ecology, Evolution and Systematics*. But what exactly do we mean by perspective? The dictionary definition is a good starting point. Amongst other definitions we find the following: “the ability to view things in just proportion”, “a prospect of the future”. In perspective is defined as “in just relationship, with the important and the unimportant things in their proper places”. These definitions capture exactly what we hope the new journal will achieve – to put our subject “in perspective”.

We believe that writing a review is itself a creative process. It is probably not possible to produce a neutral review, or if it is, then the result is likely to be very dull! Even the decision as to which material to include and which to exclude introduces a personal view about what is important. A good review organises old ideas and facts in a such a way that new relationships become evident and new directions for research are suggested: in other words, it puts things into perspective. The new journal aims to publish not only reviews – that is articles which review existing literature – but also monographic studies which include original data; however, even in the monographs we are looking for substantial articles which have a review quality about them.

Finally, a comment on style and quality: we aim to set the highest editorial standards for *Perspectives*. All articles will be subject to peer review, and will not be automatically accepted for publication, even if they were commissioned by the editors. We also aim to provide

a high level of editorial support for authors, and will take pains to ensure that articles are clear and well written. We are very conscious of the special needs of scientists whose first language is not English. As editors of a journal originating in central Europe, we feel a special responsibility in helping these scientists to publish their work in the most accessible form possible.

4 List of publications 1997

4.1 VERÖFFENTLICHUNGEN DES GEOBOTANISCHEN INSTITUTES ETH, STIFTUNG RÜBEL, ZÜRICH, 1997

Volume 128

Wilhelm, M. Wiesen und Weiden in der Stadt Zürich. Untersuchung zur Erhaltung und Förderung der Pflanzenvielfalt.

4.2 BULLETIN OF THE GEOBOTANICAL INSTITUTE ETH, 63 (1997)

Articles

- Schlaepfer, F. Influence of management on cover and seed production of *Brachypodium pinnatum* (L.) Beauv. in calcareous grassland. 3–9.
- Güsewell, S. & Klötzli, F. Measuring the abundance of *Phragmites communis* Trin. in wet meadows – a methodological investigation. 11–24.
- Landolt, E. How do Lemnaceae (duckweed family) survive dry conditions? 25–31.
- Matzke-Hajek, G. Zur Evolution und Ausbreitung apomiktischer *Rubus*-Arten (Rosaceae) in Offenland-Ökosystemen. 33–44.
- Grundmann, A. & Gillmann, D. Zur Vegetation unterschiedlich alter Blockschuttstandorte am Rossberg SZ. 45–67.

Research Projects and Notes

- Edwards, P.J. & Ekins, J.R. Morphology of gorse (*Ulex europaeus* L.) and its consequences for browsing by ponies. 69–75.
- Kollmann, J. & Schneider, B. Effects of landscape structure on seed dispersal of fleshy-fruited species along forest edges. 77–86.
- Utelli, A.-B., Roy, B.A. & Baltisberger, M. Evolution of mating systems in plants: the causes and

consequences of inbreeding in *Aconitum lycoctonum* s.l. 87–93.

- Diemer, M., Joshi, J., Körner, C., Schmid, B. & Spehn, E. An experimental protocol to assess the effects of plant diversity on ecosystem functioning utilized in a European research network. 95–107.
- Holderegger, R. Recent perspectives in conservation biology of rare plants. 109–116.

4.3 FURTHER PUBLICATIONS

A Publications in refereed journals

- Arn, D., Gigon, A. & Gut, D. (1997) Zwiebelgeophyten in Rebbergen der Nordostschweiz: Artenschutz und naturnaher Weinbau. *Zeitschrift für Ökologie und Naturschutz*, **6**, 65–74.
- Bosshard, A. (1997) What does objectivity mean for analysis, valuation and implementation in agricultural landscape planning? A practical and epistemological approach to the search for sustainability in agriculture. *Agriculture, Ecosystems & Environment*, **63**, 133–143.
- Crawford, D.J., Landolt, E., Les, D.H. & Tepe, E. (1997) Allozyme variation and the taxonomy of *Wolffiella*. *Aquatic Botany*, **58**, 43–54.
- Gigon, A. (1997) Fluktuationen des Dekungsgrades und die Koexistenz von Pflanzenarten in Trespen-Halbtrockenrasen (Mesobromion). *Phytocoenologia*, **27**, 275–287.
- Hirose, T., Ackerly, D.D., Traw, M.B., Ramseier D. & Bazzaz, F.A. (1997) CO₂ elevation, canopy photosynthesis, and optimal leaf area index. *Ecology*, **78**, 2339–2350.
- Horak, E. & Miller, O.K. (1997) A new species of *Simocybe* from North America. *Mycotaxon*, **62**, 225–229.
- Kollmann, J. (1997) Hypotheses on the regeneration niche of fleshy-fruited species in natural forest gaps and edges in central Europe. *Verhandlungen der Gesellschaft für Ökologie*, **27**, 85–91.
- Kollmann, J. (1997) Schadfraz an Gehölzsamen auf Waldlichtungen und im Wald. *Forstwissenschaftliches Centralblatt*, **115**, 113–123.
- Kollmann, J. & Poschlod, P. (1997) Population processes at the scrub–grassland interface. *Phytocoenologia*, **27**, 235–256.
- Landolt, E. (1997) Beiträge zur Flora der Stadt Zürich. IV. Dicotyledonen 2 (Berberidaceae bis Rosaceae). *Botanica Helvetica*, **107**, 29–50.

- Landolt, E. (1997) Beiträge zur Flora der Stadt Zürich. V. Dicotyledonen 3 (Leguminosae bis Araliaceae). *Botanica Helvetica*, **107**, 171–194.
- Landolt, E. (1997) Managing populations of rare wild plant species in Switzerland. *Bocconea*, **7**, 227–232.
- Les, D.H., Landolt, E. & Crawford, D.J. (1997) Systematics of the Lemnaceae (duckweeds): inferences from micromolecular and morphological data. *Plant Systematics and Evolution*, **204**, 161–177.
- Malinowski, D., Leuchtman, A., Schmidt, D. & Nösberger, J. (1997) Growth and water status in meadow fescue is affected by *Neotyphodium* und *Phialophora* species endophytes. *Agronomy Journal*, **89**, 673–678.
- Malinowski, D., Leuchtman, A., Schmidt, D. & Nösberger, J. (1997) Symbiosis with *Neotyphodium uncinatum* endophyte may increase the competitive ability of meadow fescue. *Agronomy Journal*, **89**, 833–839.
- Moreno, G., Heykoop, M., Esteve-Raventos, F. & Horak, E. (1997) *Marasmiellus phaeomarasmioides* sp.n. (Tricholomataceae) from Spain. *Persoonia*, **16**, 405–411.
- Ortega, A., Esteve-Raventos, F., Horak, E., & Moreno, G. (1997) Aportación al catalogo de los macromicetos del area potencial del *Abies pinsapo* en España. *Boletín Sociedad Micologica Madrid*, **21**, 219–249.
- Roy, B.A. & Raguso, R. (1997) Olfactory versus visual cues in a floral mimicry system. *Oecologia*, **109**, 414–426.
- Ryser, P., Verduyn, B. & Lambers, H. (1997) Phosphorus productivity and its components in three grass species with contrasting response to N and P supply. *New Phytologist*, **137**, 293–302.
- Schardl, C.L., Leuchtman, A., Chung, K.-R., Penny, D. & Siegel, M.R. (1997) Coevolution by common descent of fungal symbionts (*Epichloë* spp.) and grass hosts. *Molecular Biology and Evolution*, **14**, 133–143.
- Schumacher, P., Weber, D.C., Hagger, C. & Dorn, S. (1997) Heritability of flight distances for *Cydia pomonella*. *Entomologia Experimentalis et Applicata*, **85**, 169–175.
- Schumacher, P., Weyeneth, A., Weber, D.C. & Dorn, S. (1997) Long flights in *Cydia pomonella* L. (Lepidoptera: Tortricidae) measured by a flight mill: influence of sex, mated status and age. *Physiological Entomology*, **22**, 149–160.
- Steinger, T., Lavigne, C., Birrer, A., Groppe, K. & Schmid, B. (1997) Genetic variation in response to elevated CO₂ in three grassland perennials – a field experiment with two competition regimes. *Acta Oecologica*, **18**, 263–268.
- Urbanska K.M. (1997) Restoration ecology research above the timberline: colonization of safety islands on a machine-graded alpine ski run. *Biodiversity and Conservation*, **6**, 1655–1670.
- Urbanska, K.M., Hurka, H., Landolt, E., Neuffer, B. & Mummenhoff, K. (1997) Hybridization and evolution in *Cardamine* (Brassicaceae) at Urnerboden, Central Switzerland: biosystematic and molecular evidence. *Plant Systematics and Evolution*, **204**, 233–256.
- B Publications in unrefereed journals and books**
- Arn, D., Gigon, A. & Gut, D. (1997) Bodenpflege-Massnahmen zur Erhaltung gefährdeter Zwiebelpflanzen in begrüntem Rebbergen der Nordostschweiz. *Schweizerische Zeitschrift für Obst- und Weinbau*, **2**, 40–42.
- Arn, D., Gigon, A. & Gut, D. (1997) Bodenpflege-Massnahmen zur Erhaltung gefährdeter Zwiebelgeophyten in begrüntem Rebbergen der Nordschweiz. *Begrünung im Weinbau. XI. Kolloquium internationaler Arbeitskreis* (eds. Südtiroler Beratungsring für Obst- und Weinbau), pp. 94–98. Kaltern, Italien.
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