MONOCULUS *Copepod Newsletter*

The Newsletter of the World Association of Copepodologists

Number 48 December 2004

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Deadline for submissions to the next number of MONOCULUS: 15 March 2005

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ISSN 1543-0731 (On-line version)
ISSN 0722-5741 (Printed version)

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WAC Homepage
http://www.copepoda.uconn.edu
MONOCULUS Homepage
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http://www.uni-oldenburg.de/monoculus

Message from the President

Dear copepodologists,

My vivid memories of our last International Conference on Copepoda in Taiwan have hardly paled, but they are now going to be replaced by my curiosity and expectations about the imminent meeting in Tunisia. The local organizing committee there has made tremendous efforts to ensure the best conditions and with the help of its international members has prepared a programme that looks very attractive, indeed.

I have neighbours at home who spent their holidays in Tunisia this year and they have added to my curiosity. They have felt very well looked after and safe and their trips to historical sites were such highlights that they decided spontaneously to return next year to visit also those sites they had to miss out on this time. Tunisia has much to offer, not only for tourists but also for copepodologists. Have a look at what has been prepared by our Tunisian colleagues!

I have started to think about the business meeting because that is largely my responsibility. A new Executive Council will have to be elected. Proposals for candidates will be prepared. We shall have to decide on the venue of the 10th Conference. What is going to follow Amsterdam, Ottawa, London, Karuizawa, Baltimore, Oldenburg, Curitiba, Keelung, and Hammamet? I would be glad if candidates contacted me well in advance of the next conference, say not later than the 1st of June 2005. For a decision one must be able to compare the offers and this is possible only when there is no lack of relevant information. A presentation cannot be prepared at the last minute during the conference. Some thought and time has to be given to it and therefore it is advisable to start early enough.

I would also like to discuss with young copepodologists my idea that they formed a group and played a more active role in Society matters. In my opinion input from them would do the Executive Council a lot of good. They are the majority of us and the majority at our meetings and although they also are the group with the greatest fluctuation they would certainly have a lot to contribute to our activities.

The rest of the business meeting will be routine. Normally this part is rather time-consuming but we shall try to cut it short this time.

I am looking forward very much to our 9th Conference in Tunisia next July and hope you do too.

— Kurt Schminke, President
Oldenburg University, Germany

The 9th International Conference on Copepoda (ICOC)

Hammamet, Tunisia
July 11-15, 2005

Visit our web site and register online
http://www.univ-lille1.fr/wimereux/copepoda2005/

Registration opens: November 2004
Deadline of call for papers: 28 February 2005
Deadline of reduced fees payment: 15 March 2005

Members and Friends of WAC:

It is our great pleasure to inform you that the World Association of Copepodologists (WAC), with over 900 active members from 86 countries, will hold its 9th International Conference on Copepoda in Tunisia in 2005. This is the first time that a conference in the ICOC series will be held in Africa, the first time in the Mediterranean region, and also the first time that there are 2 co-organizers: Dr. Mohamed Néjib Daly Yahia (Faculty of Sciences of Bizerte – University of 7 November at Carthage, Tunisia) and Dr. Sami Souissi (Marine Station of Wimereux – University of Sciences and Technologies of Lille, France). The 9th international conference on Copepoda (ICOC) will be held in the very beautiful city of Hammamet, from the 11th to the 15th July 2005. We are also organizing a pre-conference workshop (a training course) from the 4th to 8th July 2005 at the Faculty of Sciences, University of Bizerte. This course is designed for younger scientists from around the world and the course tutors are highly experienced in their fields. The International Conference on Copepoda has been held every three years since 1981. The WAC actively promotes research on Copepoda in all continents and regions of the world. The previous ICOC (8th) was held in Taiwan in 2002, and the one before that (7th) was held in Brazil in 1999.

Many people are unaware that copepods are more abundant than insects and that they dominate most plankton communities in both fresh and marine waters. Adult copepods are commonly around 1-2 millimetres in length, but some species can be very small (0.2 mm for adults) and others can reach several centimetres in length. Copepods can be found in most aquatic habitats on our planet (mountains, polar zone, hydrothermal springs, etc.). Most copepods are planktonic and are integral components of most of the marine food webs, directly affecting both pelagic fish populations and the biological pump of carbon into the deep ocean. Copepods can also be dominant in benthic habitats and inhabit a wide range of different types of sediments. They play a key role in these benthic ecosystems. The role of copepods in the dynamics of global biogeochemical cycles is now fully appreciated. Recent studies have demonstrated that the copepods can also be used as proxies for detecting global climatic change effects in aquatic ecosystems. At shorter temporal scales, copepods are often used as ecological indicators. In addition, copepods are common parasites in aquaculture, and are now one of the major health hazards in commercial fish and shellfish farming. Finally, copepods are also implicated in the spread of diseases, such as cholera, and in the transmission of some human parasites, such as *Dracunculus*, the Guineaworm. By bringing together these and other research themes we will demonstrate the societal relevance of copepods and will be better able to stimulate the next generation of students to become involved in copepod research.

Following the ICOC tradition of focusing on topical areas of science related to copepods, the International Organising Committee of the 9th ICOC has approved 4 symposia on the following topics:

i) **"Behaviour of copepods: role of small-scale processes"**
ii) **"Use of copepods as bioindicators"**
iii) **"Role of copepods in climatic change studies"**
iv) **"Role of copepods in aquaculture"**

In addition the contributed papers will be organised around themes, some of which will be designated Special Sessions, and introduced by keynote speakers.

Three evening symposia will be held in order to offer to all participants greater opportunity for open scientific debate on topics which we have categorised as **"Present and future challenges for copepod research."**

We will also highlight poster presentations in dedicated sessions, which will ensure that presenters of posters have sufficient opportunity for feedback and exchange with other participants.

We invite you to participate in this conference and to contribute to its scientific success!

Local Secretaries, 9th ICOC:
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Geoff Boxshall reports on a fact-finding visit to Tunisia.

I have just returned from my first-ever visit to Tunisia – a visit that was full of surprises. As a member of the International Organizing Committee of the 9th Conference on Copepoda, the co-chairs, Sami and Néjib, invited me to a committee meeting, firstly to help finalize the scientific programme, and secondly to check out their local arrangements. You can read about the exciting science programme elsewhere but, as I did not know what to expect from my visit, I thought I would share my impressions with WAC members who will soon be making their decision whether to attend the conference.

I visited both the venue for the training course, at the University of Bizerte (north of Tunis), and the conference venue at Hammamet (southeast of Tunis). Both are less than one hour's drive from Tunis, but in opposite directions. The training course will be held in the laboratories on campus at the University of Bizerte. The buildings are all white and blue, with that typical Mediterranean feel, but inside the labs are air-conditioned and well equipped with computing facilities and/or microscopes, etc. I met the Dean and Deputy Dean on campus and found them enthusiastic and honored to host the course. They were delighted to announce that the Bizerte city council had just agreed to provide a bus to transport course participants around. The accommodation for tutors and students alike is a small tourist hotel complex on the beach some ten minutes drive from the campus. When I say on the beach, I mean a walk of 20 metres from the hotel bar to the white sand with the turquoise Mediterranean beyond. All the participants will be working hard but – we are going to have a seriously good time.

As we left Bizerte and headed South, I have to admit I was thinking that those of us on the training course were going to be somewhat privileged – that was until we reached Hammamet. Hammamet is a tourist city, with large modern hotel complexes built along a glorious white beach. We stopped outside the Mehari Hotel – the grandest 5-star hotel in town. I don't want to sound like a travel brochure but this was simply beautiful with hand made plaster work on the inside of the dome over the central atrium. It was cool, modern and oozed luxury. There are conference rooms, quality space for posters, restaurant, bars, and three swimming pools (even though the sea is literally across the road) – everything one needs for a successful conference. One wing of the hotel has two- or three-room family suites (with 5 or 7 beds) that will be suitably priced for students on very low budgets, who are willing to share. The prices for standard rooms are amazing. One week in the Mehari will cost about the same as two days in a distinctly ordinary hotel in London – thanks to the negotiating skills of the local organizers (especially Ons).

To those in the WAC who are undecided about attending: I can only say that Tunisia is unique. The people I met are friendly and open, the restaurants are excellent, the home-produced wine is great (the drive to Hammamet takes you through the main wine-growing area), the infrastructure works well, and you will experience some of Tunisia, including classical Carthage and the Medina in Tunis City, on the excursion. When traveling I like to know a few basics: Can I get money easily? (Yes – the ATMs have an English option and my cards work there just as in Spain or France); Can I get a decent beer (Yes – and I recommend Celtia, a lightish Tunisian beer that is perfect for hot weather); Can I communicate with people? (Yes – many speak English and virtually all speak French), and will I be safe (Yes – in our current world no-one can guarantee safety anywhere, but I can honestly say that once I had experienced the ambience I never felt anything other than totally secure). I hope to see you all there.

– Geoff Boxshall
11th October 2004

PS. If anyone has questions about attending the conference you are most welcome to email me on g.boxshall@nhm.ac.uk – I will do my best to answer.

Pre-Conference Workshop

Training Course in the Biology and Systematics of Copepods
4 – 8 July 2005

Venue: University of Bizerta (near Tunis City), Tunisia

Co-sponsored by MARBEF – a European Union funded Network of Excellence in Marine Biodiversity and Ecosystem Functioning.

1. Course Objective The objective of the course is to provide postgraduate students/postdoctoral fellows with a comprehensive and state-of-the-art introduction to the biology, behaviour and morphology of planktonic copepods, plus training in the necessary technical skills.

2. Tutors The course will be taught in English by six tutors: each a specialist in a different area of copepod biology or systematics. The tutors will be:

Professor Geoff Boxshall (The Natural History Museum, London, U.K.)
Professor Thomas Kiørboe (Danish Institute of Fisheries, Denmark)
Professor Carol Lee (University of Wisconsin, U.S.A.)
Dr Laurent Seuront (CNRS- Marine Station of Wimereux, France)
Dr Sami Souissi (University of Lille, France)
Professor Rudi Strickler (University of Wisconsin-Milwaukee, U.S.A.)

3. Structure and Content The course will last five days and will comprise a mix of lectures, laboratory-based practical sessions and informal, problem-solving discussions. We will be flexible and encourage the development of a "hot-house" atmosphere through the interactions between highly motivated young researchers and established workers.

1) *Introduction to Copepod Form and Functional Morphology. Tutor: Geoff Boxshall*

A brief overview of copepod morphology and diversity to indicate the range of body forms and of limb types across the whole of the Copepoda. The basic functional morphology of the reproductive, locomotory and feeding systems will also be introduced and a brief synopsis of the current classification system will be presented. This session will provide participants with the morphological foundation on which the genetics, behaviour and biology topics can build.

2) *Copepod Development. Tutor: Geoff Boxshall*

The basic patterns of copepod development will be reviewed and lecithotrophic versus planktotrophic naupliar strategies will be compared. Special emphasis will be placed on the development of sensory systems and on the correlation between the changing behavioural priorities and changes in the sensor array. This session will begin to focus attention on interactions with the environment and on the comparative structure and function of chemosensory, mechanosensory and visual systems.

3) *Copepod Behaviour and Small-scale Phenomena Around Individual Copepods. Tutor: Thomas Kiørboe*

The behaviour and communication of copepods is constrained by the physical and chemical characteristics of their immediate environment (diffusion of solutes, turbulent fluid motion, and dissipation of momentum). We will describe fundamental behavioural phenomena such as mate finding, prey finding, and predator avoidance in the context of the governing small-scale physical processes and examine the implications for population dynamics. The session will consist of lectures and practicals.

4) *Observing Copepod Behaviours. Tutor: Rudi Strickler*

Copepods are small and whatever they do, they do it fast. The lecture session will concentrate on viewing video clips of copepod behaviours with commentary on what the clips show and why the clips were taken. Every participant will receive a DVD with the clips for further study. In the practical session we will construct simple optical set-ups which will allow us to register the rapidly executed behaviours of copepods. Evaluation of the observations will result in graphs and will demonstrate the full cycle from asking the question, then observing the behaviour, to disseminating the results.

5) *Copepod Evolutionary Genetics: Understanding Adaptation of Phenotype. Tutor: Carol Lee*

The role of genetics in the adaptation of copepods to different environments will be examined. Some overviews using the species complex *'Eurytemora affinis'* as a model system will be presented.

6) *Analysis of Copepod Behaviour Patterns. Tutor: Laurent Seuront*

An introduction to different statistical techniques used to characterize the trajectories (2D and 3D) of copepods will be presented. The focus will be on recent techniques (scaling-independent), i.e., fractal dimension, multi-fractal analysis, and random walk techniques. The diversity of copepod behavioural patterns will also be introduced.

7) *Modeling Behaviour and Processes at the Individual Level in Copepods. Tutor: Sami Souissi*

An introduction to the key processes to be considered when copepods are modeled at the individual scale. A particular attention will be paid to feeding processes (encounter, attack, capture, ingestion) and also to physiological processes (development, metabolism, reproduction, mortality, etc.). Emerging techniques of modeling based on multi-agent systems (i.e., Object-Oriented Modeling) will be used to illustrate the course and during practical classes on computer. Recent platforms (software) designed for end-users will be used here in order to make this course accessible to all participants.

4. Cost

All tuition is provided FREE.

Students attending the course must pay for their own travel to the venue – the University of Bizerta (near Tunis City), Tunisia. The cost of this will be variable. We assume that all participants will be travelling to Tunisia for the 9th International Conference on Copepoda in Hammamet, commencing on 11th July. Transport from the training course to the conference venue will be arranged on 9th July 2005 and a small charge may be made.

Students must also pay for one week's accommodation and meals. Precise costs are not yet available but we estimate that the cost of accommodation plus food will be approximately 400 Euros (= about 400 USDollars) for six nights/days. More detailed costings will be provided in due course.

5. How to Apply

All students must complete a questionnaire in order to apply for one of the limited places in the course. The Questionnaire can be found in the newsletter *MONOCULUS*, and it will be placed on the Conference website (http://www.univ-lille1.fr/wimereux/copepoda2005/) and on the WAC website (www.copepoda.uconn.edu). It can also be obtained direct by emailing Geoff Boxshall.

This training workshop will be co-sponsored by MARBEF (http://www.marbef.org/) and a proportion of the places will be reserved for MARBEF members, who should also complete the questionnaire.

Please send or email your completed Questionnaire to Geoff Boxshall at The Natural History Museum, Cromwell Road, London SW7 5BD, UK, (g.boxshall@nhm.ac.uk).

The provisional deadline for receipt of applications is 31st December 2004.

Students will be selected in advance by Dr Sami Soussi and Dr Mohammed Néjib Daly Yahia, in consultation with the course organizer. Contacts for practical questions about the University of Bizerta, the samples to be analysed from the local monitoring site of the University, and other questions should be addressed to Mohamed Néjib Daly Yahia (nejib.daly@fsb.rnu.tn with a copy to dalyyahya.ons@inat.agrinet.tn)

World Association of Copepodologists - Tunisia 2005
Copepod Biology and Systematics Training Course:
Questionnaire for applicants

Please expand the form as necessary to accommodate your answers – but keep to a single page only please.

1. Name:

2. Address:

3. Contact details:
   Phone
   Email

4. What are your academic qualifications and in which year were they obtained?

5. What is your current position or project?

6. What experience do you already have of working with Copepods or other zooplankton, if any?

7. Why do you wish to attend this course?

8. What are the main areas of copepod behaviour and genetics that interest you?

Please email or send this form to: Geoff Boxshall (gab@nhm.ac.uk),
The Natural History Museum, Cromwell Road, London SW7 5BD, UK.

Student Support Programme

Dear copepodologists,

The Executive Committee of the World Association of Copepodologists recently discussed whether to support courses other than in connection with our meetings. The result is that the EC proposes to start a support programme for PhD students from developing countries to take part in international courses. It was felt that the WAC should make the first modest step away from its very restricted and so far only WAC-centered activities, and that it should broaden its scope to make itself better known beyond its own limits. (The EC intends to create a separate WAC fund designated expressly for student training, beyond the current reserve funds.) The EC therefore proposes the following programme.

Support programme for PhD students from developing countries to participate in international courses

The Executive Committee of the World Association of Copepodologists has decided to start a support programme to help PhD students from developing countries to participate in international courses. Each year US $1,600.00 will be made available for this support programme. The maximum sum per applicant is $800.00. This allows us to support at least 2 students per year. The support is not meant to defray all costs of the course.

Applications are invited from PhD students from developing countries. An applicant's PhD project must involve the study of copepods. The applicant must be a member of WAC, or apply for membership when asking for support. The topics of the course must be such as to benefit the PhD project.

The applicant should submit: (1) a brief curriculum vitae, (2) a brief description of the PhD project, (3) a plan of the course with topics and teachers, (4) a budget for participation in the course, including all costs, (5) a statement of the total sources of support that are currently provided to the applicant, and (6) a letter of support from the supervisor.

Successful applicants will be expected to write a short report for the newsletter *MONOCULUS* on the course and how they have benefited from it.

Applications are to be sent to the President of WAC:
Prof. Dr. H.K. Schminke
AG Zoosystematik und Morphologie
Institut für Biologie und Umweltwissenschaften, Fakultät V
Carl von Ossietzky Universität Oldenburg
Postfach 2503
D-26111 Oldenburg, Germany
(email: schminke@uni-oldenburg.de).

Applications will be evaluated by a committee composed of the President, the Vice President, and the immediate Past President of the WAC.

For the start the EC proposes to use the sum of the last three years for the time until our next conference. This would mean, at least 3 persons could obtain support for courses taking place during the time until the end of this year, at least 3 persons could obtain support for courses taking place between the beginning of next year and the beginning of the next International Conference on Copepoda (this includes the pre-conference workshop in Tunisia, July 2005). If fewer than 3 persons are approved for support before the end of 2004, more students can be supported in 2005.

The *deadline for applications* pertaining to courses taking place up to the end of 2004 is October 1st, 2004.

The *deadline for applications* pertaining to courses taking place between the beginning of 2005 and the next Conference on Copepoda is December 31, 2004.

– H. K. Schminke
President of the WAC

Comments on the Support Programme

Dear Kurt,

I think that the objective of the programme is laudable. I think though that perhaps side by side with this there should be one to support young PhD students to work in their own countries under the supervision of specialists in their own country. During the past 10 years I have spent about C$40,000 on helping students to train in Sri Lanka by visiting them and supplying modest funds. I also sent a large consignment (actually 5 separate ones) to the University of Kelaniya, Sri Lanka where they have set up a center for ecology and fisheries of reservoirs. This is a center where US$800 could go a long way. I have also sent my collection of zooplankton (about 13,000) samples to the University of Singapore where students and others can study this material. I also sent 19,000 reprints and some identification manuals there. I could send you some information on these. I have distributed most of my books and those collected from friends and colleagues and equipment (microscopes, collecting gear, vials) to 10 countries on 4 continents. I think that much can be done by developed-country scientists individually and I am sure others do send material just as I have done.

Best wishes,
Herbert Fernando
University of Waterloo, Canada

Robert William Pennak
13 June 1912 – 23 June 2004

The honored names of Birge and Juday are synonymous the world around with "limnology." The famous duo of Edward Asahel Birge (1851-1950) and Chancey Juday (1871-1944) virtually began the science of fresh waters in America, from their lifelong posts at the University of Wisconsin. Their community of students and researchers dominated U.S. limnology between 1900 and 1940, especially with regard to the factors controlling the distribution and abundance of invertebrates. With their grand synthesis of sciences, Birge and Juday also touched on copepods, of course, but it was through their students that they made the largest impact on our field. And we are working today with the students of their students, in an academic pedigree without end.

We have now lost the last of those eager, far-sighted, and original students of Birge and Juday in Robert W. Pennak, who died in a Denver (Colorado) nursing home on 23 June 2004, after four years of declining health. He was 92 years old.

Pennak was born in Milwaukee, Wisconsin, on 13 June 1912. He turned early toward science, inspired by a Milwaukee high school biology teacher. Pennak's first two college years were accomplished through the University of Wisconsin extension program in Milwaukee; he then finished the last two years at the campus in Madison. During his senior year, he attended Juday's limnology and plankton courses. Pennak was thrilled when he purchased his own brass microscope and spent his weekends with samples collected with a home-made plankton net. In 1934, he obtained the B.A. in Biology.

This was not a good time for a new graduate in any subject. Pennak was truly depressed in the Depression years of the 1930s, with no career employment on the horizon. He was lucky enough to have a 1934 summer job in a youth camp; in August, Juday sent him a letter asking him to be his research assistant for the academic year 1934/35. That was a major turning point, enabling Pennak to do his graduate work.

The Trout Lake Limnological Laboratory of the Wisconsin Geological and Natural History Survey was the university's field laboratory, founded in June 1925. Prior investigations had centered on lakes near Madison, while the new "Station" was 200 miles to the north where lakes of diverse physical, chemical, and biological properties were periodically surveyed. Juday had four research groups (fish, microbiology, chemistry, and plankton) sampling the lakes every 10 days. Even though Birge was in his 80s, he too was an active and determined participant, saying, in spite of minor setbacks, "the Survey must go on."

> "We went out in all kinds of weather. If it rained that day it didn't make any difference, you went out anyway. If it was windy, you went out anyway. We used these heavy old oak boats in those days. There were no life preservers. The boats were heavy, but none of us ever worried about having the boat dump over. If it had dumped over, I'm sure we would have drowned .... We never gave it a thought and worked along blissfully" (Pennak, quoted in Beckel 1987)

Pennak was in the plankton crew, identifying and counting specimens for Juday. Benthic samples were also collected, which led to Pennak's research. In June 1935, Pennak received his M.S. in Zoology, continuing the summer work for Juday at the Trout Lake Station through 1938 with increasing responsibilities, ending with full charge of the plankton and benthos programs. Pennak married Alberta V. Pope of Janesville, Wisconsin on 7 September 1935. He was Juday's teaching assistant in the years 1936/37 and 1937/38, while continuing his own research. Pennak was awarded the Ph.D. in June 1938, with his dissertation on the ecology of interstitial microfauna, especially the copepods, rotifers, and tardigrades (Pennak 1940). He continued working that summer as a post-doctoral research assistant, with no prospects for an intellectually rewarding or even gainful position.

Juday was very helpful and patient throughout Pennak's student days. After retirement, Pennak recalled with gratitude his four close years with Juday, especially discussions about the philosophy of a *working* science. The hallmark of the program was its interdisciplinary approach, "with lots of data," looking toward general limnological principles.

This was not a school for copepodologists, but the vital role played by the small crustaceans ensured that Birge and Juday would at least publish brief copepod papers; Birge had been a noted cladoceran systematist. Some of their students, besides Pennak, also found great interest in copepods: Ruby

Bere (1900-1996), Nathan Fasten (1887-1953), David Grover Frey (1915-1992), Willis Lattaner Tressler (1903-1973), and Stillman Wright (1898-1989). Some of their University of Wisconsin associates are also well remembered as copepodologists: George Leonard Clarke (1905-1987), Charles *Dwight* Marsh (1855-1932), and Arthur Sperry Pearse (1877-1956).

Pennak was called to a faculty position at the University of Colorado, and he moved to Boulder in late August 1938. Although the world was still gripped by economic depression, Pennak was fortunately supported by a grant from the American Philosophical Society, beginning a lifetime series of investigations on mountain lakes of Colorado and all aspects of freshwater biology.

Pennak spent the summer of 1939 at Woods Hole, exchanging places with George Clarke who had also been at the Trout Lake Station in 1938. This enabled Pennak to widen his interstitial studies to marine fauna. Five papers resulted from this experience (Pennak 1942a,b; 1951; 1968b; Pennak and Zinn 1943).

Back at the University of Colorado, Pennak, in 1941, started on his "fresh-water invertebrate book," allowing himself 10 years for its completion. He also began a "Stream Biology" course in 1946, a discipline he perceived as different from the classic limnology. This was likely the first such academic offering. Pennak was widely known as the author of two popular books. Pennak's (1953) *Fresh-Water Invertebrates of the United States* was the backbone of countless environmental impact statements; this book was dedicated to Juday. This basic and useful work was recently revised and extended in its fourth edition by Douglas G. Smith. As a leisure-time activity, Pennak compiled the *Collegiate Dictionary of Zoology*, named by the American Library Association as a 1964 Reference Book of the Year.

Pennak belonged to many national and international scientific societies, including the American Society of Limnology and Oceanography (president in 1963), the American Microscopical Society (president in 1956), the Society of Systematic Zoology (president in 1964), and the Society for Integrative and Comparative Biology – formerly the American Zoological Society. In the latter, Pennak was president of the Invertebrate Section in 1962 and of the Ecology Section in 1974.

Pennak was the chairman of the university's Department of Biology for six years. He had many students, including copepodologists Patricia L. Dudley and James V. Ward. Pennak retired in 1974, maintaining a campus office and lab for consulting, editing, and field work until 1987.

Pennak was a pioneer in the studies of organisms in lake interstitial water, looking at their distributions and chemical influences. Pennak's studies, ironically, stimulated marine studies, and the freshwater aspects still lag relatively far behind. The strange animals inhabiting the interstices of sand grains are not like the larger animals that burrow through and displace sand and mud. The interstitial fauna are smaller than the grains, and they wriggle actively in the water-filled spaces between the solid particles. These animals, now called meiofauna, are recognized as characterizing their own special habitat. They had been found from time to time by the earliest naturalists, but were not recognized as representing a peculiar niche. And the distinct meiofauna living in the marine intertidal, or in the beaches of lakes, was not revealed until about 1930, by studies in Russia, England, Germany, and the U.S. Pennak came into these studies with personal encouragement from Charles Branch Wilson (1861-1941), the earliest U.S. proponent of the study of interstitial copepods. After World War II, the numerical and geographical profusion of reports made the meiofauna a special study in its own right.

In the last 200 years, fewer than two dozen persons have discovered or named all the higher taxa of crustaceans (classes or subclasses). Dr. Pennak belongs to this select company, with Donald Joseph Zinn (1911-1996), as the co-discoverer of the subclass Mystacocarida on the beaches of Connecticut and Massachusetts in 1939. Mystacocarids, first seen as the new genus and species *Derocheilocaris typicus* Pennak et Zinn, 1943, are not copepods, by the present light, but one cannot discuss the evolution of the one subclass without reference to the other. Zinn was studying the interstitial copepods for his Ph.D. at Yale University. When Pennak and Zinn first saw these puzzling creatures, they believed that they were aberrant harpacticoid copepods. The new form differs from copepods primarily in its independent maxilliped segment; that and other characteristics have convinced most systematists that mystacocarids are close to copepods, somewhat more primitive, and highly adapted to the interstitial life. Mystacocarida now comprises 12 species in two genera, worldwide, always marine, and always interstitial. So far.

Pennak named seven species of copepods. In 1942, Pennak also gave us the new copepod genera *Adelopoda*, *Psammoleptastacus*, and *Psammotopa*. Our science recalls Pennak's contributions in the species *Acanthocyclops pennaki* Reid, 1992.

- David M. Damkaer,
acknowledging essential help
from Alberta Pennak

References:

Beckel, Annamarie L. (ed.). 1987. Breaking New Waters; a Century of Limnology at the University of Wisconsin. Transactions of the Wisconsin Academy of Sciences, Arts, and Letters, Special Issue. xiii + 122 pp.

Smith, D.G. (ed.). 2001. Pennak's Fresh-water Invertebrates of the United States. Porifera to Crustacea. 4th Edition. John Wiley, New York. 638 pp.

Works on copepods by Robert W. Pennak and coauthors, in chronological order:

Pennak, R.W. 1939a. A new copepod from the sandy beaches of a Wisconsin lake. Transactions of the American Microscopical Society 58(2):224-227.

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Pennak, R.W. 1944. Diurnal movements of zooplankton organisms in some Colorado mountain lakes. Ecology 25(4):387-403.

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Pennak, R.W. 1958. Some problems of freshwater invertebrate distribution in the western states. In: C. Hubbs (ed.). Zoogeography. Publications of the American Association for the Advancement of Science 51:223-230.

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Pennak, R.W. 1962. Quantitative zooplankton sampling in littoral vegetation areas. Limnology and Oceanography 7:487-489.

Pennak, R.W. 1963. Species identification of the fresh-water cyclopoid Copepoda of the United States. Transactions of the American Microscopical Society 82(4):353-359.

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Patricia Louise Dudley
22 May 1929 – 30 September 2004

With the passing of Pat Dudley on 30 September 2004, copepodology has lost one of its clever innovators and invertebrate zoology has lost a knowledgeable, serious, and tireless teacher. Pat was born in Denver, Colorado on 22 May 1929. She was an honors graduate of the University of Colorado (1951), staying to earn a Master of Science degree in 1953 under limnologist Robert William Pennak (1912-2004) with a thesis on the fauna of several mountain streams. She intended to pursue similar work at the University of Washington, Seattle, but instead came under the influence of Paul Louis Illg (1914-1998) (see *Monoculus* 36).

At the University of Washington, and its marine biological station at Friday Harbor, Pat was introduced to the infinite wonders of copepodology. Following Illg, her interests turned to the copepod associates of ascidians (tunicates). No other copepod group has such a morphological diversity in the adults. The systematics of the "ascidicoles" was in need of rehabilitation, looking not only at adult morphology but at the developmental stages as well. The tunicate commensals had been studied since the late 1600s, and various stages of their life cycles had been observed (especially by Canu in 1892). Yet a complete series had never been recorded until Pat did so for her doctorate research on “The Development of Notodelphyid Copepods and the Application of Larval Characteristics to the Systematics of some Species from the Northeastern Pacific.” She was awarded the PhD in 1957. She successfully cultured eight species from five genera at Friday Harbor, carefully detailing their development in a well-written and beautifully illustrated book of 51 plates (Dudley 1966). This insight to the affinities of the group was much more than supplemental, and her contributions were quickly recognized as a classic work in our field.

Pat was known first-hand as a friendly, energetic, and committed scholar as far afield as Naples, Banyuls-sur-Mer, Paris, Plymouth, London, Millport, Woods Hole, and Hawaii where she spent considerable time in her early copepod years.

Pat's subsequent copepodological research added more information on the development of ascidicoles as well as on the taxonomy of other associated copepods, especially those from polychaetes. Her further interests encompassed the fine structure of copepods, from studies at her newly equipped electron-microscope laboratory at Barnard College, Columbia University (New York City), where she joined the faculty in 1959. She became Professor of Zoology at Barnard and remained there the rest of her career, including terms as chairman of the Department of Biology. Pat retired to Seattle in 1994, where she planned to pick up her favorite studies on copepods. However, health problems soon intervened and she was unable to conduct any of this long-desired research, being severely ill the last few years.

A longer notice on the life and work of Patricia Dudley is planned for the *Journal of Crustacean Biology*.

— David M. Damkaer

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"The World of Copepods" Website Updated

http://www.nmnh.si.edu/iz/copepod/

"The World of Copepods" website, maintained by Chad Walter of the National Museum of Natural History (Smithsonian Institution), has been extensively updated. The new version should be completed and online by December 15th. A major improvement is that additions and corrections can now be uploaded to the online version as they are made.

This website contains five databases. The bibliographic database of literature references on all aspects of copepods and branchiurans now contains over 41,000 entries, and can be searched as to author, year of publication, and words in the title. Nearly 750 new publications have been added for the year 2004 alone. The other databases are: a taxonomic list of copepod and branchiuran genera and species, including all their present and past combinations; copepod and branchiuran genera, with synonymies; copepod and branchiuran researchers of the world; and the copepod and branchiuran types held in the NMNH collections.

CeDAMar Exchange Program for Taxonomists

Census of the Diversity of Abyssal Marine Life (CeDAMar) announces a Fellowship Program for Deep Sea Taxonomists

Rationale:

The deep sea is one of the largest and least explored ecosystems on Earth and is a major reservoir of biodiversity and evolutionary novelty. However, the limited number of taxonomists worldwide specializing on deep-sea groups, combined with the frequent collection of undescribed taxa, are major impediments for understanding and characterization of biodiversity and ecosystem function in the abyss. To partially help to overcome this so-called "taxonomic impediment," CeDAMar will support ***short-term visits of taxonomists to other institutes*** in order to work with colleagues there, and exchange knowledge concerning, abyssal material. This instrument will allow taxonomists to cross reference their samples with material from previous expeditions and natural history collections.

CeDAMar is a field project of the Census of Marine Life (www.cedamar.org). The fellowship program is supported by the Alfred Sloan Foundation.

Eligibility:

The fellowship program is devoted to individuals matching the following criteria:

A.) Taxonomists studying material from CeDAMar expeditions (currently ANDEEP, DIVA, KAPLAN, NODINAUT, BIOZAIRE, CROZEX, LEVAR) applying to visit a foreign institute, for example, a museum collection to examine type material.

B.) Taxonomists working with abyssal material from elsewhere applying to visit an institute where CeDAMar material is being processed, for example, to compare their own specimens with material collected during CeDAMar field efforts.

Application and deadlines:

A written application should contain the following information:

a) Name and affiliation (home institute)
b) Curriculum vitae (max. 1 page)
c) Description of work, specifying goals and outcomes and expected start and end of the visit
d) Letter of invitation from guest institute
e) Expected costs specifying travel expenses, and lodging
f) Expected contribution of the guest institute (such as free lodging, etc.) if applicable

A total of 10 fellowships will be granted per year. The grant will cover travel expenses and a daily allowance of 80,- Euros per day. The whole amount of each grant should typically not exceed 2000,- Euros. Higher amounts may be considered on a case by case basis. Deadlines for application are **15th March**, **15th June**, **15th September**, and **15th December** each year.

To be submitted to:
CeDAMar Taxonomists Exchange Program
Prof. Dr. Pedro Martínez Arbizu
DZMB-Senckenberg
Südstrand 44
26382 Wilhelmshaven
Germany
Phone: +49 (4421) 9475 101
Fax: +49 (4421) 9475 111
email: pmartinez@senckenberg.de

A Glittering Copepod Ballet

Off Yerger Lake the sunlight glanced,
And from the breezes the waters danced
And absorbed the rays
Of thelong summer days.
With slightest effort I floated down
To the living bottom shallow,
All silt bedded and bustling below,
Water protected the small ones collected
Swimming in and out of the light,
Countless quarter inch copepods
Jetted before me, with whip rods,
In and out of the slanted rays,
Scarcely breaking the shafts of day,
Water rays scattering, particles pattering:
A glittering copepod ballet!

Now, back in my Oscoda canoe,
I am cleansed and comforted too,
By the slap slapping waters,
By the bright bobbing waters,
I am quietly lying, quietly praying,
Harkening back to an earlier day,
When things inorganic
And all beings organic
Related to each other in water.
First separate, then together –
'Ere we walked we kicked,
In the watery embrace
Of our primeval place.
Then … I paddle on leaving only a wake,
Not really alone here on Yerger Lake.

— Richard Steinhauer, 4/16/1986

Copepods in Water Supplies

The discovery of copepods in the drinking water of New York City was a matter of great concern to the Orthodox Jewish community, and this concern generated news articles worldwide. For example, from Bricker (2004): "New York City seems a fine place for an observant Jew to keep kosher …. And it all works out just fine, provided you don't get thirsty. Some rabbis now say that New York City tap water – for a century a gold standard for cleanliness – is not kosher. These rabbis have recently discovered that there are tiny bugs, called copepods, in the unfiltered water that streams into the city from upstate. These bugs are harmless. But they are crustaceans. And crustaceans are not allowed."

Actually, the small size of copepods and their natural presence in water are attributes that may render them ritually ingestible under the Halacha (Law). One of the major kosher certifying organizations, the Orthodox Union, is studying the matter, including aspects of copepod biology. The OU's consultant, Rabbi Yaakov Dovid Lach, is rapidly becoming a copepod maven as he learns more about these fascinating creatures.

Copepodologists generally are unsurprised by the entry of our ubiquitous study subjects into municipal water supplies. In fact, copepods were reported from city water systems in Europe as early as 1886 (reviewed by Reid, 2001). However, several colleagues have provided amusing anecdotes.

Rudi Strickler wrote that: "Years ago, about 1975/76, while I was an assistant professor at Yale University, New Haven, Connecticut, we had the cheapest way of catching cyclopoids. If we needed live ones, we let the fresh water run through a small plankton net for ten minutes, if we needed dead ones, we let the hot water run for ten minutes. In this way we could allocate the gained hours to more stupid tasks than to go on field trips."

Similarly, the old Spirit Building at the Natural History Museum in London used to have a thriving population of *Tropocyclops prasinus* in the water tank on its roof. According to Geoff Boxshall, you could collect a reasonable sample just by putting a plankton net under the running tap for half an hour. In the late 1970s, it was quite common for Geoff to receive samples for identification of copepods from domestic water systems in various small towns around the UK. They were always cyclopoids, never harpacticoids.

From Silvina Menu-Marque: "[In] the water coming from the tap at the Antarctic base of Esperanza, the nauplii pass the filters when the water is drawn from the well called Boeckella Lake, and grow inside the water tanks of the houses which are located between the ceiling and the roof. Then you open the tap and beautiful orange *Boeckella poppei* come swimming into your glass. I can't imagine how they survive in such a dark environment."

— Jan Reid
Martinsville, Virginia, U.S.A.

Bricker, M. 2004. Clean, maybe, but is New York's water kosher? New York Times, Tuesday, June 1, 2004.
Reid, J.W. 2001. A human challenge: discovering and understanding continental copepod habitats. Hydrobiologia 453/454:201-226.

COPEPOD: *The Coastal & Oceanic Plankton Ecology, Production & Observation Database*

The National Marine Fisheries Service (NMFS) recently launched *COPEPOD*, a database of globally distributed coastal and open-ocean zooplankton and phytoplankton abundance, biomass, and composition data. It features easy online access and searching of over one hundred thousand plankton tows from hundreds of cruises and projects, all made available in a common format with supporting documentation and access software. The content of *COPEPOD* is made possible through the data and scientific contributions of international scientists, institutions, projects and data centers.

To further increase the spatial and temporal coverage of the plankton data within *COPEPOD*, there is an ongoing effort to locate and include more historical and recent zooplankton and phytoplankton data, specifically net and bottle samples of species composition, abundance, and total biomass. Plankton investigators are invited to add their own data to this community-wide effort.

Contributed data are accepted in any format, paper or electronic. In cases where rare books or cruise reports are involved, *COPEPOD* is willing to carefully ship, digitize, and then return the articles in a fast and safe manner. Additional information on contributing data to *COPEPOD* is available on the web site, or by contacting the project leader: ***Todd.OBrien@noaa.gov***

All available information on the responsible investigators, projects, and institutions is stored within each record of the database. *COPEPOD* also features search and summary reports by contributing project or institute, and an investigator "Hall of Fame" which lists the names of those responsible for collecting or contributing plankton data within the database.

COPEPOD is available online at:
http://www.st.nmfs.noaa.gov/plankton

— Todd O'Brien
Marine Ecosystems Division
National Marine Fisheries Service
Silver Spring, Maryland, U.S.A.

ISO 15 in sight!

The organizing team would like to invite you to the **15th International Symposium on Ostracoda**, which will take place September 12-15, 2005 in Berlin!

The ISO is held once every four years and has a tradition of over 40 years. Shizuoka, Japan, hosted the last ISO in 2001 with 137 participants from 28 countries. A modern, multidisciplinary research topic like ostracodology crucially depends on immediate and constant exchange of information between (ostracod) researchers from different fields of expertise. We therefore hope to contribute to a better understanding and to give a platform for the initiation of fruitful cooperations, according to the motto of ISO 15: **Ostracodology - Linking Bio- and Geosciences**.

Topics of **ISO 15** will be:

- Biodiversity, systematics and evolution
- Experimental morphology
- Morphometric methods
- Genetics and molecular biology
- The first ostracods in earth history
- Ecology and palaeoecology
- Recent environmental change
- Isotopic and trace element analysis
- Stratigraphy and exploration

Apart from the main scientific program, we also offer five field trips with both ecological and stratigraphical content and a mid-symposium excursion with scientific and cultural program.

The abstract volume and field trip guide will be published in the "Berliner Paläobiologische Abhandlungen"; the conference proceedings will form special volumes of "Hydrobiologia", "Palaeogeography, Palaeoclimatology, Palaeoecology" and "Marine Micropalaeontology".

Ostracodologists traditionally welcome any kind of interdisciplinary cooperation and would therefore appreciate meeting YOU next September in Berlin!
If you are interested, just do a little extra-surf to our webpage, where you can find all useful details:
www.palaeo.de/iso15

See you next year in Berlin, the young and exciting German capital!

The organizing team
Michael Schudack, Steffen Mieschke, Ulla Schudack, Benjamin Sames (all Berlin), Peter Frenzel (Rostock), Renate Matzke-Karasz (Munich) and Finn Viehberg (Greifswald).

Glossary of Crustacean Terminology

Dr. Joel (Jody) Martin, Curator of Crustacea at the Natural History Museum of Los Angeles County, and his staff and students are compiling a glossary of crustacean morphological terms. The glossary consists not of original definitions but of definitions compiled from existing (published) glossaries, with the appropriate reference(s) cited. Although they are not close to being finished with the glossary – there are many more entries to add and a scattering of errors to be corrected – it consists currently of some 50 pages of crustacean terms and their definitions, making it the largest single source of crustacean terminology. Thus, while it is being prepared it may be of some use, especially to beginning students of carcinology, so the Los Angeles team has made the work-in-progress available via the web. The working draft of the glossary can be found at:

http://crustacea.nhm.org/glossary/

and can be cited as:

Martin, J. W. 2004 and ongoing. Glossary of Crustacean Terminology. http://crustacea.nhm.org/glossary/

– Jody Martin
Natural History Museum of Los Angeles County
California, U.S.A.

Images of Arctic Ocean Pelagic Organisms

I'm beginning to post some useful pictures of copepods (and other organisms) at the following site:
http://www.sfos.uaf.edu/research/arcdiv/watercolumn/index.html

Over time new species will be added, and the information will be expanded to include more background, distribution, and natural history.

Submissions to the site are welcomed.

– Russ
Dr. Russell R. Hopcroft
Institute of Marine Science
University of Alaska Fairbanks
Fairbanks, AK 99775-7220, U.S.A.
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New Books and Websites: Reviews

Footprints in the Sea: Tales of a Marine Biologist
By Viv Gotto
2004, 127 pp., illustrated, paperbound. Ballyhay Books, Laurel Cottage Ltd, Donaghadee, Northern Ireland. ISBN 1 900935384. £7.99

In this compactly written book, Viv Gotto ranges widely and entertainingly over his career – his research on copepods and other experiences of academic life, most of the time accompanied by his wife Gwyneth – and his many avocations including tennis (to Wimbledon and Davis Cup standards). From his time as a student and lecturer at Queen's College, through World War II including a ten-month posting in the Cocos Keeling Islands, and back to Queen's, he conveys his grand enthusiasm for new experiences, returning again and again to some fascinating and often astonishing nugget of information on one or another of the many copepod symbiotics of marine invertebrates that he has studied.

The first chapter introduces us to the highly transformed tunicate associate *Mychophilus roseus* Sars – "the little red sausage." Viv's encounter with these brilliantly colored animals, his hunt through the taxonomic literature – like all of us, basically by looking at the pictures – and his subsequent discovery that nearly nothing was known of its biology, led to a permanent fascination with commensal and parasitic copepods. Many of the species that he and his students have studied are introduced in the next-to-last chapter on "The Problem Solvers: A World of Houdinis." Their complex, bizarre and often elegant physical and biological adaptations are described simply but precisely. Viv's stories give us an honest picture of the role of chance, good luck, and decades-long persistence in helping the investigators to elucidate these relationships.

Former WAC President Ju-shey Ho devoted his Monoculus Lecture at the Curitiba Conference to the need for interesting more students in the study of parasitic copepods. Like their subjects, specialists in this field hold fast to their life objective, and tend to be colorful characters leading complex and fascinating lives. Viv Gotto's stories tell us what makes these animals so much fun to study.

– Jan Reid

Copepods in Aquaculture

Edited by Cheng-Sheng Lee, Patricia O'Bryen and Nancy Marcus
Expected Publication Date: May 15, 2005
352 pp. Blackwell Publishing.

The 18 articles in this forthcoming volume contain the proceedings of the workshop on the **Culture of Copepods and Applications to Marine Finfish Larval Rearing**, which was sponsored by the Oceanic Institute of Hawai'i and held at the University of Hawai'i in May 2003. See the review of the workshop by Ju-shey Ho in *MONOCULUS* Number 45.

From the publisher: "Originating out of a workshop held on copepods by the Oceanic Institute in Hawaii, this proceedings includes review articles and papers presented by leading international experts in copepod biology and aquaculture. It is a seminal work that integrates the most up-to-date information on selecting copepod species, effects of algal species on reproduction, ways to increase production, the nutritional value of copepods, behavioral characteristics of copepods, potential use of copepod nauplii and eggs, and their application to larval rearing of various marine finfish species."

The list of chapter titles and ordering information are available on the publisher's website: http://store.blackwell-professional.com/0813800668.html

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Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish

By Susan M. Bower & Sharon E. McGladdery
2003. URL: http://www-sci.pac.dfo-mpo.gc.ca/shelldis/title_e.htm

This useful website gives extensive information on diseases and parasites of shellfish that are of commercial use in Canada. For every shellfish species, a separate chapter on each disease or parasitic organism is provided. For every species, the common name of the organism or disease agent, the scientific name or taxonomic affiliation, geographical distribution, known host species, the impact on the host, diagnostic techniques, methods of control, and basic references, which in some cases are very ample. There are helpful illustrations in some cases.

Each disease is placed into categories, according to whether the disease itself, or the host, is present in Canada; the extent of their geographical distribution; and the degree to which the disease causes significant pathology to Canadian shellfish. This information is helpful to local authorities dealing with restricting imports into Canada, or controlling movement within Canada.

The information on this website was originally posted in 1994, and was derived from Bower et al. (1994a). Now and then, chapters are revised, most lately by Bower (2004). The chapters have individual URLs. For some reason, these addresses cannot be located through my antique Netscape browser, but only via Microsoft Explorer. The references for the chapters on copepods follow.

Bower, S.M. 1996a. Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish: *Mytilicola orientalis* (Red Worm) of Mussels. URL: http://www-sci.pac.dfo-mpo.gc.ca/shelldis/pages/morwmu_e.htm
Date last revised: Sept. 18, 1996

Bower, S.M. 1996b. Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish: Parasitic Copepods on Lobsters. URL: http://www-sci.pac.dfo-mpo.gc.ca/shelldis/pages/parcoplo_e.htm
Date last revised: Sept. 18, 1996

Bower, S.M. 2001a. Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish: *Mytilicola intestinalis* (Red Worm Disease) of Mussels. URL: http://www-sci.pac.dfo-mpo.gc.ca/shelldis/pages/mirwdmu_e.htm
Date last revised: June 22, 2001.

Bower, S.M. 2001b. Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish: Parasitic Copepods on Mussel Gills.URL: http://www-sci.pac.dfo-mpo.gc.ca/shelldis/pages/pcgmu_e.htm
Date last revised: June 17, 2001

Bower, S.M. 2002a. Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish: *Mytilicola orientalis* (Red Worm) of Oysters. URL: http://www-sci.pac.dfo-mpo.gc.ca/shelldis/pages/morwoy_e.htm.
Date last revised: March 6, 2002.

Bower, S.M. 2002b. Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish: Parasitic Copepods on Oyster Gills. URL: http://www-sci.pac.dfo-mpo.gc.ca/shelldis/pages/pcgoy_e.htm
Date last revised: April 2, 2002.

Bower, S.M. 2004. Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish: *Mytilicola orientalis* (Red Worm) of Clams and Cockles. URL: http://www-sci.pac.dfo-mpo.gc.ca/shelldis/pages/mytoricc_e.htm
Date last revised: May 25, 2004.

Bower, S.M., S.E. McGladdery & I.M. Price. 1994a. Synopsis of infectious diseases and parasites of commercially exploited shellfish. Annual Review of Fish Diseases 4:1-199.

Bower, S.M., S.E. McGladdery & I.M. Price. 1994b. Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish: *Mytilicola porrecta* (Red Worm) of Mussels. URL: http://www-sci.pac.dfo-mpo.gc.ca/shelldis/pages/mprwmu_e.htm

Date last revised: Fall 1994.
Bower, S.M., S.E. McGladdery & I.M. Price. 1994c. Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish: *Mytilicola* intestinalis (Red Worm Disease) of Clams and Cockles. URL: http://www-sci.pac.dfo-mpo.gc.ca/shelldis/pages/mytintcc_e.htm
Date last revised: Fall 1994
Bower, S.M., S.E. McGladdery & I.M. Price. 1994d. Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish: Brood-pouch Copepod of Scallop Gills. URL: http://www-sci.pac.dfo-mpo.gc.ca/shelldis/pages/bpcsc_e.htm
Date last revised: Fall 1994

— Jan Reid

An Image-Based Key to the Zooplankton of the Northeast (USA): Version 2.0 http://cfb.unh.edu/CFBkey/index.html

By Jim Haney and Colleagues, Center for Freshwater Biology, University of New Hampshire, Durham, NH

Hi Janet,

Just wanted to let you know that we have been working for the past year on a new version of our zooplankton key, An Image-based Key to the Zooplankton of the Northeast (USA), and plan to unveil it on October 1st (with champagne, of course). The new version (Version 2.0) has a much expanded coverage of both calanoid (15 species) and cyclopoid (13 species) copepods as well as a fairly complete section on the rotifers (70 species), thanks to contributions by Rich Stemberger. Other sections have also been revised and enlarged.

Version 2.0 is in a new HTML format and also includes some visual surprises. Anyone interested in receiving a copy of this key should visit our UNH Center for Freshwater Biology website (cfb.unh.edu) for details. You are welcome to include mention of the key in your newsletter, if you think it might be of interest to the readership.

Best wishes,
Jim Haney
Professor and Chair
Department of Zoology
University of New Hampshire

New or Updated Addresses

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Editor's Notes

For their contributions and assistance for this number, I am grateful to Geoff Boxshall, Mohamed Néjib Daly Yahia, Herbert Fernando, Peter Frenzel, Samuel Gómez, Jim Haney, Russ Hopcroft, Süphan Karaytug, Jody Martin, Pedro Martínez-Arbizu, Renate Matzke-Karasz, Silvina Menu-Marque, Todd O'Brien, Alberto Pilati, Adelaide Rhodes, Richard Steinhauer, Sami Souissi, Rudi Strickler, Chad Walter, and Iris Werner. Marilyn Schotte let me know about Richard Steinhauer's graceful poem. At short notice, David Damkaer interrupted work on the second volume of his history of copepodologists to research and compose the articles in memory of Robert Pennak and Pennak's former student, Patricia Dudley.

Members of the WAC may advise me if they wish to receive the Literature Supplement as an e-mail attachment.

— Jan Reid, Editor
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