



SIL news

Volume 68 - June 2016

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In This Issue

Brian Moss, former SIL President	1
Editor's Foreward	2
A word from President Yves Prairie	3
33rd SIL Congress, Torino	3
Student competition winners	5
Announcements	5
Reports	10
Obituary: Val Houston Smith	14
Book review	16

Material for the December 2016 issue should be sent to the Editor by:

1 OCTOBER 2016

Dr. Ramesh D. Gulati
N100/Department of Aquatic Ecology
Post Box 50
6700 AB Wageningen
The Netherlands
Tel: +31.317.473.542
Fax: +31.317.473.675
E-mail: r.gulati@nioo.knaw.nl

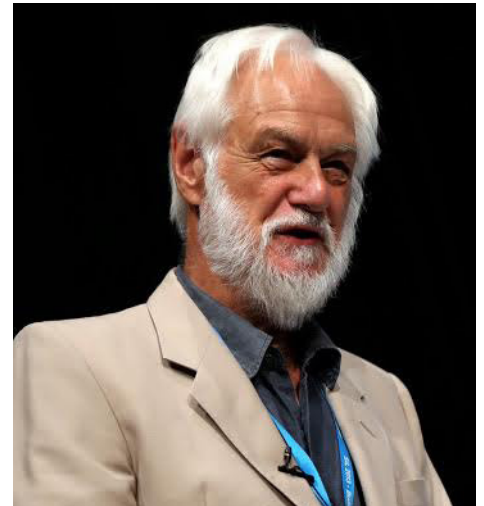
Contributions on PC formatted disk, in any standard word processor or DOS (ASCII) text, or as e-mail attachments, will assist the Editor.

Towards the end of the day

Everything, as the Resilience Alliance might claim, is characterised by tipping points. Until mid-January this year I had not seen, as a patient, the inside of a hospital since 1957, when I fell down a rock face and broke my jaw. But hospitals have now become an increasingly familiar habitat. Suddenly I lost weight rapidly, developed severe jaundice, and other metabolic symptoms, which have now led to a diagnosis of terminal, inoperable liver cancer. Mid-January was the time when my hitherto unsuspected tumour finally squeezed all my bile ducts flat and the symptoms immediately followed. This meant that I had to cancel some planned visits and engagements and in turn the news spread quite quickly among my closer friends. It then spread even more widely so that I have been persuaded to share some of the thoughts and feelings about it even more broadly with you.

Ours is a society that has become squeamish about death; our advancing technology gives greater and greater life expectancies and we are beginning to live in a dream world of immortality. It has its parallels in the mythical ostrich's 'head-in-the-sand' remoteness that most people, at least outside the science community, view our global climate and other problems. But that robs us of the opportunity of learning as much as we can from the experience and helping ourselves to cope with it.

Cancer has become something of a dreaded word so I decided from the outset that I would be as open about what was happening as possible. I have never liked euphemisms, nor the sort of managerial (and sometimes scientific!) language designed to obscure things rather than facing them. I will die in a few months time and being honest, and accepting, about that situation allows me to make the best possible use of



the time, and, I hope, to make it easier for my friends and family also to cope. As a result, dying, for me, is not a frightening prospect; it is just a biological inevitability, and one of the positive things about our advanced technology is that painkillers will make it not unpleasant. Moreover, having some notice of the event allows loose ends to be tidied, and proper plans to be made.

It has helped, I think, to be an ecologist. We understand element cycles; we realise that immortal populations would be a genetic disaster; we see, in our work, population cycles in which 'd' is just as important as 'b', not least because an ever-increasing human population simply means greater problems for the Planet. I have a strong feeling of being part of all that in a very natural way. 'Doubtless', as Max Ehrman wrote in his 1927 poem, *Desiderata*, 'the Universe is unfolding as it should'.

The present is turning out to be a tranquil time. I do not feel angry, nor sorry for myself, nor cheated nor unfairly treated, and have asked that no-one should feel sorry for me. I have had a long, untroubled and very interesting life, and an exceptionally loving and loyal wife, and there is everything to be thankful for. When I have travelled I

have tried to get outside the artificial, plastic worlds of international airports, hotels, conference centres and tourist attractions, and to see how the majority of people live. It can be an eye-opener, and has made me aware of how privileged, indeed greatly over-privileged, I have been. Those experiences have helped me too. Most of the rest of the world faces vastly more trouble than I have done, or will do. My only regret is that my family will suffer far more than I will, and one of the ways of using my remaining time well is to think about how I can help them to get through the experience.

I had hoped to come to SIL in Torino and give what would have been my last talk. (I was quite pleased with the Abstract..about getting large mammals back into limnology!) But for some reason I have now also developed a large blood clot in my lung arteries that will not clear up quickly, and have been advised that I must not fly for at least six months. So I will regret not seeing you all there. But I can still write and am very near to completion of the Fifth edition of 'Ecology of Freshwaters. I have never before written anything quite so rapidly, or with so much focus. But it is a sort of Russian roulette; once started I have to complete it, or all the work will have been wasted. I am glad I took the risk; there is a good lesson there too.

But the last lesson I have learned from all this has come with the e-mails and cards I have received. We really are a very generous and supportive community and I now realise more than ever what it has been to work and communicate, argue and sometimes laugh with you all. Trends in science are getting more cut-throat and competitive as funds become shorter, as administrations create league tables of citations and h factors, esteem indices and other nonsense, (and as reviewers seem to object more and more to my rather straightforward approach to statistics)! But deep below all that, and transcending it, there is a profound humanity in the scientific community and my recent experiences have brought that home to me. Thank you for everything.

Yours, Brian Moss

Note from the Editor: As this issue of SILNews goes to press, we are saddened to learn that Brian Moss passed away on May 27th. We would like to offer Brian's family our most sincere condolences.

Editor's Foreword

You probably have read the front page of this newsletter and noted from the very personal and touching account of Prof. Brian Moss concerning his serious illness. Brian who was our former SIL President is, in his own words, suffering from the terminal cancer disease of the liver already for a few months. He has since then lost a lot of weight and this apparently also provides initial clue to the dreadful disease. I had started as editor of this newsletter in 2006, i.e. a year before Brian became the SIL President at the Congress in Montreal in 2007. He was also SIL President during the SIL Congress at Cape Town in 2010. He gave charge of the SIL chairmanship to Prof. Dr. Yves Prairie in Budapest, Hungary, during the SIL Congress there about three years ago in 2013. Brian was the initiator of several much-needed reforms in the functioning of the SIL in general as well as concerning the participation in SIL of young students and researchers. The foremost among these reforms is a steady decline in the membership of our Society in the recent years, and secondly the rather low frequency of the plenary Congresses so far. From now on, the plenary Congress will be

held biennially instead of the triennial meetings so far. Brian was also instrumental in encouraging the young researchers, including the students of limnology, especially those from the developing countries, to become members of the SIL and participate more actively in the SIL activities. To achieve this, Brian suggested coupling the membership fee of the Society to the GDP of these countries. Brian's plea was accepted unanimously-- and registration fee for students was thus drastically reduced. It allowed younger researchers from the developing countries to join the SIL and participate in its deliberations.

Brian has been a great source of inspiration to students, in fact to limnologists at large. He himself has been all these years a highly productive scientist. I just learnt that he finished revising Ecology of Freshwaters about a week ago and the revised files are now with the publisher. Brian adds to this news by saying in his email to me "amazing how fast one can work when time is short". I have an inkling, and that too a strong one, that chemotherapy that Brian has to undergo will start soon.

This newsletter offers brief information for our readers. The SIL President Yves Prairie tells us (see page 3 of this newsletter) why Limnology sounds so unfamiliar. It should be interesting to read about the student competition organised for the first time by the SIL—thanks to Tamar Zohary, our SIL Secretary, and the cooperation she had from Judit Padisak. Jeremy J. Piggot from the New Zealand won this competition, and that entitles him to give an invited plenary lecture at the SIL Congress at Turin, Italy. Roberto Bertoni's announcement of the forthcoming meeting at Turin, Italy, tells us all about the organisation of the programme for the upcoming SIL Congress. In another interesting story, Roberto reports on the history of limnological instruments as they evolved and are now exhibited at the famous CNR Institute of Ecosystem Studies at Verbania.

It seems the saline lake scientists have every reason to be active in both saline lakes and in organising international meetings. There are two such stories in this newsletter, one of them is an announcement from Egor Zadereev of Saline Lakes meeting to be held next year in Siberia, Russia; the second story is a Report, also from Russia, concerning "Why we need to pay more attention to study the saline lakes"? There is also some news from Mexico about the next Shallow Lakes conference in Merida city in the Feb. of 2017.

Dr. Jack Jones announces the contents of Vol. 6(2) of *Inland Waters* in this newsletter. The volume that has just been published, is dedicated to Dr. Val Smith who died in April (see also Dr. Smith's obituary written by Ted Harris (p14-15 in this newsletter)).

I am rather confident that the SIL Congress at Turin will be both an interesting and successful one, not only because of our nice Italian colleagues are playing hosts, as well as their warm hospitality, but also because of a wide variety of scientific sessions organised. We need to applaud Roberto Bertoni, who is not only a very friendly and kind person but apparently a very good organiser too. I wish the organisers a great success.

Last, this Editorial Foreword has a special significance for me personally, since it marks for me 10-years as editor of the newsletter. I must end it here by saying that it has been an enjoyable experience.

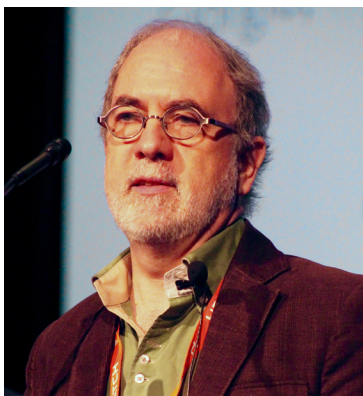
Arrivederci a Torino,

Ramesh D. Gulati (SILnews Editor)

r.gulati@nioo.knaw.nl

16 May, 2016.

A word from President Yves Prairie



What's with the word Limnology?

There are very few scientific disciplines for which the name is as unfamiliar to the public as limnology. Like many of you, I turn to the oxymoron “I’m a freshwater oceanographer” when explaining what I do to non-scientists. That comes closest to the spirit of limnology and it is immediately understood. In my home province of Quebec, there was a brief period in 2007 when I felt that the word made some inroads into public consciousness, thanks to a nearly hysterical general panic about Quebec lakes being “infected” by cyanobacteria. While the actual threat was greatly overstated by the media, the many television and radio interviews that followed gave local limnologists the chance to define and explain the term to a worried and suddenly captivated audience. Much of that brief vocabulary expansion has probably vanished by now and the prospect of turning limnology into a household word remains a daunting challenge. Admittedly, it’s difficult to penetrate the public’s imagination without the freshwater equivalent of a Jacques Cousteau or without the glamour of awe-inspiring deep-sea or other oceanographic expeditions. We do have Nessie and many other lake monsters but it would be nice to legitimize limnology with more real discoveries and creatures.

Perhaps we just have to live with the fact that limnology is never going to be as sexy as oceanography. Somehow, using I’m a limnologist as the opening line of a conversation doesn’t carry the same draw as I’m an oceanographer.... This detail notwithstanding, what I am more worried about is the impression that limnology has lost some of its luster even to some of its own practitioners. There is a sense, especially among the younger generation, that declaring oneself a limnologist is underselling their skills or is simply old-fashioned, and that terms like aquatic ecologist or aquatic biogeochemist convey a heightened degree of cutting-edge science. This sentiment is, in my view, very ironic and rather misguided. In this era where multi/inter/trans-disciplinarity is heralded as the necessary *modus operandi* to scientific advance and purposefulness, I think of limnology as the quintessential model of an integrated multidiscipline. It is no doubt the product of a personal bias but I honestly have difficulty thinking of a subject matter where ecology, chemistry, geography, physics and society are more inextricably intertwined. Indeed, when faced with real world problems, I have grown to believe that bringing specialists of these individual disciplines together is not a panacea. I believe that in many cases, or most, the required critical understanding resides precisely at the intersection of narrower disciplines, embedded within the shifting matrix of urgent societal needs and concerns. Instead, I have become increasingly convinced that one needs a certain mastery of all of them to be best able to first identify and then make sense of the patterns we see. It is the interactions between physics, chemistry, biology, and all other related disciplines that regulate

the structure and function of these critical aquatic ecosystems. I contend that without a broad training and knowledge in each of these disciplines, it is very hard to decipher the existence and importance of these interactions. This is what makes limnology such a unique and fascinating field and is also why I feel a greater sense of pride by wearing the label of the limnologist over say that of the aquatic biogeochemist (in my particular case). My point here is not to dwell unduly on the importance of a single word or a label but rather to recognize, and make others recognize, the full scope of our inquiry. I am convinced that the broader we think, the more successful we will be in helping to safeguard our precious inland waters in a scientific and rational way. So, next time you are introduced to a non-scientist asking about your profession, think of the grandeur associated with responding I’m a limnologist....

A handwritten signature in blue ink that reads "Yves Prairie".

Yves Prairie
SIL President
Prairie.Yves@uqam.ca



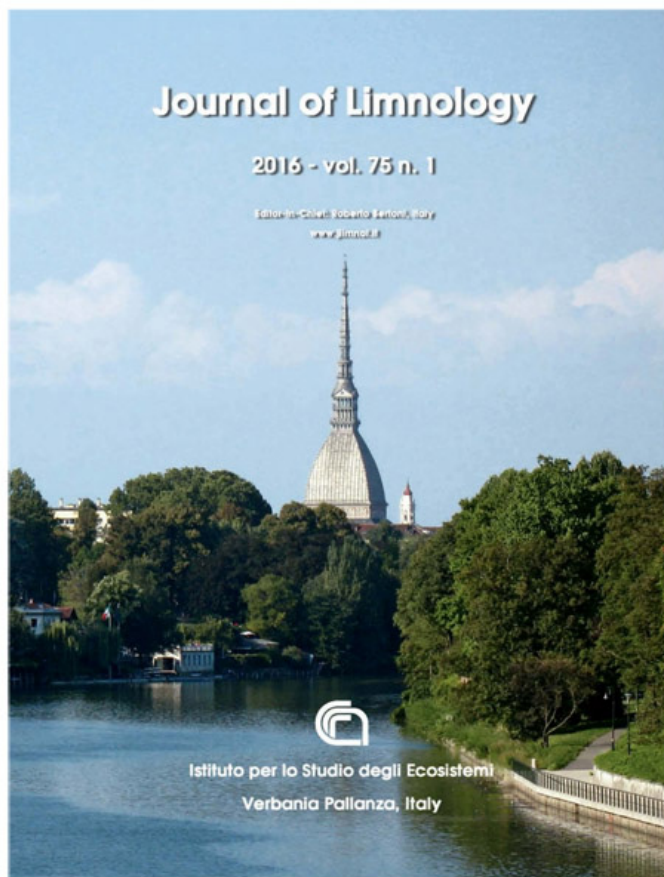
The 33rd SIL Congress in Torino is coming

The 33rd SIL Congress in Torino, Italy, is coming. These few lines are a preliminary appraisal of the ongoing work, which is inevitably of transient nature because the Congress has yet to come. However, these few lines tell us what to expect from this Congress and, I hope, will strengthen our desire to participate.



Roberto Bertoni, chief organizer SIL Congress in Torino

The first question that this preliminary appraisal allows to answer, albeit still with some uncertainty, is about how many limnologists will attend the meeting in Turin (Torino). Considering that over 700 persons have already registered and 780 Abstracts were submitted, it is reasonable to assume that there will be nearly a thousand attendees.



The second question which we can now answer is about the Congress topics. After the finalization of the special-session proposals, we now know that the Congress will comprise 37 sessions, 24 of which were proposed by participants. Scrolling through the list of conference sessions, available at www.sil2016.it in the “sessions” menu, you will find that the themes of the Congress go beyond those more recognized by the limnologists, or those that the media highlight every day because of the associated environmental problems. Indeed, there are many sessions related to emerging ecological issues and talks about ecosystems that were absent from more recent SIL congresses. I would like to mention, for instance, the sessions devoted to ecological stoichiometry in aquatic ecosystems, molecular tools in freshwater ecology, organic matter dynamics and to microbial biodiversity. I also like to point out two sessions, which go beyond the technical aspects of limnology but invite us to rethink about our disciplines with an eye to their scientific and social role (Predictive limnology revisited and Community limnology).

Many sessions relate to lotic waters and focus on Groundwater Dependent Ecosystems and African freshwaters and are therefore novel. I believe that the joint efforts of the organizing committee and many colleagues with expertise in innovative fields of limnology have helped to create a truly new programme, which will provide

important updates on the classic themes of limnology but also provide an original overview of emerging issues and methods.

As for the plenary lectures, the list shows the presence of prominent scientists, with an explicit interest in new perspectives and in the contemporary focal points of limnology (www.sil2016.it – “plenary lectures”). In addition, a plenary lecture will be delivered by the winner of the International SIL Student Competition (See the SIL Secretary, Tamar Zohary’s announcement on the next page). This competition, which was launched for the first time on the occasion of this conference, demonstrates the society’s interest in young researchers, and students and attests to its desire to promote the research of young limnologists. The winner of the award, Jeremy Piggott, has accepted my invitation to provide us, at the end of his plenary lecture, his assessment of the conference proceedings and of limnology today as it will emerge from the SIL congress. I believe that this is also important to provide each of us with elements useful to build a strategic vision of our future as limnologists.

This Conference is planned to provide a lot of attention to saving the resources, so as to be able to offer an affordable event for everyone, and especially to the young scientists. The current world-wide economic austerity and the scarcity of public funding have made it difficult to achieve this goal. We did not, however, spare any effort to ensure the scientific quality of the Congress. Only after the event will it become clear what we accomplished. The Congress is facilitated by the organization, but its success will depend on its participants. The satisfaction, exchange and growth that we derive from such meetings are in large part in the hands of the participants.

I have the ambitious dream that the SIL Congress at Torino, Italy, will be something limnologist will remember for long. To help our memory, I placed Torino and the Po River on the cover of this year’s issues of the Journal of Limnology, the historical publication of Italian limnology.

I invite you to attend the Conference with the certainty that offering the best of your science will prove crucial to realize a memorable exchange, good and fruitful for yourself and for all limnologists.

Arrivederci a Torino.

Roberto Bertoni
r.bertoni@ise.cnr.it

And the Winner of the SIL Student Competition is....

Announcements

With great pleasure we announce the winners of the SIL Student Competition:

Third place: shared between two papers that scored the same:

1) Cédric Morana (Belgium)

Morana C, Sarmiento H, Descy J-P, Gasol JM, Borges AV, Bouillon A, Darchambeau F. (2014). Production of dissolved organic matter by phytoplankton and its uptake by heterotrophic prokaryotes in large tropical lakes. *Limnol. Oceanogr.* 59: 1364-1375.

2) Pauliina Salmi (Finland)

Salmi P, Salonen K. (2015). Regular build-up of the spring phytoplankton maximum before ice-break in a boreal lake. *Limnol. Oceanogr.* 61: 240-253.

Second Place: Francisco Acosta Espinosa & Richard M. Zamor (USA), for their joint article:

Acosta F, Zamor RM, Najar FZ, Roe BA, Hambright KD. (2015). Dynamics of an experimental microbial invasion. *Proc. Nat. Acad. Sc.* 112: 11594-11599

First Place: Jeremy J. Piggott (New Zealand), for the article:

Piggott JJ, Salis RK, Lear G, Townsend CR, Matthaei CD. (2015). Climate warming and agricultural stressors interact to determine stream periphyton community composition. *Global Change Biology* 2: 206–222.

The winners will be awarded their certificates at the SIL Congress in Torino, Italy. The winner of the first place, Jeremy Piggott, will give a plenary.

We thank all those who contributed to the competition, including all the applicants (from 17 countries), the mentors who wrote recommendation letters, SIL National Representatives who coordinated the first stage (national) of the competition, and committee members who ranked the papers at the national level competition.

But most important – we owe great thanks to eight members of the student competition committee who examined and ranked the 19 articles participating in the international stage of the competition. Those committee members are chief editors or co-chief editors of limnological journals, thus experts in assessing the merits of scientific papers. Their identity will be revealed in Torino.

We take this opportunity to announce that the second SIL student competition will begin shortly after the Congress in Torino, where details of this competition will be provided. Its winners will present papers in the SIL Congress in China in 2018.

Prof. Judit Padisák,
Competition coordinator

Dr Tamar Zohary
SIL General Secretary



Jeremy J. Piggott (New Zealand), Winner of the SIL Student Competition



Francisco Acosta Espinosa, (photo above, left) and Richard M. Zamor (photo above, right) came second in the competition.



Left: Joint-third placed Pauliina Salmi and others (Finland)



Right: Cédric Morana (Belgium). Shared third-place.

A Suggestion to hold SIL 2020 in the Holy Land

It has been 48 years since the last SIL meeting in Israel and 47 years since the Kinneret Limnological Laboratory, famous for its extensive limnological research of the Sea of Galilee (Lake Kinneret), was established.

We would like to host the 2020 SIL meeting to celebrate 5 decades of research as well as 5 decades since the first SIL meeting in Israel. Israel is the meeting place of north-south and east-west. Not only do millions of migrating birds fly overhead every year but it is also a key migratory path for invasive species moving between Africa, Asia and Europe whether aquatic or terrestrial species.

Israel is also a country of contradictions with its climate, landscape, fauna and flora exhibiting gradients nearly as sharp as the summer thermocline in Lake Kinneret, ranging from a cool damp Mediterranean climate in the higher regions of northern Israel to hot, dry and arid conditions in the south.

Contradictions on temporal scales with buildings, towns and cities, such as Jerusalem, thousands of years old and with very modern bustling life of Tel-Aviv. All this is resulting also in a wonderful meeting point of cultures and religions and a melting pot of culinary flavors.

The Kinneret Limnological Laboratory hopes to have the opportunity to host you in 2020!

Addios in Torino

Gideon Gal,
Gal@ocean.org.il
Director, Kinneret Limnological Laboratory,
Israel Oceanographic & Limnological Research

Contents: Inland Waters Volume 6 (2), 2016

Editor, Jones, Jack [Jones]@missouri.edu]

This is a special volume dedicated to the late Prof. Val Smith. All the articles in it are open-access.

<https://www.fba.org.uk/journals/index.php/IW/issue/view/127>

Preface

Val Houston Smith (1950–2016): empiricism in the service of theory
John A. Downing
Page: 123

Articles

Do persistent organic pollutants stimulate cyanobacterial blooms?
Theodore Daniel Harris, Val H Smith,
Pages: 124-130

Life on the stoichiometric knife-edge: effects of high and low food C:P ratio on growth, feeding, and respiration in three *Daphnia* species.
James J Elser, Marcia Kyle, Jennifer Learned, Michelle L McCrackin, Angela Peace, Launa Steger,
Pages: 136-146

Effects of Eutrophication on Maximum Algal Biomass in Lake and River Ecosystems
Val Smith,
Pages: 147-154

Nitrogen, Phosphorus, and Eutrophication in Streams.
Walter Dodds, Val H Smith,
Pages: 155-164

Differences in phosphorus use between ancient and extant *Daphnia* genotypes alters algal stoichiometry and abundance.
Priyanka Roy Chowdhury, Punidan Jeyasingh.
Pages: 165-172

A 21-year record of sub-epilimnetic populations of *Cryptomonas* spp.
Frank de Noyelles, Val Smith, Jude H Kastens,
Pages: 173-184

Dynamics of silicon in lakes of the Taupo Volcanic Zone, New Zealand, and implications for diatom growth.
Lisa Pearson, Chris H Hendy, David P Hamilton,
Pages: 185-198

Combined effects of nitrogen to phosphorus ratios and nitrogen speciation on cyanobacterial metabolite concentrations in eutrophic Midwestern USA reservoirs
Theodore Daniel Harris, Val Houston Smith, Jennifer L Graham, Dedmer B Van de Waal, Lenore P Tedesco, Nicolas Clercin.
Pages: 199-210

Carbon isotopes of particulate organic matter and zooplankton in a lake with vs. without a dinoflagellate bloom.
Aram Goodwin, Jonathan Erez, Karl David Hambright, Nir Koren, Eugeni Barkan, Tamar Zohary.
Pages: 211-223

Diatom responses to microenvironment structure within metaphyton mats
Lynnette L Saunders, Susan S Kilham, Robert Verb.
Pages: 224-233

Phytoplankton taxonomic compositional shifts across nitrogen and phosphorus concentration gradients in temperate lakes.
Christopher T Filstrup, Adam J Heathcote, Daniel L Kendall, John A Downing.
Pages: 234-249

Biomass pyramids in lake plankton: influence of Cyanobacteria size and abundance
Adam J Heathcote, Christopher T Filstrup, Daniel Kendall, John A Downing.
Pages: 250-257

Abundance and size distribution of permanent and temporary farm ponds in the southeastern Great Plains.
Matthew M Chumchal, Ray W Drenner, Kimberly J Adams.
Pages: 258-264

Seasonal patterns in carbon dioxide in 15 mid-continent (USA) reservoirs.
John Jones, Daniel Obrecht, Jennifer Graham, Michelle Balmer, Christopher Filstrup, John Downing.
Pages: 265-272

Phosphorus and nitrogen loading restraints are essential for successful eutrophication control of Lake Rotorua, New Zealand.

Val H Smith, Susanna A Wood, Christopher McBride, Javier Atalah, David Hamilton, Jonathan Abell

Pages: 273-283

Research Briefs

PlanktoMetrix – a computerized system to support microscope counts and measurements of plankton.

Tamar Zohary, Mordechai Shneor, Karl David Hambright.

Pages: 131-135

Next Inland Waters issue - Vol 6, Issue 3 - due July 2016

13th International Conference on Salt Lake Research, 2017

We are very pleased to invite you to participate in the 13th International Conference on Salt Lake Research (ICSLR), which will be held in Ulan-Ude City, Republic of Buryatia, Russia, during 21-25 August 2017 (<http://isslr.org/conferences/2017-ulan-ude/>). ICSLR2017 will be organized by the International Society for Salt Lake Research and consortium of several Siberian research institutes. This is the second time the Conference of the Society will be held in Russia. ICSLR2017 and will not just follow the tradition of triennial meetings of the Society to bring together scientists from various disciplines studying saline lakes. The slogan of the upcoming saline lakes conference is “Studies on Freshwater and Saline Water Lakes – in search for a common ground”. There are several reasons for such a shift. Traditionally studies of saline lakes attract less attention than limnological studies of inland freshwater lakes or saline seas and ocean systems. However, this trend seems to be changing now. Erik Jeppesen (University of Aarhus, Denmark), member of the International Scientific Committee of the upcoming Conference thinks that there are several reasons for this disparity and the expected future change.

“First, it is a question of tradition. Freshwater and marine studies have traditionally been organised in isolated key study areas, leaving less room for saline lake studies. If we go a few years back in time, we will find that most people dealing with lakes were studying deep freshwater lakes, even in countries where such deep lakes are few and where shallow lakes dominate, e.g. in Denmark and the Netherlands. It has taken a while to break this tradition, but when it finally occurred in the late 1980’s, shallow lakes research took off with high speed all over the world. I think the same can happen for saline lake and brackish lake research, not least because many freshwater lakes will face the risk of becoming saline due to climate change, especially climate warming, and those that are already saline will decline in size or dry out. A second reason is that inland water studies have been particularly developed in Northern countries in Europe, Russia and North America (where most of the inland waters are), but the increasing problems due to decrease of water quantity and quality in Mediterranean and other dry areas will for sure change the focus of studies in the future. Thirdly, there has been a tendency that researchers working on saline lakes have concentrated their studies on inland saline lakes. Clearly, this community should

work in collaboration with the researchers working on brackish lakes and with a wider group of researchers working on similar types of freshwater lakes. Saline and brackish water lake research could and should build the bridge between the traditional focus areas in limnology. We observe an increasing interest in saline and brackish lake research. I feel that studies on the saline/brackish lake should use this momentum to become more visible.”



*Egor Zadereev
Vice-President of the International Society
for Salt Lake Research*

The programme of the conference will be organized to reflect the growing interest in saline lakes and related aspects and meet the traditional expectations from the conference on saline lakes. It will combine traditional sections on geology and chemistry, physics, microbial ecology, food-web ecology, human pressures on saline lakes with sections focused on comparative studies of different aquatic ecosystems, predictive mathematical modelling, paleolimnology, effects of water level on the ecology and biogeochemical cycling and other trendy topics in limnology.

The International Society for Salt Lake Research (ISSLR) follows the recent initiative of the International Society of Limnology (SIL) and has announced the Young Scientist Award to attract the distinguished young scientists to the saline lake conference in Ulan-Ude. The competition (<http://isslr.org/about/isslr-young-scientist-triannual-award/>) is open to all graduate students and early-career scientists. In this competition, the best papers in saline lake studies published in 2014-2016 will be chosen. Award winners will get an ISSLR grant, of up to 750 USD to cover their travel costs, or registration fee, or both, to attend the 2017 ISSLR conference. During this conference, each winner will be honored with Plenary Lecture on his/her winning article and related research.

The venue of the conference, the city of Ulan-Ude, is located just 80 km from Lake Baikal. All conference participants will visit the lake during the mid-conference tour. For those who want to become familiar with local saline and freshwater lakes, several post-conference tours will be organized to visit mountain valleys of Baikal area and steppes of Trans-Baikal and Dauria rich with natural and beautiful landscapes.

Check the updates at the webpage of the society <http://isslr.org/conferences/2017-ulan-ude/>. The official webpage of the conference with detailed information on registration will be launched soon. International Conference on Salt Lake Research, 2017 will bring new ideas and cross-sectoral links to limnology.

Looking forward to seeing you in Ulan-Ude.

With kind regards on behalf of ICSLR 2017 organizers.

Egor Zadereev (egor@ibp.ru)

Vice-President of the International Society for Salt Lake Research
Institute of Biophysics SB RAS, Krasnoyarsk, Russia

Courses on the Ecology and Taxonomy of Zooplankton in Mexico during 2016

Enormous progress is being made in Limnology in the Latin America, including Mexico. In addition to encouraging students to publish in international scientific journals and the organization of national and international conferences, universities encourage visits of experts and editors of scientific journals. During the past one decade many well-known limnologists from Europe (V.R. Alekseev, H.J. Dumont, R.D. Gulati, Brian Moss, N. Walz, A.A. Kotov, Z.M. Gliwicz, R. Bertoni, etc.), North America (W. M. Lewis Jr., R.L. Wallace, J.A. Downing, E. Walsh, P. Juneau, and J. Kolasa) and rest of the world (M. Gophen, T.R. Rao, Y.R. Reddy, etc.) have already visited the different Mexican laboratories including our Laboratory of Aquatic Zoology of the National Autonomous University of Mexico (UNAM, FES-Iztacala) and have shared their valuable experiences with the young limnologists and students through courses and workshops. Our university, UNAM, supports scientific workshops and courses in Limnology. For the year 2016, two eminent limnologists have already agreed to visit our university. These are Diego Fontaneto (CNR Institute of Ecosystem Study, Verbania, Italy) and Carolyn W. Burns (University of Otago, Dunedin, New Zealand).

Dr. Fontaneto plans to impart a course (from 12th to 23rd September 2016) on the identification of bdelloid rotifers, a group often neglected in many taxonomic studies because of the problems of preserving these fragile organisms.

Dr. Burns, a former SIL president, is an expert on various aspects of freshwater ecology and limnology. Her stay at our University (from 24th October to 11th November 2016), should stimulate the participants in selecting innovative aspects of limnological studies.

Both these courses are being funded by the UNAM (Posgrado de Ciencias del Mar y Limnología, PAEP). These courses are limited to Mexican participants. However, should foreign students wish to attend the course, we can consider the request if they are willing to pay their travel expenses. We can also consider access to the lectures by video conferencing or Skype, or both.

For further information:

S. Nandini / S.S.S. Sarma

Course Organizers

nandini@unam.mx; sarma@unam.mx

Site will be provided. There will be plenary lectures and invited talks at the start of each regular session, followed by oral and poster presentations. There will be parallel sessions. The number of oral presentations will depend on the number of participants. As per norms, each registered participant can present maximally two works, an oral lecture and a poster presentation.

As in the previous meetings, the following study aspects of shallow lakes research will receive emphasis during this meeting:

- Structures, function and metabolism of shallow lakes
- Allelopathy in shallow lakes
- Humic substances
- Hydrological constraints and salinity rise
- Adaptations, plasticity and evolution of organisms
- Restoration, conservation, recovery and sustainability
- Ecotoxicology
- Climate variability and long-term climate change
- Food web studies
- Desert limnology
- Interactions of multiple stressors
- Eutrophication and harmful algal blooms
- Biodiversity and invasive species
- Paleolimnology
- Ecosystem modelling

Please inform us with suggestions if there are more emerging areas of shallow lake researches. The organizing committee may consider such aspects for workshops or additional sessions.

The proceedings of the meeting will be published in one of the indexed journals, as is the tradition of the shallow lakes meetings.

Mid-conference excursions to the Pyramids of Chichen-Itza and the Celestun Biosphere Reserve are being planned. We will also try to organize visits to the karstic sinkholes (cenotes) in the vicinity of Merida City.

Organizing & Scientific Committee

José Luiz Attayde	Sandra Brucet Balmaña	Meryem Beklioglu
Vasilis Dakos	Henri J. Dumont	Kemal A. Ger
R.D. Gulati	Karl Havens	Erik Jeppesen
Linda May	Luc De Meester	Brian Moss
Yves Prairie	Mariana Meerhoff Scaffo	Martin Søndergaard
Liu Zhengwen	Tamar Zohary	

Registration Fees (US dollars, USD)

Registration Type	Early Registration	Normal Registration	Onsite Registration
	before Nov. 15, 2016	after Nov. 15, 2016 up to 17 Feb. 2017	18-24 Feb. 2017
Regular	450 USD	500 USD	600 USD
Student	200 USD	250 USD	300 USD
Accompanying person	200 USD	250 USD	300 USD

Advances in Shallow Lakes Research

The IX International Shallow Lakes Conference, Merida (Mexico) February 19-24, 2017

After the interesting and entertaining 8th international shallow lakes meeting (October, 2014) in Antalya (Turkey), Mexico will host the 9th triennial International Shallow Lakes Conference meeting in Merida City (Yucatan), which was chosen as the venue for this conference. We are developing the website to add details of the Conference.

The meeting will be organized at a luxury hotel in Merida city. At this stage, we are trying for the best package deal from various hotels in the city. The details will be soon available on the website. Merida city is well-connected by air and road to the Mexico City and Cancun, a renowned tourist destination in Mexico. Details for reaching Merida city and the Conference

Organizers of the IX International Shallow Lakes Conference, Merida (Mexico) February 19-24, 2017

S.S.S. Sarma
sarma@unam.mx



S. Nandini
nandini@unam.mx



Universidad Nacional Autónoma de México,
Campus Iztacala
Av. de lo Barrios, No. 1, Los Reyes
Tlalnepantla, Edo. de Méx. C.P. 54090.
México
Tel: +52 55 5623 1125; +52 55 5623 1256;
+52 55 5623 1155

Reports



Dr. Korovchinsky (fifth from the right in back row) with course participants

Progress on the Taxonomy of Freshwater Zooplankton in Mexico, a Report

An intensive two week-course on the identification of Cladocera with emphasis on Sidiidae was imparted by Dr. Nikolai M. Korovchinsky of the A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Science, Moscow (Russia) from 3 to 13, November 2015. The facilities and the funds for the course were provided by The National Autonomous University of Mexico (UNAM) at the Campus Iztacala (FES-I), Tlalnepantla, State of Mexico (Mexico). The course was attended mostly by graduate students and some faculty members of UNAM. There were also a few course participants from the other Mexican universities. Altogether, 20

in Europe and d) The future prospects of the taxonomy of cladocerans. Taxonomic difficulties of Sidiidae in Latin America were also discussed. The course was inaugurated by the Academic Secretary, Dr. Ignacio Peñalosa Castro (FES-I). The role of UNAM in promoting limnology in teaching at the undergraduate level was referred to by Dr. Juan Manuel Mancilla Díaz, The Head of the Research Division of FES-I. Dr. Juan Gerardo Ortiz Montiel, Coordinator of the Research Programme (FES-I, UMF) proposed the vote of thanks.

Participants brought fresh and fixed zooplankton samples from different waterbodies in Mexico. This material was used during the practical sessions. In addition, Dr. Korovchinsky also showed some rare and interesting European cladocerans from his collection of permanent preparations /slides.

The course was highly useful to the participants, who not only identified the Cladocera in their collections, but also developed an interest in pursuing this important field of limnology. At the end of the course, the participants discussed their individual research issues in limnology and made short presentations of their original works for group discussion. On the final day of the course, participants organized an informal get-together along with Dr. Korovchinsky and dinner consisted of typical Mexican cuisine (Photo below).

Dr. Patricia Dávila Aranda, the Director of FES-Iztacala, and an eminent biologist on taxonomy and ecology of various plants, exchanged views with Dr. Korovchinsky on the importance of teaching Taxonomy at the undergraduate level in Mexico and in Russia.

Financial support for the course was provided by the UNAM (Posgrado de Ciencias del Mar y Limnología, PAEP) and some additional funds for the course were made available by the Director of FES-Iztacala.

S.S.S. Sarma / S. Nandini
Course Organizers
sarma@unam.mx; nandini@unam.mx



Practical session in progress

participants attended this course (Photo above). The course comprised both theoretical and practical sessions. The following themes were covered during this programme:

- Basic Taxonomy of Cladocera,
- Basic Biology of Cladocera,
- Cladoceran diversity in neotropical regions,
- Cladoceran diversity



Dr. Korovchinsky relishing Mexican dishes

Why do we need to pay more attention to study the saline lakes?

A fundamental question for science is whether it is possible to meet the demands of a human growing population for food and fresh water? A chance to meet these demands is getting less likely because of landscape destruction and decrease of natural ecosystem resilience and productivity. It is possible to meet the demand of food especially by increasing aquaculture production (Duarte et al., 2009). Using FAO data (FAO, 2015), the authors analyzed the current trends of increasing global production of marine and inland water aquaculture (Figure 1). From the figure we can also see the following trends: there has been a steady increase of total food output of aquaculture in marine and inland waters; the aquaculture production in inland waters exceeds that in the marine waters. In other words, there is a more rapid growth of aquaculture in inland waters than that in the marine waters. The total aquatic production increased from 24.5 million tons in 2004 to 44.7 million tons in 2013, while the share of inland-water production in total world aquaculture production increased from 58 to 64% during these ten years. Analysis of FAO data shows that inland aquaculture has the fastest growth in fresh waters, which contributes to eutrophication of fresh waters, thus reducing the reserve for drinking waters. Consequently, the increase in the proportion of freshwater food production in aquaculture prevents an equally successful response to other problem of the growing human population. Thus, the demand for fresh water is on the increase. On the other hand, inland saline waters have been little used for the aquaculture development without compromising the supply of drinking water. Some saline lakes with salinity >50 g/l are very important for aquaculture development in general. They can be used to culture *Artemia*. Variability in the harvest of *Artemia* cysts may lead to a rise or fall of production in the aquaculture industry worldwide. Larvae cultivation is a bottleneck in the production of different commercial organisms (fishes, shrimps, etc.). For successful development of larviculture we need to have adequate amounts of live food for the larvae. In this regard, *Artemia* nauplii are the main live food for fish larvae now. Currently, the gap between supply and demand of global *Artemia* cysts resources is widening. Production of new *Artemia* populations in salt lakes and ponds is one of the key factors to overcome the imbalance between supply and demand of *Artemia* cysts worldwide (Jia et al., 2015).

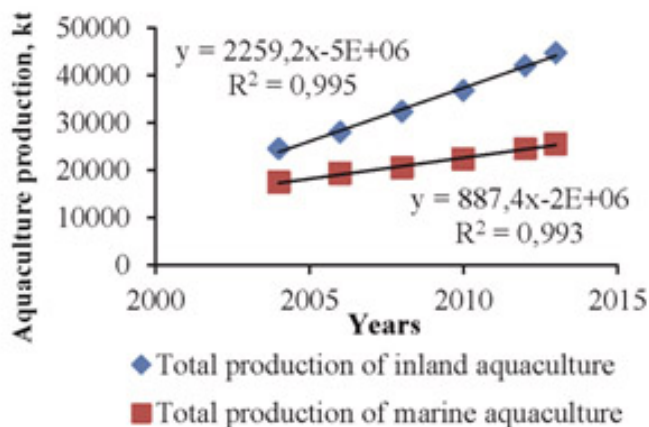


Fig. 1. The growth of the global production of marine and inland aquaculture on FAO data (FAO, 2015)



Fig. 2. Hypersaline Lake Dangxiong Co on the northern Tibetan plateau. (Photographer: Qinxian Jia)

A long-term experiment was done on Lake Dangxiong Co (area 55.53 km², salinity 120-180 g/l) (Figure 2), which is located in the southwestern part of the northern Tibetan plateau at an altitude of 4 475 m a.s.l. (Jia et al., 2015). In 2004, 850 g of *A. sinica* cysts were introduced in the lake and the average abundance of *Artemia* adults in the lake initially increased gradually from 20 ind./m³ in 2006 to 1950 ind./m³ in 2013. Calculations show that it is possible to harvest about 150 t cysts per year from the lake as well as about 350 t (dried biomass) of adult *Artemia*.

The question arises: What do we know about the saline lakes? To answer this question, we used the results of the 12th International Conference on Salt Lake Research, held in Langfang City (China) from July 14 to July 18, 2014. There were 300 specialists in limnology, sedimentology, geology, geochemistry, biology, ecology, management and conservation from 12 countries who got together to present their latest results and ideas on research as well as on the use of saline lakes worldwide (Shadrin et al., 2015a). Saline lakes are found worldwide including Antarctica. However, a majority of them originated in areas with dry climate and are located in arid and semi-arid climatic zones that occupy about one-third of the land area of the Earth (Hammer, 1986). For example, in China (Xinjiang, Qinghai, Tibet, Gansu, Inner Mongolia, Shanxi, Shaanxi, Ningxia, Jilin, etc.) there are more than 1000 such lakes. A lot of saline lakes distributed in Russia, range from Crimea to East Siberia. Total volume of all freshwater lakes on the Earth is very close to that of salt lakes – 126 and 104 km³, respectively (Hammer, 1986). They form an important dynamic part of the biosphere, and have great environmental, social and economic values (unique biodiversity, efficient carbon sinks and natural mechanisms to retard the human-related greenhouse effect, natural resting and wintering grounds for migrating birds, mineral and biological resources, medical mud, etc.). Some such lakes have been used by humans for more than 5,000 years, e.g. Lake Qarun in Egypt and Lake Yuncheng (Figure 3) in China. For a long time, the changes in lake occurred not only due to climate variability, but also due to the human activities. Now these lakes have become unique hybrid, natural and technological ecosystems serving for the human use in a variety of ways, including chemical industry, fishery, aquaculture, tourism and rehabilitation of health. Worldwide, the saline lakes are threatened by the climate change and different human activities that result in pronounced changes in the lake ecosystems with negative consequences for the local populations. No policies/directives have yet been developed at the world, country or local level to achieve environmentally sustainable use of the saline lakes (as a matter of fact the lakes in general). In other words, a well substantiated, scientific basis to



Fig 3. Hypersaline Lake Yuncheng in China.
(Photographer: Nickolai Shadrin)

develop a sustainable management strategy and technology for using these lakes are still lacking. The current, unregulated human practices for exploiting of saline lakes often disrupt the normal functioning of ecosystems of these lakes, resulting in the collapse of their capacity to yield social and economic values” (Shadrin et al., 2015a). To integrate and balance the interests of the environment (biosphere), the society (different stakeholder groups), and profit (economy/industry) a scientific platform is needed.

Living conditions in the saline/hypersaline lakes are often extreme and highly variable. In many of them, water partly or totally evaporates during the dry season, and salinity may increase so dramatically in the lakes such that only a few types of organisms, mostly prokaryotes may survive, but they need to pay a high energy cost to adapt to such a stressful environment (Oren, 2011). Organisms that do not have sufficient energy for active life in such conditions can produce dormant stages to overcome temporarily unsuitable conditions. The resting stages play an important role in such lakes (Shadrin et al., 2015b). Less extreme saline/hypersaline lake ecosystems may have amazing structural and functional diversity on relatively small scales. It is enigmatic that despite the environmental severity, many hypersaline lakes can demonstrate extremely high biological productivity. This paradox has not yet been fully explained but a broad variety of micro-niches in the hypersaline biotopes may support co-existence of aerobic and anaerobic organisms, i.e. oxygenic and anoxygenic photoautotrophs (Figure 4), and heterotrophs and chemolithotrophs. Shadrin et al. (2015a) suggested that full-range, sharp gradients of the key abiotic variables (e.g. Eh, pH, O₂, H₂S, light energy) in space (on microscale) and in time (hours) facilitate an optimal coupling between various types of metabolism while maximizing energy and biogenic element fluxes in the ecosystems. Saline lake ecosystems can exist in more than one stable state, and the shifts between alternative states reflect a bottom sediment lamination. It was shown now that in the animal world *Artemia* is not the only organism that may exist in hypersaline harsh conditions but there is an example of more than 20 copepod species, including most halotolerant *Cletocamptus retrogressus* (Harpacticoida), *Arctodiaptomus salinus* (Calanoida), and *Meridiacyclops baylyi* (Cyclopida) (Anufriieva, 2015). Thus, the saline/hypersaline lake ecosystems are much more complicated than scientists think and are yet insufficiently studied. It is obvious that the scientific platform for sustainable, multipurpose use of saline lakes must be based on a clear understanding of the special characters of the organization and dynamics of the lakeecosystems. That is why we need to study the saline lakes more intensively than so far. This is not the only

because many organisms inhabit these lakes but because the mechanisms of adaptations of these organisms are unique. Therefore, their studies may lead to a many new findings to help develop different branches in biology and biotechnology. Lastly, ecosystem studies in different saline/hypersaline lakes will promote to develop our understanding of ecosystem functioning and dynamics including general peculiarities of ecosystem shifts from one state to an alternative one.

N.V. Shadrin, E.V. Anufriieva

A.O. Kovalevsky Institute of Marine Biological Research of RAS, 2 Nakhimov ave., Sevastopol, Russia, 299029; snickolai@yandex.ru and lena_anufriieva@mail.ru

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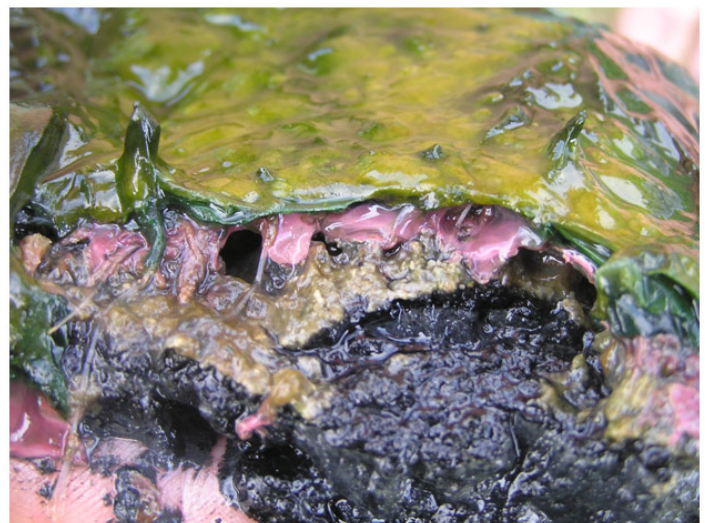


Fig. 4. Biofilm with oxygenic (green) and anoxygenic (purple) phototrophs from hypersaline lake in Crimea (Photographer: Olga Samylina).

A Museum of Ancient Limnological Instruments: the Crypta Baldi

The expression “Museums Country” perfectly defines Italy, with its 1.5 museums every 100 sq km, which is one museum for every 13,000 inhabitants (Census of National Institute of Statistic, 2011). However, not so surprisingly, only 9.8% of these museums are devoted to natural history and science. In addition, there is not a single museum devoted to the ancient instruments of limnology. The best place to fill this gap is villa De Marchi in Verbania Pallanza, the building which hosted what used to be the Istituto italiano di Idrobiologia, now part of the Institute of Ecosystem Study of the National Research Council. The limnologists of my generation, and also quite a few newcomers, know this Istituto well, which was described as a “haven for visiting limnologists” by the famous limnologist Tommy Edmondson. In a remote corner of the garden of the villa there is the ancient “ice room” of the De Marchi property. In the past, this hidden underground crypt was used to preserve food under the ice stored there over winter. Now it houses the ancient limnological instruments, the relics of over a century of limnological research developed at the Institute.

I spent a lot of time and energy searching, collecting and restoring these old and ancient instruments, many of which were lost in the attics and the basement of the villa. Thanks to the present Director of the Institute, Marina Manca, who made the “ice room” available to host the fruits of my collection, this historical patrimony has now a tiny but reminiscent home. The crypt is a circular, domed room, 4 m in diameter. The dome is made of bricks and the floor is of gneiss, with an old millstone at the center. The vaulted entrance corridor is in stone. The crypt is devoted to Edgardo Baldi, the first director of the institute that was founded in 1938. All limnologists know his name, and are reminded of it at every SIL Congress by the Baldi lecture dedicated to him. The name Crypta Baldi evokes the name of a famous monument in Rome’s historic center: the Crypta Balbi. This is a portion of the several layers of a – now underground – Roman city block, including a large portico, an annex to the theater built in 13 BC by Lucius Cornelius Balbus.

The small museum in Verbania, similarly offers the possibility to uncover the mostly buried and all too easily forgotten past. In fact, the building now accommodates more than 100 instruments used in the past for limnological research. Among the oldest, is a limnigraph (Sarasin type) dating back to the first decade of the past century (Fig. 1). Meteorological instruments are well represented, documenting the great attention early limnologists paid to climate’s effect on lakes (Fig. 2). There are also many analytical tools, such as a Hellige Potentiometer dating back to 1939 (Fig. 3). Also, sampling devices designed and built during the mid-20th century are displayed here. A sampling bottle in copper and brass that belonged to Baldi himself (Fig. 4) is a good example. Baldi’s interest in spreading limnological knowledge among non-scientists prompted him to acquire many devices for microphotography and microcinematography. They are now restored and exhibited in the crypta (Fig. 5).

These pictures are just a few teasers of what you can find in Crypta Baldi. A virtual visit of the museum is offered on its

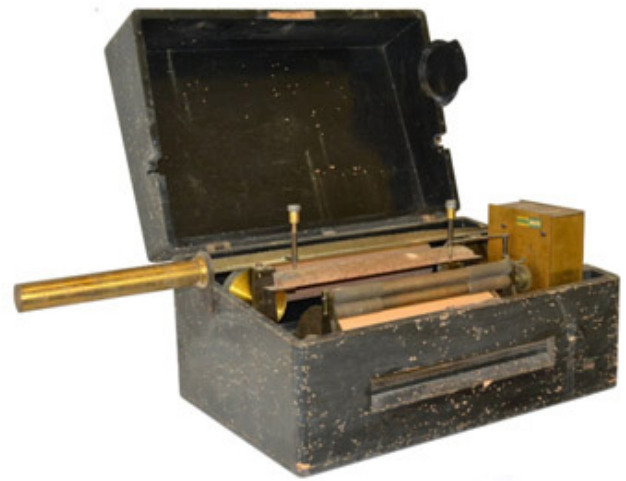


Fig. 1. Horizontal limnigraph, Sarasin type. Belonged to De Marchi. Around 1910



Fig. 2. Recorder of the anemometer Richard Frères, belonged to De Marchi. First half of the last century.



Fig. 3. Potentiometer by F. Hellige & Co of Freiburg. 1939.



Fig. 4. Baldi's bottle , open (left) and closed (right). First half of the last century.

disciplines that are increasingly autonomous, specialized, and incompatible, which hinders the essentially interdisciplinary frame required by limnology.

As a result, and in spite of the growing significance of global freshwater resources and concerns about climate change, limnology is often neglected by governmental scientific organizations and by environmental managers. The Crypta Baldi exhibits the tools instrumental for past achievements in the scientifically lively and internationally famed environment of today's Institute. I am optimistic that this continuum of active and effective science can help the research funders to understand the theoretical and practical value of limnology.

Roberto Bertoni
r.bertoni@ise.cnr.it



Fig. 5. Baldi's microcinematographic system. 1938.

website: www.silitaly.it/crypta/eindex.html. There, you can access pictures offering overviews of the museum from different sides (Fig. 6). Clicking the instruments shown in the general overviews opens the datasheet of each instrument, including a detailed picture of it. A library of short films made from 1937 to 1988 is also available.

Nowadays limnology seems to have lost its appeal as a central part of theoretical ecology. Public funding of limnological research is mainly driven by political issues. The key to success for a research project is its "socio-economic impact" rather than its innovative and scientific potential. Limnology is often prompted to become a predominantly applied science. On top of that, it is becoming every day more difficult and expensive to bring together



Fig. 6. Inner view of Crypta Baldi

Obituary

Val Houston Smith (1950-2016): Putting the Puzzle together from Organelles to Ecosystems



Val Houston Smith (1950-2016)

Val Houston Smith, aquatic ecologist and Professor of Ecology at the University of Kansas, died at home on 2 April 2016 surrounded by his family. He was 65. Val is preceded in death by his mother, Marcia (Dunn), and survived by his wife, Marilyn; sister, Bridget Wilson; father, Fray Smith; and daughters, Niki and Rosie Smith.

Val's academic career started as an undergraduate at the University in Kansas (KU), a place he would eventually call his lifelong home. Mentored by John O'Brien, Val earned Bachelor's degrees in Chemistry and Biology at KU. Val also met his future wife Marilyn Smith at KU. The two were married in 1972. Once finished with their respective studies at KU they moved to New Brunswick, New Jersey to attend graduate school at Rutgers University. After earning Master's degrees in 1976, their path led to doctoral programmes at the University of Minnesota.

At Minnesota, Val's career was sparked by two newly hired faculty members who would ultimately become his mentors and academic advisors: G. David Tilman and Joseph Shapiro. Tilman stimulated Val's interest in resource-ratio theory, while Shapiro oversaw his laboratory and field-based limnological experiments. Val's time at Minnesota was also shaped by his involvement in the Limnological Research Center, a research group led by his co-advisor Joe Shapiro as well as many now well-known ecologists and limnologists. The Limnological Research Center focused on the restoration of freshwater ecosystems, including ways to decrease the dominance of blue-green algae. Val completed his Ph.D. in 1982; ideas and research from it fueled one of his most notable publications, "Low nitrogen to phosphorus ratios favor dominance by blue-green algae in lake phytoplankton" published in *Science* in 1983. He would later be given ASLO's prestigious John Martin Award in 2013 for the publication.

Val then moved to Canada in 1982 to work with Frank Rigler on a NATO postdoctoral fellowship at McGill University. Although Rigler passed away before Val arrived, with new mentors, Robert Peters and Jaap Kalf, Val completed all projects the two had planned to conduct. The limnology group at McGill had a major influence on his career and spurred life-long friendships. Val and Marilyn also thoroughly enjoyed



Val (front, left) and colleagues (left to right) Ed Swain, Mike Lynch, Greg Lie, and Bruce Forsberg at the Limnological Research Center (LRC) in 1976.

the city of Montréal, which Val would often refer to as the family's second home. Val would then receive his first faculty position at the University of North Carolina at Chapel Hill in 1985, before returning to Canada as a visiting scientist at the Université de Montréal from 1992-1993. He finally returned to the place he would call home, the University of Kansas, in the summer of 1993.

Once at KU, Val's research expanded past the bounds of most limnologists to explore patterns and underlying mechanisms across the full domain of biology. In addition to numerous publications on the effects of freshwater and marine eutrophication, his research interests also included disease ecology, resource-ratio theory, invasions by exotic species, aquatic biodiversity, terrestrial ecology, microbial competition and community structure, phosphorus recycling and reuse, environmental economics, cellular and organelle ecology, algal metabolite production and occurrence, ecological stoichiometry, algal biofuel ecology and production, and the effect and fate of persistent organic pollutants in aquatic communities. His broad research led to 10 book chapters, 13 papers in symposium or conference proceedings, 20 non-refereed articles, over 200 seminars and presentations, and more than 110 journal articles in 56 different journals, 25 of which have been cited more than 100 times each to-date. In total, his work has been cited more than 15,500 times.

His legacy contains more than an impressive set of world renowned publications; he was also an active and engaging mentor and teacher who spawned the careers of 1 post-doc, 8 doctoral students, 9 Master's students, and numerous undergraduate students. He was a highly awarded teacher, receiving multiple teaching awards at both the Universities of Kansas and North Carolina. He also was an active member of societies like ASLO, SIL, ESA, ACS, and Sigma Xi, reviewed many complete books, book chapters, and journal articles, served KU on a myriad of committees and advisory boards, and was an integral part of the Lawrence, Kansas community.

Val left a mark on science. Throughout his career he consistently had a knack for describing and stimulating research that filled forgotten or unnoticed research gaps. While science was his vessel to international recognition, he was just as well known for his warm, friendly, caring



Val examining an experiment at the KU biological station (circa 2010).

personality. A life-time's set of friends and notable colleagues travelled from various parts of the globe to KU in April 2015 for a day-long symposium to support Val after his cancer diagnosis; a true testament of Val's far-reaching impacts on science and the societies he loved so much. Because of his joy in others, his unquenchable love of discovery and his deep sense of fairness, Val represents the person we all strive to become throughout each of our own lives. He will be greatly missed by those who knew him, and by the generations of young scientists who will be left with only his insightful work to guide their own scientific endeavors.

"Most people have spent their time trying to figure out one puzzle piece. I've spent mine trying to put the puzzle together. Without seeing the completed puzzle, it's hard to know where to put the pieces" – Val Smith, December 2015

Inland Waters dedicated volume 6, issue 2 to Val's legacy. Donations can be made to the American Cancer Society, KUMC cancer center, or the charity of the donor's choice.

Ted Harris^{1*}

Jerry deNoyelles¹

Dave Tilman²

¹University of Kansas, Department of Ecology and Evolutionary Biology, Lawrence, Kansas.

² University of Minnesota, Department of Ecology, Evolution, and

Behavior, St. Paul, Minnesota.

*Corresponding author: ted.daniel.harris@gmail.com

Selected Publications of Val Smith

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2. Smith, V.H., G.D. Tilman, and J.C. Nekola. 1999. Eutrophication: impacts of excess nutrient inputs on freshwater, marine, and terrestrial ecosystems. *Environmental Pollution* 100:179–196.
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10. Smith, V.H., R.C. McBride, J.B. Shurin, J.D. Bever, T.E. Crews, and G.D. Tilman. 2015. Crop diversification can contribute to disease risk control in sustainable biofuels production. *Frontiers in Ecology and the Environment* 13: 561–567.



Val and Marilyn (front, center) and colleagues at the Val Smith Symposium, April 2015.

Equatorial Equilibrium: Mary Burgis and Ian Dunn

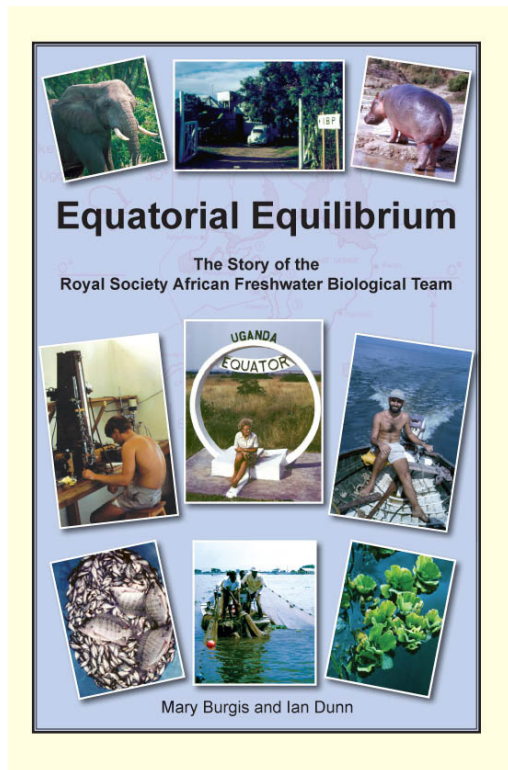
Copies of the book are available from:

Mary Burgis via pat.morris5@outlook.com

or via FBA: publications@fba.org.uk

Price: £18 for UK and 25 Euros or 35 USD for overseas – including postage.

(Happy to receive any comments on the book by post to West Mains, London Road, Ascot SL5 7DG, UK)



Ian and Lesley

“Equatorial Equilibrium” tells the story of a group of young freshwater biologists who worked on Lake George in western Uganda from 1966 to 1972. The team was an important part of the International Biological Programme (IBP), supported by the Royal Society and managed by the Freshwater Biological Association (FBA) of the United Kingdom.

The Team’s efforts, over six years, resulted in a remarkably comprehensive scientific appraisal of the productivity of a shallow equatorial lake. Lake George straddles the Equator and is one of the most productive aquatic environments in the world. All the year round its shallow waters were a thick green algal soup. This was achieved despite arriving in Uganda to find no expected preparations had been made.

Before being able to start their fieldwork and laboratory researches, the Team had to physically construct and equip their own living and laboratory accommodation. This was carried out despite the difficulties of working and living at this remote site in the shadow of the Ruwenzori mountains in the far-west of Uganda.

The authors bring together memories, anecdotes and personal stories of the residential ecologists and visiting scientists. It is well illustrated with personal and historic photos and includes an Appendix listing the publications that reflect the enormous scientific success of the project.

With its mixture of biography, travel stories and glimpses of day-to-day living, “Equatorial Equilibrium” shows how things have changed over the last 50 years. It illuminates an era when scientists were allowed to think for themselves, collaborate freely with others and allowed relatively free rein to produce results. It is a unique glimpse of the realities of field work and the personalities of the individuals involved, in a period that has now passed into history.



Mike and James purse-seining

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SIL Officers

PRESIDENT

Prof. Dr. Yves Prairie
Université du Québec à Montréal
Département des Sciences Biologiques
C.P. 8888 Succ. A
Montréal, QC H3C 3P8
CANADA
Email: prouve.yves@uqam.ca

GENERAL SECRETARY - TREASURER

Prof. Dr. Tamar Zohary
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Israel Oceanographic & Limnological Research Ltd.
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ISRAEL
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EXECUTIVE VICE - PRESIDENTS

Prof. Dr. David Livingstone
Eawag
Ueberlandstrasse 133
CH 8600 Dübendorf
SWITZERLAND
Email: living@eawag.ch

Prof. Dr. Sally MacIntyre
The University of California
Department of Ecology, Evolution,
& Marine Biology
Santa Barbara, CA 93106-6150
USA
Email: sally@eri.ucsb.edu

Prof. Dr. Vera Huszar
Universidade Federal do Rio de Janeiro
Museu Nacional
20940-040, Rio de Janeiro, RJ
BRAZIL
Email: vhuszar@gb.com.br

EDITOR-IN-CHIEF, INLAND WATERS

Prof. Dr. John R. Jones
University of Missouri-Columbia
SNR, Fisheries and Wildlife Sciences
302 Anheuser-Busch Nat. Res. Bldg.
Columbia, MO 65211-7240
USA
Email: jonesj@missouri.edu

EDITOR, *SIL NEWS*

Ramesh D. Gulati
NIOO/Department of Aquatic Ecology
Post Box 50, 6700 AB Wageningen
The Netherlands
E-mail: r.gulati@nioo.knaw.nl

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