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SIL news

Volume 44 - January 2005

The International Association of Theoretical and Applied Limnology works worldwide to understand lakes, rivers and wetlands and to use knowledge, gained from research, to manage and protect these diverse, inland aquatic ecosystems.

In this Issue

Prof. Gene Likens speaking to the delegates during the opening ceremony at the SIL Congress in Lahti, Finland, August 2004 (photo is courtesy of Tapio Ruokoranta).

Message from the President

I report briefly here on some of the exciting and important actions taken at the SIL Congress in Lahti, Finland. By all accounts the Congress was robust and successful in terms of scholarly presentations, sharing of new ideas, and the renewing of friendships. Some 1,250 attended this well-organized and stimulating SIL Congress.

In my presidential address to the Congress attendees, (*www.limnology.org/news/president/2004.html*) I proposed that SIL has been highly successful as a scientific organization for 82 years, but faces serious challenges in the future. To begin to address these challenges, the following actions have been taken:

continued on next page

Material for the May 2005 issue should be sent to the Editor for:

February 14, 2005

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Contributions on a PC formatted disk, in any standard word processor or DOS (ASCII) text, or as email attachments, will assist the Editor.

(1) A new mission statement for the organization was approved at the Congress (see below).

(2) I have appointed an ad hoc Futures Committee, chaired by Prof. Brian Moss, to bring recommendations to me and to the National Representatives (see the column to the right) regarding steps that might be taken to foster and enhance the future of SIL. SIL members should forward any comments for the Committee's consideration to Prof. Moss.

(3) I proposed and the Congress approved the appointment of an additional Executive Vice President to be selected from a developing country and to serve during this triennium.

(4) I suggested and the Congress approved the appointment of an Ethics Committee, chaired by Prof. Carolyn Burns. This committee is charged to provide a statement of ethical principles for SIL and its members.

A full listing of actions taken at this Congress can be found in Prof. Robert G. Wetzel's (General Secretary/ Treasurer) report which will be published in the concluding volume of the Proceedings (*Verhand. Internat. Verein. Limnol.* 29).

Heart-felt thanks are extended to Prof. Timo Kairesalo, his organizing committee and all of his Finnish colleagues and support staff for making this Congress so effective and so pleasant.

The next SIL Congress is scheduled for 11-17 August 2007 in Montreal (*www.uqam.ca/SIL2007*). I hope to see all of you there.

Gene E. Likens, President
likensg@ecostudies.org

New Mission Statement

The International Association for Theoretical and Applied Limnology works worldwide to understand lakes, rivers and wetlands and to use knowledge, gained from research, to manage and protect these diverse, inland aquatic ecosystems.

Objectives and Goals of SIL

1. To study all inland aquatic ecosystems;
2. To understand how these ecosystems arose, function and are maintained;
3. To educate everyone about the value of these aquatic systems for the well-being and survival of all organisms, including humans on Earth; and,
4. To protect and conserve these ecosystems by promoting and fostering only sustainable use for future generations.

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Prof. Jouko Sarvala, a member of the organizing committee, talking with Prof. Pétur Jónasson, the former President of SIL, outside the Sibelius Hall at the SIL Congress in Lahti, Finland, August 2004 (photo is courtesy of Tapio Ruokoranta).

Participants/members enjoying coffee and sharing their ideas at the SIL Congress in Lahti, Finland, August 2004 (photo courtesy of Tapio Ruokoranta).

SIL Congress in Lahti, Finland (8-14 August 2004)

The Organizing Committee of the Lahti Congress, the Finnish Limnological Society and the City of Lahti would like to express their sincere gratitude to all 923 congress delegates and 89 accompanying persons for making a successful as well as scientifically stimulating congress.

Feedback received through questionnaires, returned by 365 congress delegates and accompanying persons, was mainly positive. In the questionnaire the delegates were asked to give their opinion on arrangements and events before and during the congress. The rating was 1=very poor, 2=poor, 3=not poor, not good, 4=good, 5=very good. In most of the questions over 50% of the delegates had considered the matter in question good or very good. Some weak points also became apparent from the responses. When in the final question it was asked how satisfied overall the delegates were of the congress 61.2 % answered 'satisfied' and 26.6 % 'very satisfied'.

There were 454 submitted papers.

The Congress website (*www.palmenia.helsinki.fi/congress/SIL2004*), with the photo gallery of the Congress, will be kept available till the end of March 2005.

Looking forward to seeing you all at the next SIL Congress in Montreal!

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Prof. Jouko Sarvala looks away while Prof. Roger Jones and Prof. Timo Kairesalo discuss ideas while at the SIL Congress in Lahti, Finland, August 2004 (photo is courtesy of Tapio Ruokoranta).

Professor Pennak at approximately 70 years of age.

Robert W. Pennak* 1912 - 2004

Robert W. Pennak died on June 23, 2004. He was 92.

In 1938, upon finishing his Ph.D. degree at the University of Wisconsin, he joined the Biology faculty at the University of Colorado. Although he officially retired in 1974, he was permitted to keep his office and laboratory on the campus, and essentially every day until his recent illness, he kept busy with his research, field work, extensive correspondence, consultation contracts, and editorial work. During his many years with the University he served as Biology Department chairman for six years, as acting Graduate Dean for six months, and as Secretary of the Graduate Faculty for four years. He also served on innumerable University committees.

Dr. Pennak was known world-wide for his teaching and biological research on lakes and streams. He organized and taught the world's first university course in stream biology. He published about 150 articles in U.S. and foreign professional journals. His two books, "Fresh-water Invertebrates of the United States" and "Collegiate Dictionary of Zoology", are widely used as text-references. The former has been generally acclaimed as a classic and has gone through more than 30 printings. He was active in 13 professional national and international societies and served as president of five of them. His name is to be found in many American and foreign biographical directories. At various times he served as editorial consultant or on the editorial board of 17 different professional journals. In 1950, at the age of 38, he gave the University of Colorado Annual Research Lecture, and in 1972 he was designated an Outstanding Educator of America. For seven years he was a member and Chairman of the National Science Foundation Graduate Fellowship Committee in Biology in Washington, D.C. Professor Pennak presented more than 90 research papers at learned societies, and more than 70 campuses invited him to give guest seminars for biology groups. He directed the work of 30 M.A. students and 17 Ph.D. students.

During his retirement years, Professor Pennak's services were widely in demand as a stream and lake consultant, including assignments for more than 30 corporations, public agencies, land developers, fisheries agencies, mining operations, conservation agencies and foreign governments.

Survivors include his wife, Alberta; a son, Richard Pennak, of California; and a daughter, Cathy Pennak, of Denver. Also surviving are two grandchildren and two great-grandchildren living in Denver.

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** Edited from a version written by Dr. Pennak, a characteristically Pennakian approach.*

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For Your Information

SILnews is now on the SIL website in PDF format. The newsletter is created in Adobe Acrobat, Version 5. To open, use Adobe Acrobat Reader.

Cosmopolitanism and Microbes

In the previous issue (Vol. 43, September 2004) of SILnews Professor Foissner questions our view that small organisms (e.g., protozoa) have cosmopolitan distribution – in the sense that habitat properties alone, rather than historical contingencies, determine where in the biosphere any particular microbial species thrives.

Ours is not a theory for protozoa alone. We have shown that small organisms in general tend to have wide geographical distribution, and those smaller than about 1 mm do appear to occur wherever their habitat requirements are met. These observations link to current ideas in community ecology predicting that large population sizes will correlate with wide geographical distribution, due to high probabilities of dispersal and low extinction rates (Finlay and Fenchel 2004; Fenchel and Finlay 2004). We recognise that some protists appear to be confined to particular climatic zones. They may, for example, show pantropical or bipolar distribution, but note that trans-tropical gene flow of 'bipolar' planktonic foraminifera has been shown (Darling *et al.* 2000).

Wide geographical distribution also has an impact on the number of species because of the lowered probability of allopatric speciation. This is reflected in the relatively modest global species richness of protists and smaller meiofauna – notwithstanding that some species remain to be discovered. At the local scale (e.g., a freshwater pond, or a few square metres of soil), the diversity of small organisms will always exceed that of larger organisms.

The disagreement is only a question of degree. Foissner suggests that maybe 33% of all ciliates show some degree of endemism. We tend to believe that this estimate is inflated, but even if true, it presents a situation that is markedly different to that of macrofauna and –flora for which cosmopolitan distribution is extremely rare (save for anthropogenic introductions). Macrofauna and –flora may be confined to mountaintops, river systems, old lakes or limited areas within continents: the flora of the Cape Province (South Africa), for example, includes more than 60% endemic species. The vast number of animals and plants with restricted geographical distributions explains their huge global species diversity.

We agree with Foissner that it is difficult to prove (or disprove) that every protist species occurs on all continents or in all oceans. New species are discovered every year and they are by definition endemic until found elsewhere. In 1995 we (Fenchel *et. al.* 1995) studied the protist biota of a marine anaerobic water column in a Danish fjord. No one previously had looked for anaerobic flagellates in such habitats and among other things we described a peculiar and very characteristic euglenoid flagellate (*Postgaardi mariagerensis*). Within a year it was found in samples collected in the anaerobic layers of a saline lake in Antarctica (Simpson *et al.* 1996/97) and soon after it was reported from the bottom of the Santa Barbara Basin off California (Bernard *et al.* 2000). So one should not give up the hope that some of the "endemic ciliates" will, after all, turn up elsewhere - once someone looks for them in the right places.

Foissner further questions our argument that large population sizes are required for large-scale dispersal by referring to the fact that mushrooms, mosses and ferns produce enormous numbers of spores and that these species should therefore have cosmopolitan distributions. In fact, representatives of these groups do tend to have very wide distributions, and this may be attributed to their spore dispersal ability, so the argument is not really at variance with our view. But the argument is also not quite valid. A huge number of spores is not equivalent to a huge population size. If an individual fern produces a million spores in its lifetime, on average only one millionth of these will survive to produce a new fern – the rest will succumb. The meaningful population size of ferns is, in the present context, the number of reproductive individuals. Five ferns may, perhaps, inhabit a square metre, but this area will also host something like 10^8 soil protists.

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The Systematics and Biogeography of Ciliated Protozoa

A biologist tends to rely on and to extrapolate from a particular organismic database. The finches of Galapagos profoundly influenced Darwin's interpretations of species. Mayr's magisterial knowledge of the birds of the world similarly shaped the details of the "Modern Evolutionary Synthesis". The technology employed in the study of particular organisms also has a significant role in a biologist's interpretation. Students of the same organisms may heatedly differ in their explanations when they use different analytic tools. The current controversy over the systematics and biogeography of microorganisms provides a case in point.

My experience with the ciliated protozoa leads me to suggest that their environment is a fine-grained ecological mosaic populated by large numbers of morphologically similar, evolutionarily active and physiologically distinctive species. This interpretation is based on genetic and molecular studies of a few cultivated species in the laboratory. It is in sharp contrast to that argued by other students of the ciliates. Finlay and Finchel (2002) project a limited number of morphologically distinct species (morphospecies) with cosmopolitan distribution. Their interpretation is based on the microscopic analysis of organisms collected from impressive worldwide collections. The controversy involves important issues in our assessment of biodiversity and the stability of the ecosystem.

I contend that an enumeration of protist species based on morphology alone seriously underestimates the number of species, the number of niches, and the complexity of the microbial habitat. Since the laboratory cultivation of any large number of the species is impossible, the issues must be resolved by molecular evolutionary analysis in order to answer fundamental questions for the global biogeography of microbial organisms. I attempt here to summarize briefly the basis of my interpretation in ciliated protozoa.

Paramecium was the first of the ciliated protozoa to be subjected to controlled genetic analysis. In 1937 Tracy Sonneborn discovered mating types in strains classified morphotypically as *Paramecium aurelia* (see Sonneborn 1957). The recognition of mating types allowed him to carry out genetic crosses, and he quickly demonstrated the existence of several genetically incompatible sets of morphologically indistinguishable isolates from natural sources. He initially designated the different groups as "varieties", later as "syngens", and finally as "species", when molecular correlates allowed the separation of species without breeding tests. Though only limited systematic ecological and biogeographical investigations were carried out, Sonneborn documented a number of significant differences in the basic features of the life histories of the sibling species – the conditions of mating, the lengths of the periods of sexual immaturity after a sexual reorganization, the time of onset of autogamous capability and the onset of clonal senescence. Using comparisons with other morphospecies in the genus *Paramecium*, and with other genera of ciliated protozoa, he proposed that the differences among sibling species should be interpreted on the basis of differences in their genetic economies (Sonneborn 1957). Sibling species can be placed on a gradient in an inbreeding-outbreeding array. According to this interpretation, genetic species with inbreeding tendencies have shorter life histories, are relatively more dependent on mutational variety than on recombinational variety, and are more physiologically specialized than species with outbreeding tendencies.

The Sonneborn interpretation was summarized by Nanney (1980, Chapter 6), and was accepted by some prominent systematic protozoologists. The Sonneborn contribution was, however, rejected by Ernst Mayr (see Schloegel 1999), and was not considered seriously in subsequent extensions of evolutionary theory to microbiological organisms.

Since the genetic domestication of *Paramecium*, isolates of several other genera have been domesticated to laboratory propagation. In all cases in which substantial numbers of strains have been collected and studied, they have been found to comprise genetically isolated but morphologically indistinguishable groups. The most extensive set of strains of ciliates thus far collected belongs to the genus *Tetrahymena*. Many of these sibling species are readily cultivated in the laboratory. They have been the basis of important studies in molecular genetics, and their students have made significant contributions to our understanding of ribozymes, telomeres, and epigenetic regulation of gene expression (Nanney and Simon 2000).

No sustained comparative exploration of the genetics and ecology of ciliate sibling species has been undertaken (but see Doerder *et al*. 1995). However, a substantial amount of biogeographical information has been sporadically assembled over the years for the genus *Tetrahymena* (Nanney 1999; see also the web site at *http://www.life.uiuc.edu/nanney*). The focus of most genetic studies is the species *Tetrahymena thermophila*. This species has been collected hundreds of times in eastern North America; it has never been collected outside North America. Its closest relative is *T. malaccensis*, which has only been found in Indonesia. *T. americanis* is probably the most abundant species in North America, but it has also occasionally appeared elsewhere, including in two collections from China. Other species of the complex, such as *T. tropicalis* and *T. cosmopolitanis*, are much more cosmopolitan in their distribution. It is important to note that only a few of the dozens of named sibling species have been subjected to breeding analysis, originally the only method for establishing the boundaries of gene pools.

These breeding studies, however, provide the standards for assessing the molecular dispersion within and between gene pools, primarily by using sequence differences in conserved ribosomal RNA molecules. One can argue that the evolutionary stasis of ancient organismic designs (Nanney 1982; Williams 1986) obscures an enormous amount of physiological, ecological and molecular diversity. Without either breeding studies or molecular assessment, however, few assertions concerning the biogeography of protist species can be taken seriously.

Recent critical microscopic studies of ciliates collected in previously unexplored places demonstrate how incomplete is our taxonomic inventory, even at the morphological level (Foissner 2004).

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Announcements

Cyanonet Launch in Africa: Identification of National Representatives

Cyanonet, an internet-based global clearing house of information on cyanobacteria (= blue-green algae) is currently being launched. Details of the project are available on *www.dhec.co.za/cyanonet*

The regional representative for Africa, Bill Harding of South Africa, is in the process of identifying individuals in African countries who are prepared to act as information links or national representatives so that a regional overview of cyanobacteria in Africa can be formulated.

An invitation is extended to anyone in an African country who may be able to assist, alternatively to anyone - in any country – engaged in work in any field related to: surface waters, water resources, water resource management, water-related organizations including government departments, invasive species programs, water supply engineering, agriculture and public health.

Details of the information that is needed is provided on the above website, as well as a pro forma letter of invitation to assist in this venture.

Please note that all efforts to get Cyanonet up and running are voluntary and unpaid. Accordingly the success or failure of this venture will be directly determined by the level of response that is received.

Contact *Bill Harding* at *cyanonet@dhec.co.za* for further information.

Identification, enumeration, measurements and evaluation of density and biomass of freshwater zooplankton and benthos

Dr. Claudiu Tudorancea, a specialist in freshwater zooplankton can provide information on zooplankton samples including species identification, enumeration and evaluation of density and biomass for crustaceans and Rotifera, using a computerized method. These services have been used since 1988 by the Federal and Provincial governments of Canada as well as non-governmental organizations.

Dr. Monica Tudorancea, a specialist on zoobenthos, will sort samples and identify the fauna. Her field of expertise is the Chironomidae (taxonomy, density, and instar composition). She has seven years of experience in this field.

Both are members of SIL and can be contacted at:
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Book Reviews

Advances in Limnology Vol. 58: Lake Stechlin - An Approach to Understanding an Oligotrophic Lowland Lake

Edited by Rainer Koschel and Donald D. Adams
311 p., 2003
Archiv für Hydrobiologie
Special Issues: Egebneisse der Limnologie 58
ISBN 3-510-47060-5
Euro 68.00

Limnologists have studied only a few of the millions of lakes on the planet in any great detail and for any length of time. These few lakes are particularly important to our discipline, because they provide links between the comparative and historical approaches, and they are the systems where we can integrate what we know about the parts of lake ecosystems to gain an understanding of the whole. The importance of these few lakes is enhanced when the existing information is summarized in a monograph, a special journal issue or a collection of papers.

Lake Stechlin, the subject of over 500 scientific publications and 45 years of research when this volume was published in 2003, deserves to be listed among these relatively well-known lakes that we turn to when we want to put our results into context. However, Lake Stechlin was not a lake whose name I recognized from the other side of the Atlantic before reading this volume, edited by Rainer Koschel and Donald D. Adams. The objective of the book, paraphrased from the editors' preface, is to present new limnological studies on the lake, summarize its present state and functioning, and stimulate growth of ideas and new research. There is also considerable information about the history of the lake on historical and geological time scales. While the editors do not claim it to be a complete review, it is a good entry point to the literature on Lake Stechlin. The publication of this volume is timely, following the creation of a new building and laboratory in 2002 for the Leibniz-Institute of Freshwater Ecology and Inland Fisheries on the lake's southern shore. Like other special issues in the Advances in Limnology series, it is a collected volume. The papers are in a logical order, but each is a self-contained unit that could have been published on its own. Accordingly, there is a high degree of redundancy in the background information provided in the papers. That does not detract too much, even on reading it from start to finish. Many readers will choose chapters relevant to their work, and will benefit from the redundancy.

The preface by the editors introduces us a briefly to the lake, its human history and its cultural value. Lake Stechlin is medium-sized (4.23 km^2), deep (69.5 m), meso-oligotrophic (TP 13.8), temperate (53° 10' N) lake in glaciated northern Germany. From 1966 to 1989 it received 300,000 m^3 d^{-1} of cooling water from a nuclear power plant, the water having been drawn from a more eutrophic lake nearby. Otherwise, human impacts have a long history, but their effects have not been excessive. Much of its basin is forested and natural mechanisms have helped buffer the perturbations; one focus of the book is those buffering mechanisms and the long-term prognosis for the ecosystem.

The second and third papers in this volume are on water balance. This is a difficult problem in Lake Stechlin, as it has no surface inflows and outflows, save an artificial outflow (the Pozlow Canal) that was dug for navigation in the 18th century and re-opened and modified during the operation of the nuclear power plant. The lake occupies a relatively flat basin with poorly-defined boundaries in permeable glacial deposits. The paper by Nützman *et al.* develops water budgets using several methods, including a chloride budget, leading to an estimate of recharge sufficient to replace the water in 60 years. The following paper by Holzbecher deals with how subsurface watershed boundaries and flows were altered by the construction of the canal and its modification during the operation of the power plant.

The next three papers are related to trophic status, as reflected by redox conditions in the sediment, hypolimetic oxygen concentrations, and internal loading. The first by Sass *et al.* deals with sulfate reduction in the sediments, including its vertical extent, the bacteria responsible, and controlling factors. The second by Caspar *et al.* describes sediment profiles and fluxes of CH_4, CO_2 and N_2. The problem of bubble formation and its contribution to fluxes is one of the issues dealt with in some detail. The final paper in this trio, by Gonsiorczyk *et al.*, describes oxygen consumption and SRP accumulation in the hypolimnion, and provides evidence that both processes are increasing despite decreases in P-loading and no change in areal rate of O_2 consumption. Together they make a good contribution to understanding the internal regulation of redox conditions at the sediment-water interface and the balance between sediments as a P sink or source.

Nedoma *et al.* have the only paper on nutrient utilization, and take a comparative approach using two nearby lakes that are eutrophic. Their paper focuses on utilization of DOP using ^{32}P-labelled nucleotide and non-nucleotide substrates. There are few data; one experiment on each lake, one week apart during late August to mid-September; so any conclusions about differences between lakes and substrates are tentative. Nonetheless, the authors raise the interesting hypothesis that the fates of nucleotides and non-nucleotide DOP differ, with the former used mainly by bacteria and the latter by phytoplankton.

Four papers follow on phytoplankton, mostly exploiting an intensive sampling program; seven years of phytoplankton community composition and biomass, collected weekly throughout the year at three depths, with accompanying environmental and zooplankton data. The lead author on three of the papers is J. Padisák from the University of Veszprém, Hungary. The first paper deals with inter-annual variation, the second focuses on development and decline of the spring diatom bloom, the third by Scheffler *et al.* investigates dimorphism in one of the dominant centric diatoms, and the last deals with cyanoprokaryote maxima in the upper hypolimnion. This last chapter is unique in the collection for including a brief review across many lakes and comparison with some Brazilian lakes. Together these papers make some sobering points for those of us used to doing quick studies in fair weather: history is important, and present communities depend on past conditions as well as current ones; winter is important, even for understanding phytoplankton in summer; and the hypolimnion is important, even for understanding epilimnetic populations. Otherwise less important species ascend to dominance occasionally in Lake Stechlin, with strong effects on the rest of the biota and on biogeochemical cycles, but the causes of their temporary success are not readily understood even with such a good data set.

The only paper dealing primarily with zooplankton is by Weiler *et al.* and concerns the habitat requirements of *Eurytemora lacustris*. They argue that this copepod is a cold stenotherm, inhabiting only lakes deep enough to have an oxygenated hypolimnion, and that its presence in the adjacent Lake Nehmitz was only during the operation of a nuclear power plant that caused water to be drawn from Lake Stechlin into Lake Nehmitz. The paper provides the crustacean species list for both lakes, and information about seasonality and vertical migration. While this is the only zooplankton chapter, zooplankton biomass data are presented in the paper by Padisák *et al.* on phytoplankton inter-annual variability and in the following chapter by Schulz *et al.* on the feeding

of planktivorous vendace (*Coregonus albula*). Schulz *et al.* provide data on species composition and annual succession as well. Their major finding is that vendace exhibit a strong selection for cladocerans whenever they are available. The predatory Cladocera *Bythotrephes* and *Leptodora* are evident in the diet even when they are not abundant enough to be quantified in zooplankton samples. The data also suggest the existence of two separate vendace populations, morphologically indistinguishable but with a different depth distribution, diet and growth.

The next two papers also focus on fish. Mehner *et al.* compare estimates of fish density and biomass during June by two independent crews using the same echo sounding technology. The paper is centred on methodology, but it does present data on abundance, biomass, size distribution of pelagic fish, and even a little biology. Anwand *et al.* provide a basic study of species composition, growth and feeding ecology of the fish community. This is a brief chapter, summarizing what little is known about the past fish community, the present community, and feeding as determined by collections on one date in August for two different years. Size-at-age data are also presented. Overall, the growth of fish appears to be rather slow. Perch are the exception; they grow well after reaching sufficient size to become pelagic piscivores, filling an otherwise empty niche.

The last two papers deal with paleolimnological record, reporting on different aspects of three sediment cores from different depths. The longest core from the middle of the deepest basin was 631 cm, although this core did not cover the longest history. A shorter core from a shallower site covered 13,000 years. Röper and Schwarz report on elemental and mineral analyses that indicate periods of increased trophic status (less oxic conditions near the sediment, more calcite deposition), allochthonous inputs (TOC:N), erosion (quartz) and metal deposition (several anthropogenic metals). It appears from these cores that Lake Stechlin has maintained its oligotrophic character over its entire history, but there have been periods of greater productivity and reducing conditions. The final paper by Brande presents microfossil, mostly pollen, stratigraphy of Lake Stechlin documenting changes in the surrounding forest, human influences (both ancient and modern), and changes within the lake, for example in macrophytes and mollusc communities.

The book has the shortcomings one expects to one degree or another in a collected volume. Some topics are missed entirely (benthos, productivity at trophic levels other than fish, circulation), while coverage of others is uneven. Better integration of the material in the different chapters could have increased the overall value of the book. Without that, it falls short of elucidating "an approach to understanding". The book does fulfill its objectives of introducing the lake, and providing a selection of current research. It also appears to be an excellent portal to previous work on the lake.

While reading *Lake Stechlin*, I often considered what it would be like to teach a course in limnology from a collection of research papers dealing with a single lake. This is clearly beyond what the editors intended, but this collection could be a good focus for such a course, with just a little more breadth that could be achieved by adding a few papers already published separately. Going cover to cover forced me to read more broadly than I otherwise would; it was a learning experience and often caused me to think about my own research interests from a different perspective. I am sure that I will revisit this book often, and recommend it to anyone with an interest in temperate lakes.

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Aquatic and Wetland Plants of Southern Africa

by Christopher D. K. Cook
Institut für Systematische Botanik der Universität Zürich
Backhuys Publishers, Leiden, The Netherlands
2004, 282 pp, hardbound, ISBN 90-5782-142-7, Euro 86.00

Ecologists working in Second- or Third-World countries encounter the problem of dealing with plant and animal species unknown to them. The effort of linking sometimes contradictory information in dispersed literature is time-consuming and often leads to unsatisfactory results. The biodiversity in these countries is often very large, and development projects affect large areas with little-known ecological side effects. This is also true for the wetlands in the semiarid and arid parts of southern Africa. A rising demand for water by the growing population and for agricultural land increasingly threatens all types of wetlands and their flora and fauna. Despite an urgent need for manuals for the classification of plants and animals, worldwide funding of taxonomic work is meagre. Under these circumstances, this manual by Christopher Cook, an internationally renowned specialist with vast experience, is especially welcome. It fills the gap that greatly impeded the work of taxonomists, biologists, and wetland ecologists.

The manual covers Namibia, Botswana, Swaziland, Lesotho, and the Republic of South Africa. In the introduction, the author characterizes aquatic and wetland plants. His pragmatic approach of including all plants growing under wetland conditions (soils saturated with water for at least 60 consecutive days or flooded for 14 consecutive days) is most appreciated. Many manuals suffer from restrictions to hydrophytes *sensu strictu* and neglect helophytes that often play an important role in wetland processes. He also summarizes valuable information on endemic species and their distribution. A large reference list follows the introduction.

The key to the genera is user-friendly and is based mostly on easily seen vegetative characters and not only on reproductive features that often develop only during certain periods of the life cycle. A general description of the families and genera leads the way to the description of the 482 species, subspecies, or varieties well illustrated with some environmental parameters and the distribution range. Short descriptions of an additional 117 species are given. A glossary and an index are found at the end of the manual.

This excellent book can be highly recommended not only to scientists and students. Also environmentalists from southern Africa active in wetland protection will certainly benefit greatly from this manual.

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Letters to the Editor

In SILnews 40 (September 2003) Marlene S. Evans reviewed The Great Lakes of the World (GLOW), Food Web, Health, and Integrity, edited by M. Munawar and R.E. Hecky. One observation, "The paper on the Indonesian lakes Matano and Towuti provides new information on these largely unknown deep, tectonic lake ecosystems. Both lakes are located on Sulawesi Island and have been geologically isolated from mainland Asia for millions of years", requires further comment.

In Indonesia, very little primary fieldwork has been done on lakes. It is exceptional that the two remote lakes were visited twice in 1993 by G.D. Haffner, P.E. Hehanussa and D. Hartoto, the authors of the above paper, and Expedition Indodanau (1991-1995) in July. Haffner *et al.* explain that Lake Matano was homothermal and continuously mixing, while Expedition Indodanau showed that it was stratified. In the temperate sense, a small vertical temperature difference may look homothermal but Expedition Indodanau documented stratification also by other physical and chemical variables. It is possible that during the hemispheric winter the lake becomes nearly isothermal and mixes deeply, but water may not homogenize completely. Most probably Lake Matano exhibits partial atelomixis and temporary meromixis. The authors claim that what they call the isothermal nature of lakes Matano (590 m) and Towuti (203 m) is only found in these systems. However, similar conditions are common in several other deep lakes in Indonesia.

The above authors suggest only three trophic levels for Lake Matano: phytoplankton/detritus, zooplankton and forage fish and that the lack of diatoms is an anomaly in both the lakes. However, elsewhere in the text, piscivore fish are mentioned and observations of *Navicula* and *Surirella* species shown. Expedition Indodanau also found diatoms. In the reviewed paper, the unusual pattern of endemism was not emphasized. Rivers connect a five-lake system, including lakes Matano and Towuti, with 60 endemic copepod, prawn, mollusc and fish species in it but the five lakes share only one prawn species. In addition, Expedition Indodanau recorded very poor open-water pelagic phytoplankton communities in Lake Matano. The seven algal species had a biomass of 0.002 mg/l, chlorophyll-a concentration of 0.15 mg/m^3, lowest in the Indonesian large lakes, and a transparency of 15-16 m. The respective values for Lake Towuti were 0.015 mg/l (nine algal species), 0.2 mg/m^3, and 20 m.

Haffner *et al.* argue that the turbidity plumes along the wall of the deeper basin of Lake Matano might be related to the source of isothermal mixing and concentrations of chromium, iron, manganese and nickel in the sediments were well above levels that are considered to induce toxicological stress. The high levels in the sediments provide evidence of significant groundwater inputs. Considering the specific character of Lake Matano and its exceptional pattern of endemism, it is surprising that the major heavy metal source is omitted: the Canadian PT Inco's mining and smelting operations next to the lake. The lake with an exceptionally long water residence time received industrial effluents with cobalt concentrations of 1 mg/l, manganese 70 mg/l, nickel 23 mg/l, and zinc 1.5 mg/l, while the total nitrogen concentrations were 30 mg/1 and total phosphorus 1 mg/l. The nickel ore reserves of Inco's Soroako concession are among the largest in the world.

Understanding the structural and functional similarities and differences between tropical and temperate lake ecosystems needs further attention. More on Indonesian limnology can be found in the SIL publication "Limnology in Developing Countries, Vol. 2".

References cited:

Haffner, G.D., Hehanussa, P.E. and Hartoto, D. 2001. The biology and physical processes of large lakes of Indonesia: Lakes Matano and Towuti. In: Munawar, M. & Hecky, R.E. (eds.). The Great Lakes of the World (GLOW). Food Web, Health, and Integrity. Backhuys Publishers. Leiden. pp. 183-192.

Lehmusluoto, P. and others 1997. National inventory of the major lakes and reservoirs in Indonesia. General Limnology. Revised Edition. Expedition Indodanau Technical Report. Edita Oy. Bandung and Helsinki. 67 pp.

Lehmusluoto, P. and others 1999. Limnology in Indonesia. From the legacy of the past to the prospects for the future. In: Wetzel, R.G. & Gopal, B. (eds.). International Association of Theoretical and Applied Limnology. Limnology in Developing Countries. **2**:119-234 (*http://www.limnology.org/publications.html*).

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As the International Association of Theoretical and Applied Limnology promotes new knowledge among limnologists to advance the understanding of inland aquatic ecosystems, I propose new principles for a comparative appreciation and recognition of the results obtained in countries from various zones of the globe.

In aquatic ecology a new rhythmological methodology should be used. Time is an important ecological factor, which permits a comparison of scientific data even at a global scale. One should scientifically appreciate the past, the present and the tendencies to be followed in the evolution of ecological phenomena.

For many aquatic ecosystems in different countries, I think that this new model to investigate and evaluate scientific data is useful as a requirement in the development of science and society. For aquatic ecosystems such as the Amazon or Danube, this new approach would be a model for international collaboration, providing comparable scientific data that is valuable for both theoretical and applied view points.

As the founder of Aquatic Ecorhythmology I formulated Ecorhythmology laws, such as:

1. In all Earth's ecosystems rhythmical modifications are occurring.
2. At all levels of ecosystems there are many rhythms with various characteristics.

These rhythmical modifications are produced in the same periods of time and these should be scientifically investigated and known, mainly in the protected zones of ecosystems still having normal rhythms. As is well known, anthropogenic factors can change natural rhythmicity and the evolution of phenomena, even destroying them.

I think that for the management and reconstruction of ecosystems, new studies should be effected based on the knowledge of new concepts and laws and new methodology.

Simona Apostol
Romania

Calendar of Events

International Symposium on the Eutrophication Process and Control in Large Shallow Lakes (With Special Reference to Lake Taihu, a Shallow Subtropical Chinese Lake).
22 - 26 April 2005
Nanjing-Wuxi, China
Contact: Ms. Yafen Chen
Nanjing Institute of Geography and Limnology
Chinese Academy of Sciences
73 East Beijing Road
Nanjing 21008, China
chenyf@niglas.ac.cn
Phone: +86-25-86882022
Fax: +86-25-57714759
http://www.niglas.ac.cn/symposium/

The 53rd Annual Meeting of the North American Benthological Society (NABS).
23 - 27 May 2005
New Orleans, Louisiana, USA
For the first time in its history, NABS will be meeting jointly with the American Geophysical Union (AGU). Additional information, including call for papers, abstract submission, accommodations, special sessions, workshops and student awards, is available via the left navigator bar of the NABS website: http*://www.benthos.org/Meeting/*; meeting information specific to AGU members is available via this AGU website: http*://www.agu.org/meetings/sm05/*

5th conference on the Ecology and Management of Shallow Lakes (Shallow Lakes 2005).
"Shallow lakes in a changing world"
5 - 9 June 2005
Dalfsen, The Netherlands
Contact: Conference secretariat Shallow Lakes 2005
c/o NecoV (Netherlands-Flemish Ecology Society)
Mozartstraat 53A
6661 BH Elst, The Netherlands
administratie@necov.org
www.shallowlakes.nl

The Eighth International In Situ and On-Site Bioremediation Symposium.
6 - 9 June 2005
Baltimore, Maryland, USA
Contacts: For questions about submission of abstracts or short course proposals:
Gina Melarango
614 424-7866
biosymp@battelle.org
Inquiries about co-sponsorship, exhibits, or registration may be addressed to:
The Conference Group
info@confgroupinc.com
(Phone: 1 800 783-6338 USA & Canada) or (614) 488-2030
Fax: (614) 488-5747
www.battelle.org/biosymp

7th International Conference on Acid Deposition "Acid Rain 2005".
12 - 17 June 2005
Prague, Czech Republic
Web page of the conference: *www.acidrain2005.cz*

International Symposium on Wetland Pollutant Dynamics and Control Conference.
4 - 8 September 2005
Ghent, Belgium
Contact: ir. Gijs Du Laing
Laboratory of Analytical Chemistry and Applied Ecochemistry
Coupure Links 653
9000 Gen, Belgium
wetpol@biomath.ugent.be
Phone: +32 9 264 59 95
Fax: +32 9 264 62 32
http://biomath.ugent.be/~wetpol

19th International Commission on Irrigation and Drainage (ICID) Congress - Use of Water and Land for Food and Environmental Sustainability.
10 - 18 September 2005
Beijing, China
Contact: Congress Secretariat
CICCST
Room 717, 86 Xueyuan Nanlu
Haidian District, Beijing 100081, China
info@icid2005.org
registration@icid2005.org
Fax: 86 10 62180142
www.icid2005.org

The World Conference on Ecological Restoration "*Ecological Restoration: A Global Challenge*".
12 - 18 September 2005
Zaragoza, Spain
Contact: Conference Secretariat: di&co
Paseo de Sagasta, 19, Entlo dcha
50008 Zaragoza, Spain
Phone: +34 976 211 748
Fax: +34 976 212 959
secretariat@ecologicalrestoration.net
Http://www.ecologicalrestoration.net

Nutrient Management in Wastewater Treatment Processes and Recycle Streams (IWA Specialized Conference).
18 - 21 September 2005
Krakow, Poland
Contact: Conference Secretariat
Adam Kalucki (Conference Manager)
LEMTECH Konsulting
ul. Szpitalna 40
31-024 Krakow, Poland
adamk@lemtech.krakow.pl
lemtech@lemtech.krakow.pl
Phone: (+48 12) 429 40 31; 429 40 39; 429 40 42
Fax: (+48 12) 429 40 65
www.bnr2005.krakow.pl

6th River Bottom Symposium.
19 - 25 September 2005
Brno, Czech Republic
Contact: Dr. Svetlana Zahradkova and Dr. Jana Schenkova
Masaryk University
Faculty of Sciences
Kotlarská 2, 611 37 Brno, Czech Republic
zahr@sci.muni.cz
schenk@sci.muni.cz
Phone: +42 0 549 498174
Fax: +42 0 541 211214
http://www.sci.muni.cz/zoolecol/hydrobio/rivbot6

9th Conference - International Society for Salt Lake Research (ISSLR).
26 - 30 September 2005
Perth, Western Australia
Contact: Jacob John, Chair ISSLR 9th Conference
Department of Environmental Biology
Curtin University of Technology
GPO Box U1987 Perth WA 6845, Australia
Phone: +61 8 9266 7327
Fax: +61 8 9266 2495
j.john@curtin.edu.au
http://www.isslr.org

11th International Conference on the Conservation and Management of Lakes - *Towards sustainable management of African Lake Basins.*
31 October - 4 November 2005
Nairobi, Kenya
Contact: Permanent Secretary
Ministry of Water Resources Management and Development
Maji House, Ngong Road
P.O. Box 49720
Nairobi, KENYA
nilesec@wananchi.com and
simeonochieng@yahoo.com
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Fax: +254 20 727622
or
International Lake Environment Committee
Attn: 11th World Lake Conference Secretariat
1091 Oroshimo-cho,
Kusatsu-city, Shiga 525-0001, JAPAN
kenya2005@ilec.or.jp
Phone: +(81-77) 568-4567
Fax: +(81-77) 568-4568
Website: http://www.ilec.or.jp/eg/wlc.html

2005 International Symposium of the North American Lake Management Society.
9 - 11 November 2005
Madison, Wisconsin, USA
Contact: Dr Jeffrey A. Thornton, Chair
Host Committee in Waukesha, Wisconsin
jthornton@sewrpc.org or *iems@aol.com*
Phone: +1 262 547-6721 x 237
Fax: +1 262 547-1103
www.nalms.org

2006

The Tenth International Symposium on Aquatic Oligochaete Biology. Tentatively scheduled to convene at:
The Institute of Hydrobiology
Chinese Academy of Sciences, Wuhan, China
Contact: Dr. Hongzhu Wang, D.Sc.
Associate Professor
Institute of Hydrobiology
Chinese Academy of Sciences
Hubei, Wuhan 430072, People's Republic of China
wanghz@ihb.ac.cn
Phone: +86 27 87647719
Fax: +86 27 87647664

2007

SIL2007 in Montréal.
Preparations for the next SIL Congress in Montréal are continuing. The local organizing committee is working towards an exciting scientific program with several special sessions as well as a series of excursions. Please visit the congress' website for more complete information and updates at
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- location and duration of the position;
- closing date for applications;
- a short paragraph describing the position, including any citizenship, educational or employment prerequisites; and,
- information on where potential applicants may obtain further information, including names of contact persons, telephone numbers, fax numbers, e-mail addresses, and web site addresses, where appropriate.

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Submissions for the SIL website should be sent by e-mail to *webmaster@limnology.org* or by fax to the attention of *Gordon Goldsborough* at: +1 (204) 474-7618.