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In this Issue

Lake Vesijärvi and the City of Lahti (southern Finland): Comprehensive Interactions between the Lake and the Coupled Human Community 1-5

Environmental Issues 5

Working Groups - Paleolimnology 6

Letter to the Editor 6

Book Reviews 7-10

Change of Address 11

Calendar of Events 11

SIL Officers 12

Material for the May 2004 issue should be sent to the Editor for:

February 16, 2004

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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.

Fig. 1. Lakeshore building has increased after the successful restoration of the lake (Photo courtesy of Pertti Vesanen - 2000).

Lake Vesijärvi and the City of Lahti (southern Finland) Comprehensive Interactions between the Lake and the Coupled Human Community

by
Timo Kairesalo and Kirsi Vakkilainen

continued on next page

An Overview of Lake Vesijärvi

Lake Vesijärvi is located in southern Finland and surrounded by the City of Lahti and the municipalities of Hollola and Asikkala. Lake Vesijärvi (110 km^2) flows through the River Vääksynjoki and Vääksy Canal into Lake Päijänne, one of largest lakes in Finland that now also serves as the raw water source for the metropolitan area of Helsinki (the Capital of Finland). Lake Vesijärvi is divided into four main basins. The open lake basin facing the City of Lahti is named Enonselkä (Fig. 5). The basin of Lake Vesijärvi was formed as the continental glacier withdrew from the ancient bedrock and heaped terminal moraine to form ridges, the Salpausselkä Ridges, at both ends of the basin.

The shoreline of Lake Vesijärvi is 180 km long, 45% of which is used for forestry, 33% for summerhouse settlement, 13% for permanent settlement and the remaining 9% for agriculture. The drainage area of Lake Vesijärvi (515 km^2) is mainly covered by woodland (58%) but the proportion of arable land is also quite high (17%). The mean depth of the lake is 6 m and the maximum depth 42 m in the northernmost Kajaanselkä basin. Mean and maximum depths in the Enonselkä basin are 6.8 m and 33 m, respectively. Theoretical retention time of water in the lake and the Enonselkä basin is ca. 5.5 years. Due to the shallowness of the lake, two-thirds of the sediments in the Enonselkä basin (26 km^2) are in direct contact with epilimnetic waters (depth <10 m) during the stratification period (May-September).

Eutrophication History

Lake Vesijärvi ('vesi' means 'water') was originally a clear-water lake and received a great deal of its water from lakeshore springs. Due to the fertile, calcium-rich soil of the drainage area and connection to Lake Päijänne and Kymijoki River, Lake Vesijärvi and its surroundings provided a favourable and attractive environment for human settlement and different activities like agriculture, a fishery, industry and transport. At the beginning of the 20th century, when the foundation of the City of Lahti was laid (1905), Lake Vesijärvi was known for its transparent water so that the lake bottom at 5 m depth was visible on clear, calm autumnal days. At that time the lake was also very famous for its flourishing fishery and the most wanted fish being 'the king' bream (*Abramis brama*; up to 8-9 kg) which during its spawning in the summer was caught by the cartloads from shallow, vegetated lake areas. Burbot (*Lota lota*), pike (*Esox lucius*), perch (*Perca fluviatilis*), and roach (*Rutilus rutilus*) were also plentifully fished in the spring, and vendace (*Coregonus albula*) and smelt (*Osmerus eperlanus*) in the autumn. Crayfish (*Astacus fluviatilis*) and waterfowl (*Anas* spp.) also provided important catches and trading goods.

The first signs of eutrophication of Lake Vesijärvi, and especially of the Enonselkä basin, were recorded during the first decades of the last century as a consequence of increased industrial and sewage effluent discharges from the City of Lahti. For instance, the first incidence of cattle poisoning in Finland, by cyanobacteria-rich lakewater, was documented in Lake Vesijärvi as early as 1928. Thereafter, the lake was used for decades as a recipient for domestic sewage, exploited for the needs of industry and transport, or as a timber storage site. In the 1960s and 1970s, the lake became known as one of the most eutrophic large lakes in Finland. *Anabaena* and *Microcystis* blooms were common, and taste and odour problems in water and in fish occurred frequently, especially in Enonselkä basin. In addition, during stratification periods, oxygen deficiency below 10 m depth and complete oxygen depletion in the hypolimnion (20-30 m), were a regular phenomena.

During this time the annual phosphorus loading of sewage effluent to Enonselkä basin was 50-60 tonnes, equivalent to 1.9-2.3 g P m^{-2} (Keto 1982). The City of Lahti built a new sewage treatment plant in 1976, and the sewage was diverted from Lake Vesijärvi. The artificial, wintertime aeration of the lake was done between 1979 and 1984. These were necessary prerequisites for the recovery of the lake. In principle, the conventional measures were successful: the phosphorus loading was reduced below the critical level and oxygen depletions in winter were prevented. Aeration, however, had no influence on hypolimnetic oxygen concentrations in summer, and due to high internal loading, phosphorus concentrations also regularly doubled. Consequently, during the 1980s eutrophication problems started to increase again and the lake experienced both summer and winter blooms of harmful, toxic cyanobacteria. Thus most of the recreational and fishing values of the lake were destroyed.

Overall, Enonselkä basin provides a typical example of the problems encountered in the restoration of large, eutrophic lakes. Cyanobacterial blooms continued despite conventional restoration measures, which evidently were not adequate to restore the lake.

Rehabilitation and Management

The City Council of Lahti realized in the early 1980s that addressing the problems affecting the lake required a new approach that would involve all the various groups and individuals impacting the lake, as well as the various institutions having regulatory authority over different aspects of lake ecology and lake management.

The Lake Vesijärvi Project (the ecological management and research of the lake) was initiated in 1987 by a 15-member cooperative strategic group of local environmental authorities, university scientists, and national water and

fishery authorities and by a 30-member operational group composed of experts from the Lake Vesijärvi Fishery Area, the Regional Rural Centre, local fishing associations, fishery advisors and village associations. The goals of the project were to stop the eutrophication, eliminate the toxic blooms and mass developments of cyanobacteria, and rehabilitate the recreational values and to re-establish a sustainable fishery in the lake.

Fig. 2. Trawl-catch of roach (Photo courtesy of Juha Keto - 1992.

The project combined the goals of water quality control and fishery management in an ecological management strategy. This strategy involved the employment of conventional eutrophication control measures on discharges to the lake (e.g., environmental protection planning covering the drainage area, including systematic monitoring of the external loading) as well as biomanipulation, i.e., mass removal of roach by trawling (Fig. 2). Mesocosm experiments in the lake had revealed that roach, which in the course of the lake's eutrophication had developed a very dense population, had a key role in maintaining high phytoplankton biomass and productivity in the Enonselkä ecosystem (Horppila and Kairesalo 1990; Horppila *et al.* 1998). Biomanipulation was started in 1989, and during five years (1989-1993) over 1,200 tonnes of 'coarse fish' (450 kg ha^{-1}), mainly roach (52 % of the catch) and smelt (28 %) was removed from the lake. Consequently, the roach stock diminished to almost one fifth. In addition, the intensive stocking of pikeperch (*Stizostedion lucioperca*) was carried out during 1987-1991, and the spawning areas of pike were largely managed. These measures resulted in the increase in the natural stocks of predatory fish (pike, perch, burbot and pikeperch) and commercially important planktivorous coregonid fish. This large-scale manipulation of the fish stock was followed by the collapse of cyanobacterial biomass and then doubled water clarity (Figs. 3 and 4). The recreational values of Lake Vesijärvi were thus restored (Kairesalo *et al.* 1999, Suoraniemi *et al.* 2000).

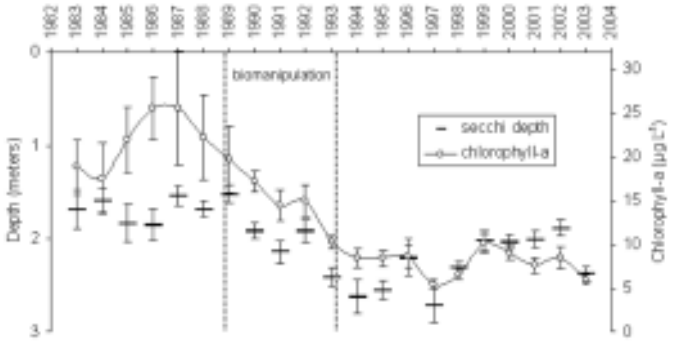

Fig. 3. Chlorophyll-a concentration (0-5 m) and Secchi depth in Enonselkä basin (means +/- SE) from 1983-2003.

Fig. 4. Biomass of cyanobacteria (means +/- SE) in Enonselkä basin (0-5 m) from 1986-2002.

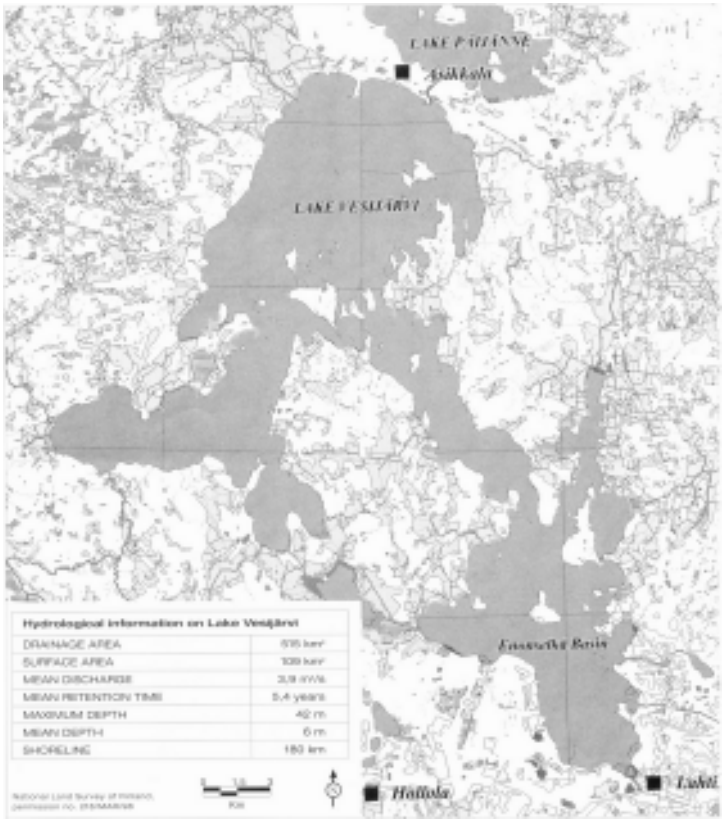

Fig. 5. Map of Lake Vesijärvi.

Socioeconomic Feedbacks

Due to the lake's recovery, building activity, as well as the value of land around the lake, have risen. The impact of a cleaner lake, for instance, was estimated to be in total 0.3 Million Euros m^{-2} for the built-up lakeside districts in Lahti (Fig. 1). The City of Lahti built a new harbour and a new concert and congress centre, the Sibelius Hall, on the lakeshore and in many ways this has turned people's attention back to the lake. The improvement of the quality of water naturally covers a vast area around the lake affecting also the economic profit/value of those thousands of estates and buildings not situated directly on the lakeside but which have a right to the common water area in Lake Vesijärvi. Altogether, 900 new building lots have been planned around the lake. In addition, the private sector, municipalities, and different fishing organisations have greatly developed fishing opportunities and fishing grounds. The restored recreational value of the lake has stimulated the tourist sector in the local economy, and ship and boat traffic has proliferated. Overall, direct and indirect economic benefits from the Lake Vesijärvi restoration and management project have greatly exceeded the costs of the project (ca. 2.5 Million Euros).

Ecological State Now and Future Hazards

In general, good water quality without harmful blooms of cyanobacteria was strengthened in the Enonselkä basin

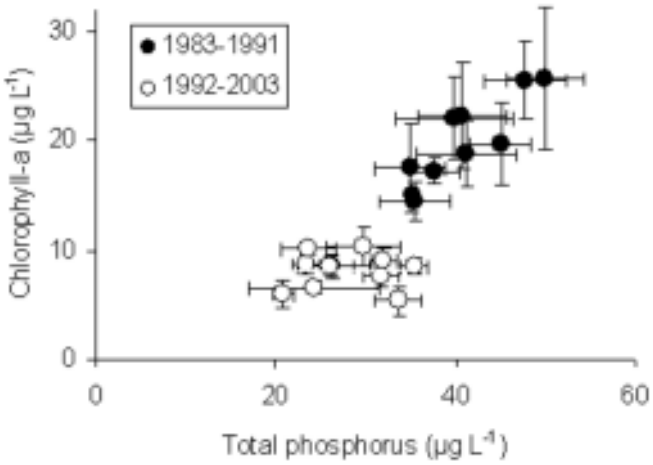

Fig. 6. Relationship between chlorophyll-a and total phosphorus concentrations (means +/- SE) during 1983-1991 and 1992-2003 in the Enonselkä basin (0-5 m).

in the 1990s (Figs. 3 and 4). Strong stocks of predatory fish (now comprising 30% of the total fish biomass) together with continued management fishing of roach (about 50 tonnes yr^{-1}; Horppila and Peltonen 1984) by local fishermen, have kept planktivorous fish stocks low, and consequently, zooplankton densities high enough to control algal biomass. However, some alarming signals of a change to poorer, more turbid water quality were recorded in late 1990s, and especially during the latest years when cyanobacterial biomass has peaked in late summer (Fig. 4). Nevertheless, these years still fit well in the current 'stable state' figure (1992-2003), with low deviation in chl *a* regardless of a relatively wide variation in the epilimnetic phosphorus concentration (Fig. 6). A more serious hazard in the lake's recent development concerns the deficiency of hypolimnetic oxygen during the most recent, hot and windy summers. The oxygen deficient and phosphorus-rich water layer has again increased to 7-10 m depth in late summer and has disturbed the stability of the planktonic communities when mixed with surface water by winds. Subsequently, the expansion of the oxygen deficient water layer has decreased off the water volume for zooplankton to hide from planktivorous fish. For instance, in 2002 zooplankton (especially cladocerans) collapsed just before cyanobacteria formed their peak. Uncertain, however, is still whether these phenomena were primarily driven by exceptional weather conditions, or whether they reflected a major change in the lake's functioning and eutrophication, e.g., due to intensified lakeshore building and other human activities on and around the lake. Concerned about the re-appearance of cyanobacteria blooms and the development of the lake's state, local and regional authorities and funding agencies have allocated support for a new rehabilitation and research project, the Lake Vesijärvi Project 2, for 2002-2006.

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Environmental Issues

Can Environmental Flows Compensate for Upstream Dams?

Since 2000, a team of research scientists from the Cooperative Research Centre (CRC) for Freshwater Ecology (CRC-FE) in Australia have been investigating the relationship between flows, habitat and biotic response in the Cotter River, an upland gravel bed river which supplies Canberra (Australia's capital) with drinking water. The presence of dams on a river typically removes much of the natural flow variability. To compensate, environmental flows in the Cotter River are released as a series of low flows and monthly flow spikes. This pattern of releases has been used to investigate the way hydraulic habitat, fish, macroinvertebrates and algae respond to the presence of dams and the environmental flows released from them.

One of the key aspects of riverine habitat is hydraulic character. Hydraulic conditions within the Cotter River display a complex response to changes in discharge, yet key flow thresholds exist which produce marked changes in hydraulic diversity. These thresholds occur at flows which have been most impacted by the presence of dams. This reach scale characterization of hydraulic character was complemented by site scale measurements of hydraulic and physical character which were combined with habitat preference curves for an endangered fish species (Gadopsis bispinosus) to produce relationships between flow and physical habitat availability. Again, a complex response was observed, with the geomorphic character of the site influencing the nature of the relationship observed.

The ecological benefits of the environmental flow releases were measured in changes to benthic metabolism. The flow spikes change the rates and balance of stream metabolism (production/respiration), with a shift toward production following a flow spike. As the macroinvertebrate taxa showing impairment below the dams use periphyton as a food resource, it may be possible to modify the flow releases to improve the invertebrate communities.

This study of the Cotter provides some of the first quantitative data relating flow volumes with habitat and the responses of biota in a temperate Australian river. The results of this study show that the pattern of environmental flow releases can help compensate for dams and this information is being used to inform the environmental flow decision making process for the Cotter River.

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Working Groups

Paleolimnology

Lake Baikal, the world's oldest lake, is also called the "Tertiary Museum Lake" because of its many endemic biota. Recent geophysical investigations by Russian and American workers assess the thickness of the sediments at ca. 9,000 meters.

Since the first international meeting on Baikal Drilling plans on 22 July 1989 at the University of South Carolina, USA, 47 scientific participants, mostly Russian and American with a few German and Japanese workers, labored for many years. Contributions are summarized in many academic periodicals and the SIL Working Group on Paleolimnology of Relict Lakes (S. Horie, Editor) Newsletter 6 (1992) - 13 (2000).

The Baikal studies were unified politically to enhance close collaborative work between the USA and Russia. Other countries could also participate in the joint studies, as sufficient participation fees were available at the headquarters at Irkutsk.

Future drilling and analytical plans were being discussed by Baikal investigators. Drilling conducted by the 47 investigators advanced to 674 m depth at 337 m of water depth in 1998 in the area close to the 1996 core at 53º 41' 48"N, 108º 21' 06"E at Academician Ridge. Analytical results have been published already in scientific periodicals and the Newsletter. The results of the 674-meter core (1998) and the earlier core (1993, Buguldeika) was assigned the nomen BDP – I Group Core. Future cores obtained in the 21st Century are assigned to the BDP – II Group Core.

Because many of the initial workers were geologist, physicists, and chemists rather than limnologists, the following plan was carefully evaluated to expand the breadth and interest in future research on cores taken from Baikal. I am requesting: 1). Volunteers for the Baikal Drilling projects (register names); and, 2). If institutions desire to join the drilling operations in order to obtain share samples (i.e., a few grams from every horizon), registration is necessary. Samples are shared in proportion to the amount of drilling expenses paid to Russian administration prior to the coring operations. Personal payments are not acceptable. Samples in the spring will be opened and share - the process will be discussed by all participating members. Please respond directly to Prof. S. Horie, Parkallee 2, A-2334 Vosendorf, AUSTRIA.

Copies of the IPPCCE Newsletters (books) edited by S. Horie and published by the SIL Working Group are in very limited supply. These Baikal references, as listed below, are written in English (20 × 27 cm format). Prices are available, at cost, upon request.

	Total Pages	Baikal Papers
No. 6 (1992)	171 pages	Pages 1 - 124
No. 7 (1993)	179	Pages 1 - 66
No. 8 (1994)	128	Pages 1 - 60; 66 - 76; Pages 89 - 106
No. 9 (1995)	128	Pages 1 - 87
No. 10 (1996-97)	163	Pages 1 - 25; 98-105; Pages 134 - 159
No. 11 (1998)	160	Pages 1 - 58
No. 12 (1999)	127	Pages 1 - 10; 62 - 114
No. 13 (2000)	132	Pages 1 - 35; 60 - 82

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Letter to the Editor

Regarding the information about the reservoirs in Finland, (SILnews, Volume 39, May 2003) I think that probably there is some misunderstanding. The Finnish colleagues considered only the area and the phrase I wrote, 'When the water level is at the maximum of 152 m the Alqueva Dam will create the largest artificial lake in Europe with an area of 250 m^2, a perimeter of more than 1,000 km and a total capacity of 4,150 hm^3,' I was considering all these characteristics and not only the area. In fact, the Lokka Reservoir has an area of some 400 km^2, but a volume of 2,100 hm^3..thus almost half of the Alqueva. Therefore, despite being smaller in area, I still would consider Alqueva the largest reservoir.

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Book Reviews

Pollution of Lakes and Rivers: A Paleoenvironmental Perspective

By John P.Smol
280 pp., 2002, softbound
Arnold, London, UK and Oxford University Press Canada
ISBN 0-340-69167-0
EURO 30.00/USD 30.00

This book is all about paleolimnology, and a very readable account at that. Initially, I thought the title was slightly misleading, while the main heading indicates a text of general limnology. This is explained by the book being a volume in a series termed Key Issues in Environmental Change, in which the subtitles Paleoenvironmental Perspective and Environmental Change Perspective appear on several volumes. On second reading, the title is quite acceptable, as it emphasizes the integral relationship between paleo- and neolimnology, and the importance of time and history in understanding the dynamics of ecosystems and development of environmental problems.

The book opens with short introductory chapters (1-3) about water, time scales and sediments, followed by description of the basic techniques of collecting and dating sediment cores (Ch. 4) and paleolimnological analyses (Ch. 5). The subsequent chapters guide the reader into modern quantitative paleolimnology and its many applications. Surface sediment calibration data sets are an essential tool (Ch. 6), which enables inference of past environmental conditions in great detail through analyses of biological remains in the sediments. Chapters 7 through 15 are arranged in a broad historical sequence, describing the main themes of paleo research since the 1980s, thus recapitulating the development of ideas and refining of methods. Acid rain and other atmospheric pollutant issues (Ch. 7-10) gave a major thrust for this development, which then allowed tackling of problems related to catchment and ecosystem disturbances (Ch. 11-13) as well as atmospheric and climatic changes (14). Detecting elusive signals from noise and deciphering multiple stress effects have become progressively more demanding issues during this development.

The book concludes with chapters outlining the future of paleolimnology, listing new problems and new challenges (Ch. 15), and assessing the significance of paleolimnology as a key for understanding the future of our environment (Ch 16). This last short chapter is like a conclusion of a good lecture series, presenting the author's personal perspectives and reflections on the issue. This is most appropriate, as John Smol has been one of the central figures in the field of paleolimnology throughout much of its modern development.

All in all, the book is well written, readable and highly informative. The examples cover much of the significant paleolimnological studies conducted during the past decades in different parts of our planet. I especially enjoy John Smol's paleoenvironmental perspective, which throughout the book relates the paleoecological data and observations with more general environmental issues.

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Aquatic Arsenic Toxicity and Treatment

Tom Murphy and Jay Guo (eds.)
166 pp., 2003, hardbound
Backhuys Publishers, Leiden
ISBN 90-5782-130-3
EURO 70.00

The book provides a broad overview of the problem of arsenic contamination of drinking water – a problem that is often termed as the 'global arsenic crisis'. Murphy and Guo have compiled an interesting combination of papers on this issue, dealing primarily with Asia and Latin America.

After a brief introduction by the editors to the general health and toxicity issues related to arsenic pollution, the book launches into country or region-specific chapters that focus on the state of arsenic pollution of drinking water. The second half of the book is dedicated to various treatment technologies for removing arsenic from drinking water or for in-situ treatment of arsenic-contaminated aquifers. The collection of chapters in the book is somewhat eclectic in that a comprehensive treatment of neither the geographical distribution of arsenic contamination nor the entire range of water treatment options is presented. This, in part, is also reflected in the greatly varying chapter sizes, presentation formats and scientific depth. The focus on arsenic toxicity in Asia excludes many countries with significant magnitude of the problem, including Cambodia, India (West Bengal), Mongolia, Nepal, Thailand, and Viet Nam. Similarly, the Chinese chapter focuses on a localized problem in the Xinjiang province while not addressing other major arsenic-contaminated areas. For the treatment technologies, it can be misleading to present to a non-expert a selective assortment of technologies, without identifying the logic for their selection or for the exclusion of others.

The book could have been greatly improved for the lay reader by providing overview chapters for the sections on geographical distribution and water treatment technologies. Such a treatment would systematically highlight the differences in challenges, response options and remediation across countries and regions.

Nonetheless, the book remains a valuable reference on information about the challenges faced in Asia and Latin America. It is perhaps one of the first efforts to discuss the two regions side by side in a comparable manner.

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Freshwater Red Algae of the World

By S. Kumano
375 pp., 2002, hardcover
Biopress, Bristol
ISBN 0-948737-60-3
£59.00

One might ask the question, is a book dedicated to freshwater red algae really needed? My answer is a definite yes. Up to the publication of this book, there has not been a single monograph that covers this very widespread group of organisms on a global basis and scientists working on samples have had to rely on an extensive library of reprints. Based on the fact that I receive numerous requests for identifications of inland rhodophytes on a yearly basis, the reprint library scenario has not been a sufficient one. Shigeru Kumano has been one of the leaders in this field, having produced a significant fraction of the findings, and is well qualified to produce this important book.

The book is basically divided into four parts: a listing of all taxa presented, a short history of the subject, a key to the genera, and section of taxonomic descriptions down to the species and occasionally variety level. This organizational scheme works well with the majority of coverage appropriately given to the last section (pp. 9-324). The strength of the book is its inclusiveness, with some very recent references added in an Addendum. There are plentiful illustrations and/or photographs of each species and the literature is extensive and reasonably complete. There is a good listing of abbreviations, a useful glossary, species index, but no subject index.

One small issue with the book is the uneven quality of the photographic figures, which arises because many of them are reproductions of journal papers. Some examples in which it is difficult to see the feature being described include Figs.14.3, 15.1-8, 94.1-4, 106a.5, 123b.5, and 139.4-8. Nonetheless, this is a small fraction of the figures and does not detract from the overall utility of the book. Another potential issue with the book is the uneven coverage of various taxa, in some cases leading to what appears to some of us in the field as over-proliferation of infrageneric taxa. One such example is the family Compsopogonaceae for which two recent taxonomic analyses by Vis *et al.* (1992) and Rintoul *et al.* (1999) have made a number of synonymies based on detailed morphometric and DNA sequence analyses, yet these changes have not been incorporated into this monograph. The result is that a novice will have a challenging time identifying taxa in the family using the features in the keys. However, I have tried the keys to various taxa throughout the book and found most of them to work well as long as you are patient and can find all of the characteristics described and have a reasonable knowledge of red algal morphology.

In summary, I believe that *Freshwater Red Algae of the World* by Shigeru Kumano is a valuable addition to anyone's freshwater algal taxonomic library if you are working in environments that contain these taxa, such as streams and rivers.

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Introduction to the Class Branchiopoda (Guides to the Identification of the Microinvertebrates of the Continental Waters of the World, Volume19)

by Henri J. Dumont & Stefan.V. Negrea
398 pp., 2002, paperbound
Backhuys Publ., Leiden
ISBN 90-5782-112-5
EURO 90.00/US$ 86.00

This book fills a void in the study of lower crustaceans - it synthesizes knowledge on the branchiopods (fairy shrimps, clam shrimps, shield or tadpole shrimps, and water fleas). The fact that some of these animals are up to 100 mm long and it could be argued should not be part of a series on microinvertebrates, this is totally a semantic argument and hardy practical considering the systematic and ecological affinities of member groups.

After an insightful chapter on the history of research into branchiopods, the authors launch into detailed synopsis of the external morphology, internal anatomy, reproduction, development and growth, feeding ecology and ethology, ecology and biogeography, before becoming involved in

classification, keys to superorders, orders and families and the diagnostic characters of these. There are even short chapters on the developing field of molecular phylogeography, research methods including culture methods, and on the uses of branchiopods.

Each of the respective chapters serves as a review in the field and as a starting point for those embarking on studies of their speciality. Wide use is made of figures from experts, mostly modern and very detailed, like those from Alonso, Kotov, Silva-Briana and the authors, with the total list reading like a who's who in branchiopod studies. There are some good original SEMs from Smirnov, Walossek and Olesen, but many of these are individually unacknowledged, unless the explanation is that they are the authors' originals.

There is a lot of misinformation about Branchiopods and this book serves to correct much of this. However it occasionally fails: an example is on p. 44 concerning the number of thoracic segments in anostracans, these authors claiming it to be the thoracopod bearing segments, though Walossek's (1993) work clearly shows the genital segments are thoracic in origin. Further on p. 54 we read that female anostracans have bi-segmented antennae! Then there are the ever present problems in terminology of crustacean segmental parts which various experts have tried to standardize in recent years, e.g., praeepipodite for pre-epipodite and cheliform for pincer-like. Some descriptors could be more precise, e.g., the use of inner surface of an appendage when clearly medial surface is better. Further, the authors talk about medial articles on one or two segmented antennae when this term should only be used for appendages of three or more segments. The section on Notostraca would have been more convincing if the classic work of Sassaman (1991) had been included. There is inconsistent use of the terms 'Conchostraca', 'Laevicaudata', 'Spinicaudata' and 'Cyclestherida' and the status of the genera *Cyzicus*, *Eocyzicus*, *Caenestheria* and *Caenestheriella* is not resolved properly, and the genus *Baikalolkhonia* is ignored.

The authors give a very useful account of the contorted history of branchiopod classification. However they omit reference to 'An Updated Classification of the Recent Crustacea' by Martin & Davis, 2001. The Negrea *et al.* (1999) scheme adopted in the book is at variance with the Martin & Davis scheme, mainly in having different taxonomic ranks to the various groups and in the much larger number of families recognised by Negrea *et al.* There are good molecular reasons for the splitting of families in the later, but the lack of reconciliation of taxonomic ranks and groupings with Martin & Davis will only lead to further problems in systematics. One anostracan family, erected recently by Naganawa and Orgiljanova (2000), and Naganawa (2001), is not mentioned at all.

While the authors should be applauded for providing the simplest possible keys, this simplicity is their undoing in places. For instance, to get to *Parartemia* in 2(1) on p. 249 one passes through 'brood pouch bilobed' to get to *Artemia* and *Parartemia*, yet in two of 15 species of *Parartemia* it is not bilobed, and the brood pouch of *Artemiopsis* and *Branchipus* is bilobed. Many will find the keys set out in a confusing manner (they are dichotomous, but not in the usual manner); indenting the couplets would have helped. For the uninitiated, the keys are a good start, but I suspect experts will continue using the more complicated but reliable keys for their respective groups.

The book shows evidence of rushed publication to 'meet its 2002 deadline' to quote the acknowledgements. Although there are only a few typographical errors (an annoying one is edopodite for endopodite), more painstaking work would had removed combinations of English and American spelling (liter and litre). Closer attention to English would have avoided the following on p. 59: 'The Spinicaudata have one pair of appendages per segment (in all up to 32 pairs), while the Cyclestherida have 16 pairs' - Wow, *Cyclestheria hislopi* with 16 pairs of appendages per segment! Then there is the loose use of 'brackish' for saline waters of very low salinity when the better descriptor of 'hyposaline' should be used ('brackish' should be restricted to dilute sea water). This common European position is upsetting to those of us who live in countries where many inland waters are hyposaline and very different from coastal marine waters.

Concluding the book are 61 pages of references and a taxonomic and a general index. All three are thorough and very useful. It is difficult, however, to be totally inclusive of all the works available on branchiopods. For instance, I found three minor papers on Australian branchiopods missing, but this does not worry me. What is more serious is the omission of major works of non-European authors, some of whom have been mentioned above, and to which could be added Belk, Cesar, Cohen, Geddes, and Periera on anostracans alone.

Overall this book is a mine of information, well synthesised, explained and documented. As such every worker on the branchiopods will need a copy or have access to one in a library. One great advantage of the book is the treatment of all branchiopods, and not just the cladocerans or larger branchiopods separately, as many of us tend to do. So the big picture is available. Even carcinologists with wider interests will find information of use to them in this book. This book needs to be widely available in libraries. It is a pity the book ignores some studies and does not always promote the best information.

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COPEPODA:CYCLOPOIDA Genera Mesocyclops and Thermocyclops (Guides to the Identification of the Microinvertebrates of the Continental Waters of the World, Vol. 20, Coordinating editor: H.J.F. Dumont).

Edited by Hirosha Ueda and Janet W. Reid
316 pp., 2003
Backhuys Publishers, Leiden
Paperbound
ISBN 90-5782-126-5
EURO 80.00

The introduction by the editors outlines the taxonomic history of the two genera, the characters which are currently considered important in the differentiation of species of *Mesocyclops*; as well as the characters specifically used in the identification key to species and subspecies of *Thermocyclops*.

It is noted that keys to species are presented only for adult females as information on male characters is limited. Janet Reid's chapter on evolution and biology covers many aspects of the biology of the two genera including a large number of references especially on feeding, biological control of anopheline mosquitoes, intermediate hosts of human parasites and diapause.

A technique for observing copepods by Janet Reid will be of immense help to researchers who find the dissection of small copepods very tedious and time-consuming. A chapter on terminology by the editors includes a comprehensive list of characters with clear and well presented illustrations. A long chapter on Genus *Mesocyclops Sars*, 1914 by M. Holynska and the editors is followed by a shorter chapter on Genus *Thermocyclops* Kiefer, 1927 by I.M. Mirabdullayey and the editors. The publication concludes with an extensive and comprehensive reference list and an index of species and subspecies.

The *Mesocyclops* chapter opens with a generic diagnosis followed by a key to females of 66 *Mesocyclops* species. Five *nomina dubia* are listed. Detailed species' descriptions follow with clear illustrations of the most highly weighted characters of all 66 species as well as notes on distribution and biology. The *Thermocyclops* chapter includes a generic diagnosis followed by a key to females of 51 species and subspecies. The descriptions follow the same pattern as for *Mesocyclops* with illustrations for each species and subspecies.

Many of the species of these two genera occur on the African continent and information has been available only from old publications. Information in recent publications on the taxonomy of freshwater copepods fails to address the identification of less well known and recently described species of *Mesocyclops* and *Thermocyclops*.

I was delighted to see so much information summarised in one book and I have already found it a help in identifying species of the two genera. This is an extremely valuable contribution to our knowledge of the species and subspecies of *Mesocyclops* and *Thermocyclops* and is an important advance on our knowledge of freshwater cyclopoids. It is well written with detailed and accurate illustrations and is an excellent contribution to the series on Microinvertebrate Guides. I strongly recommend it as an important acquisition for scientists involved in the taxonomy and biology of freshwater cyclopoids.

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http://www.benthos.org/

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SIL XXIX Congress.
8 - 14 August 2004
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Contact: Congress Management Office
University of Helsinki
Palmenia Centre
for Research and Continuing Education
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Finland
sil-2004@helsinki.fi
Phone: + 358 3 892 11
Fax: + 358 3 892 20219
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Fifth International Symposium on Large Branchiopods (ILBS5 for short).
16 - 20 August 2004
Toodyay, near Perth, Australia
ILBS5@cyllene.uwa.edu.au
www.zoology.uwa.edu.au/ILBS5

5th International Symposium on Ecohydraulics.
12 - 17 September 2004
Madrid, Spain
Contact: TILESA, OPC, S.L.
Londres, 17
28028 Madrid, Spain
Phone: +34 91 361 2600
Fax: +34 91 355 9208
ecohydraulics@tilesa.es
http://www.tilesa.es/ecohydraulics

9th International Conference on Wetland Systems for Water Pollution Control.
27 - 30 September 2004
Avignon, France
Contact: Wetlands Systems Conference Secretariat
CEMAGREF - 3, bis quai Chauveau
69336 Lyon Cedex 09
France
wetlands@lyon.cemagref.fr
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2005

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