ROTIFER NEWS

A newsletter for rotiferologists throughout the world

Issue 26: July-August 1995

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PRODUCED AT The Murray-Darling Freshwater Research Centre

ROTIFER NEWS

Rotifer News is a newsletter for professional and amateur investigators of the Rotifera. The newsletter is not part of the refereed scientific literature (e.g. *Limnol. Oceanogr.*, *Freshw. Biol.*, *Oecologia* etc) and should not be so cited. It is a means of informal communication between widely dispersed workers with a common interest, where news, abstracts, work in progress, requests, recent publications and so on can be advertised or circulated.

Rotifer News is produced at The Murray Darling Freshwater Research Centre once or twice a year, depending on contributions from readers and regional editors. Regional editors are listed below. Back issues of the newsletter are available from Bob Wallace or Russ Shiel on request. Assistance with production and mailing cost is always appreciated!

If you know of anyone who may wish to receive *Rotifer News* who is not presently on the mailing list, please pass on their address to the nearest regional editor

* * * * * *

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The cover: Giulio Melone's prize winning SEM (Stereoscan Micrograph Awards) "Rotatory apparatus of *Epiphanes senta*: group of cilia used to collect food"

Editorial

The editor reports that not much has come in from you, the readers. The few regulars who have contributed or commented get a mention in the Newsn'Views. Ros Pontin sent a clipping from *The Sunday Telegraph* in the U.K., which prompted me to contact the author, Matt Ridley. He kindly responded, and courtesy of Mr Ridley and *The Sunday Telegraph*, most of his article extolling the virtues of bdelloids is reproduced in this issue (see Claudia - more people are aware of belloids than we thought!!).

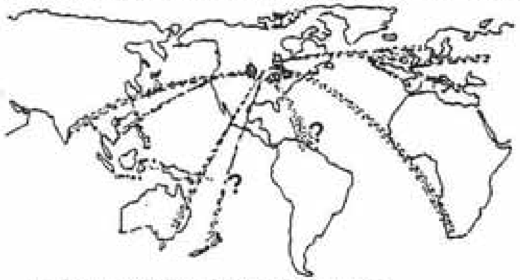
The attempt by Bob Wallace and I to get a bionet.rotifera newsgroup up and running failed through lack of support (see later), which was a disappointment. The proposed newsgroup wouldn't have made much difference to the regular users of e-mail who contact each other directly, but it would have brought in more 'outsiders' who may not yet be aware of our group activites, of our newsletter, or the wealth of information which resides with the global community of rotifer workers. Shall we try again?

Finally, I call again for support for the newsletter, both in the form of contributions to the news, articles, what's happening in your part of the world, and also subscriptions. If you haven't contributed to the upkeep of the newsletter and are able to do so, it's only $US5 an issue, or $US10 a year. If you can't send money, equivalent barter value is accepted - stamps, lots of small vials of rotifers, anything legally sent through the mail....within reason!!........Back issues are available on request for the cost of the issue plus postage, or for some depleted issues, plus photocopying - around $US3-4/issue generally covers costs. Keep rotifers in the news!

Russ Shiel

Rotifer VIII - Minnesota 1997

Summer (northern hemisphere) 1997 is the time, Collegeville, Minnesota is the place, Liz Wurdak is organizing....watch this space for details..........



Lesser-crested rotiferologists migratory habits, circa 1997
? = doubtful migratory route, although known to exist at origin

No sex please, we're bdelloids!

The following article appeared on July 16, 1995 in *The Sunday Telegraph* (U.K.), was spotted that very day by John Pontin, was snipped out by the indomitable Ros, who mailed it to your far south editor, who phoned the Sunday Telegraph to check copyright....surprise, a fax from the author himself!.....so, with thanks, consecutively to Mr Ridley, *The Sunday Telegraph* and the ever watchful Pontins, here is the Ros-annotated, Russ-edited article, itself exerpted from *The Red Queen* © Matt Ridley (1994: Penguin Books), originally titled:

"What a life! No sex but lots of food and sleep"

Ros: One Sunday my husband drew my attention to this provocative title of an article in our Sunday newspaper, *The Sunday Telegraph*. The article was one of a regular series written by Matt Ridley under the main heading of *Down to Earth*, covering topics in conservation, natural history etc. This time the article was about rotifers - and not only any old rotifers, but - of course, you've guessed - about bdelloid rotifers. Fame at last! I hope Mr Ridley will approve if I tell you about his excellent article and quote extensively from it.

First he describes his subjects and their amazing talents -

> I want you to imagine that you are a small animal called a bdelloid rotifer, known in the vernacular as a Snark. [*Ed: he made this up!*] Although a *bona fide* animal, you are very small: several of you can dance upon the head of a pin. Your life is a strange alteration between busy greed and sublime sleep. Your preferred habitat is a gutter, a roadside puddle, a bird-bath or a small pond - anywhere, in fact, that regularly dries up.
>
> ......*[snip]*......
>
> There comes a time when the puddle dries up and many of the creatures in it die. But not the bdelloid rotifers, for whom this is the cue for sleep. They have perfected the art of desiccation. Folding away their paddle wheels, reorganizing their organs and shutting down their functions, they simply let their tissues dry out.

Ros: and some of their consequences -

> At this they are champions, capable of enduring a lack of water that would kill bacteria or other animals. A dried-out rotifer is called a tun and it is, to all intents and purposes, a speck of dust.
>
> Tuns are picked up by the wind and scattered across the globe. Rotifer tuns travel regularly across the Atlantic - genetically identical strains have been found in Africa and North America. They perfected intercontinental travel long before birds or aeroplanes were even thought upon.
>
> ...*[snip]*...
>
> As if by magic, they revive as soon as they get wet again and begin their brainless population explosion afresh.

Ros: I have to confess that I did not know that a dried-up rotifer was called a *tun*. I always thought that a *tun* was a barrel for beer. Perhaps I am getting confused with happenings at the last Rotifer Symposium! It used to be quite common in England to see *The Three Tuns* as the name of a pub and I took this to mean *The Three Barrels*. But now I realise that it actually means *The Three Rotifers!*

Now Mr Ridley comes to the heart of the matter -

> The desiccated tun is now, it transpires, a vital clue in a theory about the evolution of sex...For bdelloid rotifers never have sex at all, and according to genetic estimates probably have not had it for 60 million years, a period of abstinence that would shame even St Augustine.
>
> Sex, according to the Red Queen theory, is necessary for disease resistance, because it enables you and your descendants to change the genetic locks, foiling the bacterial burglars. The fact that rotifers get along without it is therefore, to quote the words of one biologist, "an evolutionary scandal".
>
> Or was, until very recently. It now transpires that because the tun is too dry for bacteria, and light enough to blow around the globe, rotifers can keep one step ahead of bacteria. Each new pond they blow into has a foreign strain of disease in it. By the time the disease has found out how to attack the new arrivals, they have dried up and blown on.

Ros: How about that then? Brainless but cunning! But this theory does not explain for me why populations of apparently the same rotifer persist in the same bird bath or pool over long periods, drying out and reappearing with circumstances. Or perhaps we should assume that each outburst of, say, *Rotaria citrina*, is a different strain blown in from elsewhere. Any thoughts on the subject, anyone? Claudia?

In the meantime - thanks, Mr Ridley, for giving rotifers a rare moment of newsworthiness - and I'll see you all at the sign of *The Three Rotifers*!

Ros Pontin

e-mail addresses

The global rotifer community is...s l o o o w l y...being connected to the Internet. The following list of addresses are those which have been provided by the addressees, or gleaned from other 'netters'. If you are connected to the net and your address isn't here, please let one of the regional editors know, or preferably direct to the address below. If your address is incorrect here, let me know by e-mail: <<shielr@mdfrc.canberra.edu.au>>.

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Newsn'Views

International Training Course held at Gent

[**Ed:** Nandini Iyer has written a participant's view of the Int. training course:]

...for *Rotifer News* I thought it might be interesting to tell you how this "International Training Course on Lake Zooplankton - A tool in Lake Management" at Prof. Dumont's laboratory has been.

To begin with, we all arrived at Gent in the first week of October. There were 10 of us ; one each from Laos, Cambodia, Thailand, Phillipines, India, Ethiopia, Burundi, Tanzania, and Suriname. All the participants had different backgrounds in terms of experience, but had a basic interest in zooplankton. Notwithstanding the title of the course, the emphasis during it was essentially on zooplankton identification and taxonomy, mainly that of Rotifera, Cladocera, and Copepoda. Hendrik began with the rotifers, first by introducing the different families and then teaching us how to identify the species by observing the trophi and using appropriate keys. Dr. N. Korovchinsky, from Moscow, dealt with each family of the cladocera in detail. Sibylle Maas taught us Copepoda identification with more emphasis on cyclopoids. For each group we had approximately five weeks of theory and practical exercises during which we identified the organisms from the samples we had brought from our respective countries. At the end of the course we prepared a small report highlighting our findings during the study.

In addition to the daily classes, we visited several places of general interest such as the Antwerp Zoo, Science Exhibitions in Brussels, a fish farm using recycled water from a nuclear power plant in Tihange (in southern part of Belgium) and NIOO in Nieuwersluis, The Netherlands. We also had several lectures dealing with ecological aspects of zooplankton study such as culture techniques, competition, vertical migration and biomanipulation. Just to dispel the notion that the course was 'all work and no play', I would like to tell you about all the parties we had. Apart from birthdays (when they were a must!) and a farewell party for Dr. Korovchinsky, we had them at any time we felt like it! They were great fun since we all cooked our respective 'delicacies' together. And we also had our share of squabbles too (within the group, of course!).

The course was quite a success, since many participants began by learning to identify what a rotifer, cladoceran, or copepod looks like and went on to make exhaustive lists of species in their samples. It was also a wonderful oppurtunity to meet people from so many different nationalities, most of whom will continue to work in this field in their country. It is obvious that if such courses are held in more laboratories all over the world, on a national or international level, many people can begin with a good background in zooplankton identification, which, in turn , would result in more reliable ecological studies.

Nandini Iyer

Book Review

Rotifera, Volume 1. "Biology, Ecology and Systematics" by Thomas Nogrady, Robert L. Wallace and Terry W. Snell (SPB Academic Publishing BV, 1993, The Hague

The Rotifera Volume 1 is the first in the Section on Rotifera planned to be published as "Guides to the Identification of Microinvertebrates of the Continental Waters of the World", with Dr Henri Dumont as the coordinating Editor for the entire series. The Section on Rotifera has Dr Nogrady as editor (also editor of Rotifera Vol. I). The Rotifera Volume 1 with its 140 pages has the size smaller than a Penguin book but the character of a mini text book. The first six of the twelve chapters describe in nutshell the state-of-art in the field of rotifer science; they deal, respectively, with a general introduction, collecting, culturing and preserving, morphology and internal organization, physiology, population ecology and community ecology. The chapters 7-10 describe very briefly the state of our knowledge of the evolution, systematics and taxonomy, classification and identification, respectively, of rotifers. The chapter 11 is a fascinating retrospect: an attempt- and a very successful at that- to trace into the history of rotifer research and the developments starting with the works of Anthony van Leeuwenhoek (1632-1723) and to link these to research perspective to date. The editors have undoubtedly greatly benefited from a recent paper by Koste & Hollowday published in the Rotifer Symposium VI as well as from personal collections and enthusiastic help of these authors and Ruttner-Kolinsko and Birger-Pejler for photos/portraits of the legendary rotiferologist.

In the second chapter one is convinced that despite all the developments, many a time tips rather than techniques are a key to successful culturing of rotifers, especially if one does not need axenic cultures. In aquaculture it is possible to harvest kilogram quantities of rotifer biomass. Clearly skill rather than sophistication plays a more important role in fixing rotifers: hot-water fixation is apparently still one of the better known techniques to fix rotifers, though several reagents are now in use to fix animals. The problem of anaesthetizing rotifers in extended state, especially illoricate rotifers (e.g. bdelloids and collothecids) is still unsolved. Rotifer body size being sometimes as small as 40 µm, use of scanning electron- microscopy (e.g. Clement and coworkers) has revolutionized studies on ultra structure. Such tools combined with biochemical techniques will unravel if multiple species are disguised as taxon. There is also progress in the fields of neurobiochemistry and neuropharmacology, based mainly on the studies of Nogrady. There is probably still a long way to go before we get a good insight into the evolutionary affinities of the rotifers. Though, as for micro-crustacean feeding, our knowledge of nutritive value of food is still very inadequate, rotifer mass-culturists have contributed to our knowledge of role of fatty acids composition of food. We still do not know, however, how stored lipids are used during food limitation and reproduction. Some recent data (Guisande and Serrano, Chapter 5) show that carbohydrate are the major form of storage in rotifers since lipid content is more constant irrespective of the development stage. Argument of Wallace (Chapter 4) that anisotropic objects found in rotifer embryos of several monogonont rotifers serves as an energy source during the post embryonic development is appealing but needs corroboration. Study of pollutant effects on rotifers and use of rotifer as sentinel species are some interesting new applications in environmental toxicology briefly mentioned in chapter 4 on physiology. This chapter ends with a brief but interesting note on aging and senescence that lifespan of rotifers can be markedly extended by preventing accumulation of intracellular calcium. This strengthen the evidence in favour of linking the two important aging theories: the "Free Radical Theory" and the "Ca Theory". Physico-chemical factors, food acquisition, including those of the sessile rotifers, and population dynamics form the basis of chapter 5 (Population Ecology). The impression one gets is that irrespective of what the food menu of a rotifer is, the way a rotifer encounters and processes food is a more fascinating areas of future research than determining clearance rates alone. The mechanism by which rotifers can regulate their food uptake is the subject of several papers in the last two decades. Here, the book succeeds in arousing the reader's inquisitiveness to read the numerous references cited, in which the works of Gilbert and co-workers form an impressive big share. Recent works on genetic variation among rotifer populations has added a new facet to studies on population dynamics. Cross mating experiments and electrophoretic analysis of protein variation show succession of distinct genetic populations - triggered possibly by ecological factors. Studies on genetic divergence and chromosomes determination are likely to make rapid headway. That "rotifer biogeography actually reflects the geographic distribution of rotifer researchers" very aptly summarises our present status of our knowledge on this aspect.

As regards the role of rotifers in community ecology, the evidence gathered hitherto suggests that in oligo-mesotrophic lakes they may be an important link in the microbial food-web, consuming 25- 30 % of the bacterial production. Besides, under certain conditions rotifers may be important competitors to cladoceran filter-feeders. They may also contribute importantly to recycling of nutrients in lake ecosystems.

The book contains an impressive list of some 545 references relating to rotifer research, roughly 90 % of which originated in last eighteen years (1975-1993) -the period which also marks the development to a near-adulthood of this family of rotiferologist. The six, triennial international rotifer symposia held in this period have aroused great interest and led to intensive contacts among the members of this rotifer family. A word of critique is that a rotifer caricature was conspicuous by it absence on the front page of this mini-book. I am certain this is more an omission than an error; the editors probably have realized this for the volumes in offing. Some more information on the inside of the cover page of these "Guides" about volumes already published, under preparation or planned for near future is needed. This will remove some puzzlement the Rotifera Vol. 1 caused to me at the outset. In short, the book is a very useful starter to those that will follow in near future, as indicated by the editors in the Preface. I have a conviction that both the elite in International "Rotifer family" and those wanting to glance through the state-of-art in the field of rotifer ecology, will welcome this book alike.

Ramesh D. Gulati

Report on a Recent Zooplankton Symposium

A Symposium on the Sensory Ecology and Physiology of Zooplankton was held January 8-12, 1995 in Honolulu, Hawaii., sponsored by the US Office of Naval Research and the University of Hawaii Sea Grant program. It brought approximately 100 zooplankton biologists together to discuss their work in this rapidly expanding field. Most were from the USA, but there also were European as well as Japanese representatives. The animals discussed were primarily crustaceans - crabs, lobster, copepods and daphnids. There was a smattering of work on corals, oysters, pteropods, and jellyfish and, of course, rotifers.

Rotifers were ably represented by Peter Starkweather who gave a good summary of their sensory potential with regard to feeding. He described how mechano- and chemosensory modalities are used to discriminate prey using receptors primarily on cilila of the corona. The electron microscopy of Pierre Clement was frequently utilized to illustrate the anatomical features of these sensors. Peter described the role of fluid flow in determining sensory reception, and how behavioral responses occur in and are constrained by laminar, viscous fluid flows.

Terry Snell and Roberto Rico-Martinez described mate recognition in *Brachionus plicatilis* and the role of glycoproteins on the surface of females. They described the species-specificity of these signals as determined by male mating bioassays and the biochemical aspects the glycoprotein signal. The glycoprotein is glycosylated with mannose, glucose, N-acetylglucosamine, N-acetylgalactosamine, and fucose in nanomolar ratios of 64, 23, 2, 1, 1, respectively. A polyclonal antibody against the mate recognition glycoprotein was shown to bind to several strains of *B. plicatilis* and *B. rotundiformis*.

It was clear from this meeting that rotifers are making an important contribution to the sensory ecology of zooplankton, and in the case of mate recognition signals, may be leading the way.

Terry Snell

Announcement

Symposium on Live Food Organisms
& Environmental Control for
Larviculture of Marine Animals

Dates: September 1-4, 1996
Place: Nagasaki University, Japan
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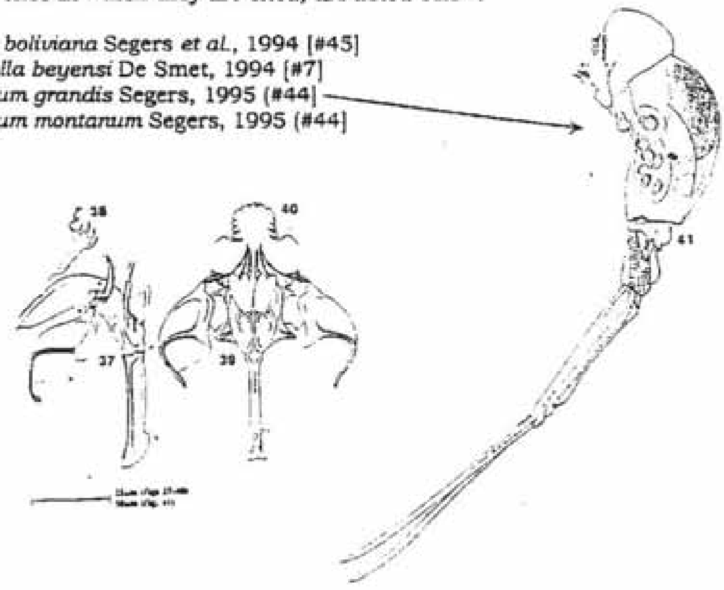
New taxa reported

New rotifers described since the last issue of the newsletter, and the refence in which they are cited, are listed below:

Lecane boliviana Segers *et al.*, 1994 [#45]
Lepadella beyensi De Smet, 1994 [#7]
Scaridium grandis Segers, 1995 [#44]
Scaridium montanum Segers, 1995 [#44]



Updated Bibliography

Ed. note: To maintain a comprehensive list of recent publications - authors should remember to pass on copies, or at least publication details, to one of the regional editors, or directly to Russ Shiel at MDFRC. In the list below, only the address for reprints is included. Every effort has been made to include a summary, however some lists sent by authors did not contain summaries, so these papers remain unseen. Some papers include keywords in lieu of a summary. The major subject areas in each citation are categorized below - many papers include several topics.

Aquaculture: 1, 11, 17, 25, 27, 33, 59, 66;

Anatomy/Biochemistry/Genetics/Pharmacology/Physiology/Reproduction: 12, 23, 30, 41, 52, 53;

Biogeography/taxonomy: 7, 13, 21, 24, 28, 29, 30, 31, 39, 45, 46, 47, 48, 49, 54;

Biomanipulation/Eutrophication/Perturbation/Water quality: 19, 22, 26, 42, 43, 51, 55, 57, 64, 65;

Ecology/Population dynamics/Food webs: 2, 3, 5, 6, 8, 9, 10, 11, 14, 18, 19, 20, 31, 34, 35, 37, 38, 40, 42, 44, 50, 51, 56, 57, 58, 60, 61, 62, 63, 64, 65;

Toxicology: 4, 15, 16, 32, 36, 51, 53;

1. **AOKI, S., J. KANDA & A. HINO, 1995.** Measurements of the nitrogen budget in the rotifer *Brachionus plicatilis* by using ^{15}N. *Fish. Sci.* **61**, 406-410. <<Univ Tokyo, Fac Agr, Fisheries Lab., Shizuoka 43102, Japan.>> Using *Nannochloropsis oculate* and a ^{15}N tracer technique, the turnover time between egestion and excretion was measured. Approx. 80% of the ingested nitrogen was egested into the culture medium and about 80% of the assimilated nitrogen was utilized for reproduction. The turnover time of egestion and excretion were about 20 min and 2.5 h, respectively. The obtained short turnover time for excretion is consistent with the hypothesis that assimilated nitrogen is used immediately and primarily for reproduction and the excess is stored in body tissue when food is abundant.

2. **BERTILSSON, J., B. BERZINS & B. PEJLER, 1995.** Occurrence of limnic micro-crustaceans in relation to temperature and oxygen. *Hydrobiologia* **299**, 163-167. <<Univ Uppsala, Inst Limnol, Norbyvagen 20, S-75236 Uppsala, Sweden.>> Information on the distribution of 56 micro-crustaceans from different types of waters in south and central Sweden was analyzed to reveal their relationships to temperature and oxygen content. A very wide tolerance for variation was found for most species.

3. **BRETT, M.T., K. WIACKOWSKI, F.S. LUBNOW, A. MUELLER-SOLGER, J.J. ELSER & C.R. GOLDMAN, 1994.** Species-dependent effects of zooplankton on planktonic ecosystem processes in Castle Lake, California. *Ecology* **75**, 2243-2254. <<Univ. Calif. Davis, Div. Environm. Studies, Davis, CA 95616 USA.>> Our results suggest differences in the grazing effects of common freshwater zooplankton can be pronounced and indicate that both seasonal succession and long-term shifts in the zooplankton community structure should have marked effects on microzooplankton competitors and prey, the phytoplankton, and nutrient cycling. The raptorial cyclopoid copepod *Diacyclops* was apparently exclusively predaceous as it decimated the ciliate and rotifer microzooplankton, but had no notable effect on the other measured parameters relative to zooplankton-free controls.

4. **CHAROY, C.P., C.R. JANSSEN, G. PERSOONE & P. CLEMENT, 1995.** The swimming behaviour of *Brachionus calyciflorus* (rotifer) under toxic stress.1. The use of automated trajectometry for determining sublethal effects of chemicals. *Aquatic Toxicology* **32**, 271-282. <<Univ Lyon 1, Trajectometrie Comportements, & Connaissances Lab, Bat 403, 43 Blvd 11 Novembre 1918, F-69622 Villeurbanne, France.>> The swimming speed (temporal factor), the swimming sinuosity (spatial factor), and the periods of swimming were measured and the influence of four chemicals, each representing a distinct chemical class (copper, pentachlorophenol, lindane and 3,4-dichloroaniline), on the rotifer's swimming characteristics were examined. The three test parameters exhibit different sensitivities depending on the chemical tested. The 2-h EC(50)s obtained with the behavioural test were of the same order of magnitude as the 24-h LC(50)s resulting from conventional acute toxicity tests with the same test species. This potential use of behavioural test criteria for sublethal toxicity testing with rotifers is discussed.

5. **CONDE-PORCUNA, J.M. & S.S.S. SARMA. 1995.** Prey selection by *Asplanchna girodi* (Rotifera): The importance of prey defence mechanisms. *Freshwater Biology* **33**, 341-348. <<State Univ. Ghent, Anim. Ecol. Lab., Kl Ledeganckstr. 35, B-9000 Ghent, Belgium.>> The clearance rates of *A. girodi*, which selectively fed on *Keratella cochlearis*, decreased with increasing prey density. Predator density had no effect on the feeding of *A. girodi*. Short-spined prey (spine length less than 25 µm) showed a significantly higher susceptibility to predation than either the non-spined or the long-spined forms. Large *Asplanchna* fed selectively on reproductive females of *K. cochlearis*, thereby reducing the fecundity of their prey.

6. **DEB, D. 1995.** Scale-dependence of food web structures: tropical ponds as paradigm. *Oikos* **72**, 245-262. <<World Wide Fund Nat., India E Reg. Off., Tata Ctr 5TH Floor, 43 Chowringhee Rd, Calcutta 700071, India.>> Planktonic rotifers were among 87 component species found in two tropical freshwater pond systems. Analysis of interactions showed that several food web statistics were scale-dependent. 11,500 computerized analog webs were built, representing the largest tropical aquatic food web database. Results indicate that (a) as many details of inter-specific interactions as possible within a web are necessary for unravelling the actual complexity of real ecosystems, and (b) computerized analogs of real webs, incorporating all necessary details of interactions, may be used to ensure robustness of conclusions about the web features.

7. **DE SMET, W.H. 1994.** *Lepadella beyensi* (Rotifera Monogononta, Colurellidae), a new species from the Canadian High Arctic. *Hydrobiologia* **294**, 61-63. <<Univ Antwerp, Dept Biol., RUCA Campus, Groenenborgerlaan 171, B-2020 Antwerp,

Belgium.>> A new species of *Lepadella* was discovered during an investigation of the Rotifera of freshwater ponds in Cambridge Bay, Victoria Island, N.W.T., Canada. A description of the new species is given.

8. **DOHET, A. & L. HOFFMANN, 1995.** Seasonal succession and spatial distribution of the zooplankton community in the reservoir of Esch-sur-Sure (Luxembourg). *Belg. J. Zool.* **125**, 109-123. <<Ctr Univ, CRP, Ave La Faiencerie, L-1511 Luxembourg, Luxembourg.>> During 1990-93 the zooplankton community (75 taxa, dominated by rotifers) had the same species succession during the three years, shifting from rotifers in early spring to small-bodied cladocerans (*Bosmina* spp.), and, finally, to larger cladocerans (*Daphnia* spp.) in early summer. Shifts in zooplankton composition have also frequently been observed in midsummer, when the cladoceran assemblage of *Daphnia-Bosmina* was generally replaced by a combination of *Ceriodaphnia-Diaphanosoma*. These species successions are discussed in relation to size-selective predation.

9. **DUMONT, H.J. & S.S.S. SARMA, 1995.** Demography and population growth of *Asplanchna girodi* (Rotifera) as a function of prey (*Anuraeopsis fissa*) density. *Hydrobiologia* **306**, 97-107. <<State Univ. Ghent, Anim. Ecol. Lab., Kl Ledeganckstr 35, B-9000 Ghent, Belgium.>> A prey density of 100 ind ml(-1) per predator per day did not support *A. girodi*, while at the highest prey concentration, *A. girodi* reached a peak of 115+/-7 ind ml(-1). At the highest prey density, the rate of population increase (r) was 1.51 d(-1). The significance of estimating mortality in population growth studies is discussed. Life-table demography of *A. girodi* was studied using the same prey at the same concentrations. None of the survivorship parameters (e.g. mean lifespan and mean survivorship) showed a significant relation to prey density. Net reproductive rate and generation time (but not rate of population increase) were affected by prey abundance.

10. **DUMONT, H.J., S.S.S. SARMA & A.J. ALI, 1995.** Laboratory studies on the population dynamics of *Anuraeopsis fissa* (Rotifera) in relation to food density. *Freshw. Biol.* **33**, 39-46. <<address above.>> Population growth went through a phase of exponential increase which lasted from 7 to 10 days before a plateau and, in some cases, a decrease occurred. There was a linear relation between food density and rotifer plateau density. The egg ratio decreased with increasing population density. The ratio of loose eggs to eggs attached to females indicated that more eggs became detached at higher food densities. As in many other rotifer species studied so far, population density of *A. fissa* was less stable at higher algal food concentrations. Numerically, *A. fissa* could be grown at twice the density achieved in *Brachionus*.

11. **DUMONT, H.J., A.J. ALI, S.S.S. SARMA & J. MERTENS, 1994.** Predatory filter-feeding in fairy shrimps: functional response of *Streptocephalus proboscideus* (Crustacea: Anostraca) fed *Anuraeopsis fissa* (Rotifera). *Int. Rev. ges. Hydrobiol.* **79**, 511-519. <<address above.>> Regardless of predator size and sex, prey consumption was dependent on prey density. Functional response curves either plateaued or declined at 320 prey ml-1 in post-metanauplii, juveniles and adults I, and at 640 ml-1 in adults II. Females consumed c. 40% more prey than males. On a daily basis, adult II females consumed up to 1.05 mg rotifer dry

weight (10% of their own body weight) while post-metanauplii consumed up to 0.2 mg DW (100% of their body weight). Filtration rates indicated that a fully grown *S. proboscideus* may filter as much as 2 l of water per day, suggesting that fairy shrimps, in their natural environment, may often be food-limited.

12. **DUSENBERY, D.B. & T.W. SNELL, 1995.** A critical body size for use of pheromones in mate location. *J. Chem. Ecol.* **21**, 427-438. <<Georgia Inst. Technol., Sch. Biol., Atlanta, GA 30332 USA.>> Because chemoreception is the most universal sense, it has been assumed that pheromones also are important in aquatic organisms, including bacteria, but few have been found. The physical limits on effective strategies for organisms to come into contact for mating were modeled with assumptions appropriate for organisms less than a millimeter in size in an open aquatic environment. One sex was assumed to be motile, while the other sex was passive or devoted energy to locomotion or to diffusible pheromone production. Results suggest that pheromone production is very favorable for organisms much above the critical size, which appears to be between 0.2 and 5 mm in water. On the other hand, bacteria are probably too small to use diffusable pheromones for mate location; most protozoans and rotifers may also be too small.

13. **EMIR, N. 1994.** Zooplankton community structure of Cavuscu and Eber lakes in central Anatolia. *Acta Hydrochim. Hydrobiol.* **22**, 280-288. <<Hacettepe Univ, Fac Sci, Dept Biol Hydrobiol, Ankara 06532, Turkey.>> From Cavuscu lake totally 50 Rotifera, 2 Copepoda, and 7 Cladocera species; 49 phytoplankton genera and 5 macrophytes have been identified while, 37 Rotifera, 3 Copepoda, 5 Cladocera; 45 phytoplankton genera and 6 macrophytes have been identified from Eber lake. 13 new rotifer records for the Turkey were found, which were *Brachionus diversicornis, Macrochaetus collinsi, Lecane stichaeta, Cephalodella sterea, Cephalodella auriculata, Trichocerca iernis, Encentrum saundersiae, Pompholyx complanata, Floscularia ringens, Conochilus natans, Filinia pejleri, Rotaria rotatoria*, and *Philodina megalotrocha*.

14. **FELIX, A., M.E. STEVENS & R.L. WALLACE, 1995.** Unpalatability of a colonial rotifer, *Sinantherina socialis* to small zooplanktivorous fishes. *Invert. Biol.* **114**, 139-144. <<Ripon Coll, Dept Biol, Ripon, WI 54971 USA.>> Colonies of *Sinantherina socialis* form conspicuous masses that should make them extremely vulnerable to fishes capable of ingesting small live prey (<<3 mm in length). To test this hypothesis we offered rotifer colonies as prey to 14 species of small-mouthed, predatory fishes, alternating with small cladocerans. Most rotifer colonies (71-100%), but few cladocerans (0-14%) were rejected after capture. Fish feeding behavior on rotifers followed a consistent pattern: locate, approach, attack, mouth repeatedly, and reject (spit out). Except for loss of a few individuals, rotifer colonies that had been repeatedly rejected remained undamaged. This is the first evidence for unpalatability of rotifers to zooplanktivorous fishes.

15. **FERNANDEZ-CASALDERREY, A., M.D. FERRANDO & E. ANDREU-MOLINER, 1995.** Chronic toxicity of methylparathion to *Daphnia magna*: Effects on survival, reproduction, and growth. *Bull. Env. Contam. Toxicol.* **54**, 43-49. << Univ. Valencia, Fac. Biol. Sci., Dept Anim. Biol. Anim. Physiol., Ecotoxicol. Lab., Dr

Moliner 50, E-46100 Burjassot, Spain.>> K/W: rotifer, *Brachionus calyciflorus*, pesticides, pollutants, cadmium, tests.

16. FERRANDO, M.D. & E. ANDREU-MOLINER, 1992. Acute toxicity of toluene, hexane, xylene, and benzene to the rotifers *Brachionus calyciflorus* and *Brachionus plicatilis*. *Bull. Environ. Contam. Toxicol.* **49**, 266-271. The rotifers were found to be more tolerant to these hydrocarbons than most investigated aquatic invertebrates and fishes, with *B. plicatilis* more resistant than *B. calyciflorus*. K/W: pollution, oil, toxicology, rotifer, aromatics, hydrocarbons.

17. GATESOUPE, F.J. 1994. Lactic acid bacteria increase the resistance of turbot larvae, *Scophthalmus maximus*, against pathogenic *Vibrio*. *Aq. Living Resources* **7**, 277-282. <<Ifremer, INRA, Ctr Brest, Unite Mixte Nutr Poissons, F-29280 Plouzane, France.>> It was investigated whether the artificial maintenance of a high concentration of lactic acid bacteria (LAB) in rotifers might increase their dietary value for turbot larvae, particularly when the fish were infected with pathogenic *Vibrio* sp. One LAB strain isolated from *Brachionus plicatilis* was cultivated, then introduced daily into the enrichment medium of rotifers. In this way, LAB were retrieved in large amounts in turbot, and a significant limitation of larval mortality rate was observed when turbot were challenged with pathogenic vibrio at day 9. The inoculum concentration of LAB had a decisive effect on survival rate, and the optimum was between 10(7) and 2 x 10(7) Colony Forming Units (CFU) daily added per ml of the enrichment medium (53% survival rate after 72 h of challenge, versus 8% for the infected control group without LAB).

18. GAUDY, R., G. VERRIOPOULOS & G. CERVETTO, 1995. Space and time distribution of zooplankton in a Mediterranean lagoon (Etang de Berre). *Hydrobiologia* **301**, 219-236. <<Ctr Oceanol Marseille, Marine Endoume Stn, CNRS, La N 41, Rue Batterie Lions, F-13007 Marseille, France.>> *Brachionus plicatilis* and the copepod *Acartia tonsa* constitute the bulk of the zooplankton population during all the year. *A. tonsa* is positively correlated with temperature, salinity and seston and negatively to oxygen and chlorophyll. *B. plicatilis* is positively correlated with temperature and seston, but also with chlorophyll, while salinity has a negative effect. The specific eggs number of both species is chlorophyll dependent. As the two species occupied the same space habitat most of the year, they are potentially in competition for food. A way to optimize the food utilization could be the time separation of their feeding activity, nocturnal in *Acartia* and diurnal in *Brachionus*. Another way could be selective feeding upon food particles depending on their size (*Brachionus* being able to use finer particles than *Acartia*) or their quality (*Brachionus* being more herbivorous than *Acartia*) as demonstrated in some grazing experiments carried out in parallell.

19. GUIRAL, D., R. ARFI, M. BOUVY, M. PAGANO & L. SAINT-JEAN, 1994. Ecological organization and succession during natural recolonization of a tropical pond. *Hydrobiologia* **294**, 229-242. <<ORSTOM, Rech. Oceanol., BP V18, Abidjan, Côte Ivoire.>> The structure of a planktonic community was studied in April 1990 for 24 days (D1 to D24) during the natural recolonization of a tropical pond (Cote d'Ivoire) made azoic by emptying and liming (D0). After the pond treatment, the natural refilling from groundwater began immediately. The microheterotrophic (bacteria, flagellates, ciliates), phytoplanktonic (*Coelastrum*

microsporum) and zooplanktonic (the rotifers *Brachionus plicatilis* and *Hexarthra intermedia*) communities were first based on opportunist species favored by the initially large nutritive availability. The colonization was completed with the development of secondary consumers (last stages of *Apocyclops panamensis* and chironomids). The progressive complexity of the system ensured the attentuation of the disturbing events.

20. JACK, J.D. & J.J. GILBERT, 1994. Effects of *Daphnia* on microzooplankton communities. *J. Plankt. Res.* **16**, 1499-1512. <<Univ. Louisville, Dept Biol., Louisville, KY 40292 USA.>> Intact phytoplankton and microzooplankton communities from eutrophic Star Lake were incubated for 4 days with and without *Daphnia pulex*, *Daphnia galeata mendotae*, or a natural assemblage of *Daphnia* species. The cladocerans had varied effects on the rotifers, ranging from significant suppression of most rotifer species (*Keratella cochlearis*, *Polyarthra remata*, *Keratella crassa*) in the *D.pulex* jars, to the suppression of one (*K. crassa*) or no species in the *D.galeata mendotae* and Star Lake *Daphnia* assemblage jars, respectively. Ciliates were not consistently more vulnerable to cladoceran suppression than similarly size rotifers. The suppression of ciliates and rotifers was attributable to both direct effects (predation, interference, or both) and indirect effects (e.g. resource competition) of the cladocerans.

21. JOSE DE PAGGI, S. & W. KOSTE, 1995. Additions to the checklist of rotifers of the superorder Monogononta recorded from Neotropis. *Int. Rev. ges. Hydrobiol.* **80**, 133-140. <<Inst. Nacl. Limnol., Macia 1933, RA-3016 Santo Tome, Santa Fe, Argentina.>> Updates the 1982 checklist with the addition of >130 new records to the neotropical rotifer fauna. Species names, authority and date, locality and country, and reference citation, are listed.

22. JUANICO, M., Y. AZOV, B. TELTSCH & G. SHELEF, 1995. Effect of effluent addition to a freshwater reservoir on the filter clogging capacity of irrigation water. *Wat. Res.* **29**, 1695-1702. <<Juanico & Friedler, Mediterranean Sewage Treatment, IL-19205 Megido, Israel.>> Clogging capacity was estimated with an instrument that measures the increasing differential pressure needed to maintain a constant flow of water through a 80 µm screen filter. The dependence of the clogging capacity on plankton composition and suspended solids concentration was studied by means of multiple regression analysis, on four different arrangements of the matrix of data. The addition of effluents raised the clogging capacity sharply and quickly, primarily due to an increase in the number of large algae and zooplankton species. These large species partially substituted for the small ones which were dominant before the entry of effluents. The concentration of suspended solids also affected the clogging capacity, but to a much lower extent. A relationship between the clogging capacity and the total number of plankton organisms was not found. The addition of plankton filter-feeding fish to the reservoir is recommended.

23. KLEINOW, W. & H. WRATIL, 1995. Innenansichten eines Rädertiers. *Mikrokosmos* **84**, 7-12. <<Zool. Inst. Univ. Köln, Weyertal 119, D-50923 Köln, Germany.>> REM-Aufnahmen der Oberflächen von inneren Organen und Geweben von Rotatorien liefern ergänzende Bilder zu den durch Transmissionselektronenmikroskopie oder Lichtmikroskopie gewonnen

Beschreibungen ihrer Morphologie. [Ed: Very clear SEM views of sectioned rotifers to show internal structure.] K/W: *Brachionus plicatilis*, internal structure, musculature, organs, rotifer, sagittal and transverse sections.

24. **KOSTE, W. & Z.G. YAN, 1995.** On *Paradicranophorus aculeatus* (Neistwestnova-Shadina, 1935) with remarks on all other species of the genus (Rotifera: Dicranophoridae). *Int. Rev. ges. Hydrobiol.* **80**, 121-132. <<Ludwig-Brill-Str. 5, D-49610 Quakenbrück, Germany.>> In 1934, the rotifer Paradicranophorus aculeatus was discovered by Neistwestnova-Shadina in the River Oka near Murom (Russia). She described it as a *Dicranophorus* species. In 1958, the rheophilic rotifer was rediscovered in the Polish River Grabia by Pawlowski. This paper reports a third occurence in three samples from the Yun Nan Luoxiao River in China, allowing additional studies of this rare species. Other *Paradicranophorus - P. wockei; P.hudsoni; P. sordidus & P. sudzukii* are compared..

25. **LEBEDEVA, L.I. & O.N. ORLENKO, 1995.** Feeding rate of *Brachionus plicatilis* O. F. Müller on two types of food depending on ambient temperature and salinity. *Int. Rev. ges. Hydrobiol.* **80**, 77-87. <<Leninsky Prospect 72, Apt 417, Moscow 117261, Russia.>> Feeding rates of *Brachionus plicatilis* were studied for two types of food - algae *Monochrysis lutheri* & acid baker's *yeast Saccharomyces cerevisae*. It was found that at 16 and 26 degrees C the dependence of the ingestion rate (ration) on food concentration differed greatly. A hypothesis was suggested to explain this phenomenon. A critical concentration of both types of food at which the increase in the rotifer ration ceased is 4 . 10(6) cells . ml(-1). This is the minimum "background" food concentration for *B. plicatilis* mass cultivation. The average rations measured at the concentration of M. lutheri and S. cerevisae of 4 . 10(6) cells . ml(-1) were 1.3 +/- 0.1 and 4.8 +/- 1.3 mu g dry weight. . ind(-1) . day(-1) at 26 degrees C and 0.54 +/- 0.1 and 1.9 mu g d. w. . ind(-1) . day(-1) at 16 degrees C, respectively. The rations obtained in the laboratory were corrected for the conditions of rotifer commercial production in the open field in summer time. The correct values were 0.86 and 0.72 mu g d. w. . ind(-1) . day(-1) for algae and yeast, respectively.

26. **LEEPER, D.A. & B.E. TAYLOR, 1995.** Plankton composition, abundance and dynamics in a severely stressed cooling reservoir. *J. Plankt. Res.* **17**, 821-843. <<Savannah River Ecol Lab, Drawer E, Aiken, SC 29802 USA.>> Temperatures in Pond C, a cooling reservoir on the Savannah River Site in South Carolina, USA, ranged up to 58 degrees C during reactor operation. The thermal effluent eliminated zooplankton from regions where the temperature exceeded 45 °C, reduced zooplankton abundance by 1-3 orders of magnitude and typically halved the number of taxa. Reactor operation also reduced phytoplankton biovolume, often by >>70%. During intermittent reactor operation, the rotifer *Filinia longiseta* dominated the zooplankton and two cladocerans of the genus *Moina* were abundant. Zooplankton repopulation after reactor shutdown is discussed..

27. **LUBZENS, E., O. GIBSON, O. ZMORA & A. SUKENIK, 1995.** Potential advantages of frozen algae (*Nannochloropsis* sp.) for rotifer (*Brachionus plicatilis*) culture. *Aquaculture* 133, 295-309. <<A. Sukenik, Natl Inst Oceanog, Israel Oceanog & Limnol Res, POB 8030, IL-31080 Haifa, Israel.>> The advantage of

Nannochloropsis over other unicellular algae is primarily its unique fatty acid composition. Rotifers which consume the algae carry these fatty acids to the fish larvae. Cultivation of large quantities of algal biomass to support this food chain is a heavy burden in many hatcheries, and in many other locations it cannot be carried out all year round. In this study we examined the possibility of substituting frozen biomass for fresh *Nannochloropsis* as a sole food source for rotifer cultures or as an enrichment treatment prior to feeding the rotifers to the larvae. Relatively high reproductive rates were found in rotifers of three strains which were fed frozen *Nannochloropsis* biomass. Total fatty acid content of these rotifers and fatty acid distribution were related to the chemical composition of the algae. The results of this study suggest that application of frozen *Nannochloropsis* biomass may promote easier management in biomass production of lipid-enriched rotifers. This provides the artificial food chain with essential fatty acids, which are crucial for the development and cultivation of fish larvae, with a relatively limited effort for algae production on the hatchery site.

28. **MAAS, S., H. SEGERS & K. DECLEER, 1995.** The freshwater Rotifera and Copepoda fauna (Rotifera: Monogononta; Crustacea: Copepoda) of three islands in the Syechelles Archipelago. *Biol. Jaarb. Dodonaea* **62**, 169-174. <<Lab. Animal. Ecol., Zoogeog. & Nature Conserv., Dept. M.S.E., Univ. Gent, K.L. Ledeganckstr. 35, B-9000 Gent, Belgium.>> 34 Rotifera and 5 Copepoda are reported, of which 26 Rotifera and all Copepoda are new to the fauna of the archipelago. Most taxa reported are cosmotropical or cosmopolitan.

29. **MARINONE, M.C. 1995.** A new and phylogenetically suggestive morphotype of *Keratella lenzi* (Rotifer, Monogononta), from Argentina. *Hydrobiologia* **299**, 249-257. <<Pampa 3257, Piso 7, Unidad 25, RA-1428 Buenos Aires, DF, Argentina.>> The morphological characteristics of *Keratella lenzi* (f. *ayui*) f. nov. and the phylogenetic and ecological implications of the appearance of posterolateral spines in *K. lenzi* Hauer, 1953 are discussed. The morphotype is described after detailed observations using light and scanning electron microscopy, and compared with other *Keratella* species of the superspecies 'valga'. The pores of the lateral antennae are described, and proposed as a new character for future comparative research. Some ecological information is also given.

30. **MELONE, G. & C. RICCI, 1995.** An uncommon bdelloid rotifer: *Abrochtha intermedia* (de Beauchamp, 1909). *Boll. Zool.* **62**, 29-34. << Univ Milan, Dipartimento Biol, Via Celoria 26, I-20133 Milan, Italy.>> This philodinavid rotifer has not been recorded since its discovery and original description in 1909. In this paper we redescribe this rotifer. Scanning electron microscopy revealed its unique rotatory apparatus that is hitherto unknown. Unlike that of other bdelloids its corona consists of a ciliated band limited by a preoral ciliation, an undivided trochus, and by a postoral ciliation, the cingulum. Other morphological characters, such as the rostrum, the dorsal antenna and the foot with spurs and toes, are common to all bdelloids. Some observations of *A. intermedia* feeding and swimming behaviour are given.

31. **MODENUTTI, B.E. 1994.** Spring-Summer Succession of Planktonic Rotifers in a South-Andes Lake. *Int. Rev. Ges. Hydrobiol.* **79**, 373-383. << Univ NaCl Comahue, Ctr Reg Univ Bariloche, CC 1336, RA-8400 Bariloche, Argentina.>> In

Laguna Ezquerra (Rio Negro, Argentina) during the spring and summer period, total rotifer density differed markedly. In spring rotifer populations remained at low density and an inverse relationship with cladoceran biomass was found. In contrast, in summer, the rotifer densities increased greatly and a positive relationship with cladoceran biomass was observed. Food resources decreased during mid January and this seemed to give rotifers a competitive advantage over cladocerans. Bosmina longirostris and Ceriodaphnia dubia were both present during the spring, but only Bosmina prevailed in summer. The composition of cladoceran assemblages together with food resources seem to be an important factor in rotifer dynamics.

32. MOFFAT, B.D. & T.W. SNELL, 1995. Rapid toxicity assessment using an *in vivo* enzyme test for *Brachionus plicatilis* (Rotifera). *Ecotox. Environm. Safety* **30**, 47-53. <<Georgia Inst. Technol., Sch. Biol., Atlanta, GA 30332 USA.>> A 1-hr *in vivo* enzyme inhibition assay based on esterase activity has good potential for marine toxicity assessment. A test was developed for the rotifer *Brachionus plicatilis* based on the nonfluorescent substrate fluorescein diacetate (FDA), which is metabolized by esterases to a fluorescent product. Enzyme inhibition, as determined by reduced fluorescence, can be scored visually or quantified using a fluorometer. Quantification of fluorescence permits the calculation of NOEC, LOEC, chronic value, and IC20. The 1-hr esterase inhibition test has sensitivity comparable to that of 24-hr rotifer acute tests for several compounds. The toxicity of six compounds was examined using the quantified assay. The esterase inhibition test is an attractive tool for assessing aquatic toxicity because of its speed, simplicity, sensitivity, and applicability to a broad range of aquatic species.

33. MUROGA, K. 1995. Viral and bacterial diseases in larval and juvenile marine fish and shellfish: A review. *Fish Pathology* **30**, 71-85. <<Hiroshima Univ., Fac. Appl. Biol. Sci., Higashihiroshima 724, Japan.>> In Japan, seed production techniques have been developed for about 80 species of marine fish and shellfish. However, mass mortalities due to infectious and non-infectious diseases have often occurred in larvae and juveniles reared in hatcheries. Among these problems the viral and bacterial diseases are reviewed in this paper. Live foods contaminated with pathogenic bacteria have been suspected to serve as an important source. Rotifers are mentioned.

34. MUSSARED, D. & R.J. SHIEL, 1995. Billabongs - a swag of biodiversity. *Geo Australasia* **17**, 70-80. Public 'awareness' colour glossy article on biodiversity, focussing on Murray-Darling Basin billabong micro-macrofaunal communities. A food web is included, as are rotifers, with light and SEM micrographs. Graphic presentation of a live rotiferologist in a billabong.

35. OOMS-WILMS, A., G. POSTEMA & R.D. GULATI, 1995. Evaluation of bacterivory of Rotifera based on measurements of *in situ* ingestion of fluorescent particles, including some comparisons with Cladocera. *J. Plankt. Res.* **17**, 1057-1077. <<Netherlands Inst. Ecol., Ctr. Limnol., Rijksstraatweg 6, 3631 AC Nieuwersluis, Netherlands.>> Ingestion rates of rotifer species using 0.51 µm microspheres or fluorescently labelled bacteria as tracers differed, with one exception. The ingestion rates depended on both the species and the tracer type.

Rotifers were much more important grazers on bacteria than cladocerans in the study period (April-September). Based on microspheres, the rotifer populations with the highest uptake of bacteria were *Filinia longiseta* (May-July) and *Anuraeopsis fissa* (June-September). According to the uptake of fluorescently labelled bacteria, *Conochilus unicornis* had the highest uptake in June and *A. fissa* in July.

36. PERSOONE, G., C. JANSSEN & W. DE COEN, 1994. Cyst-based toxicity tests .10. Comparison of the sensitivity of the acute *Daphnia magna* test and two crustacean microbiotests for chemicals and wastes. *Chemosphere* **29**, 2701-2710. << State Univ Ghent,Biol Res Aquat Pollut Lab, J Plateaustr 22, B-9000 Ghent, Belgium.>> This paper statistically evaluates the sensitivity of the acute *Daphnia magna* bioassay in comparison to that of two crustacean microbiotests: the Streptoxkit F and Thamnotoxkit F, which make use of larvae of the anostracans *Streptocephalus proboscideus* and *Thamnocephalus platyurus* respectively, hatched from cysts. All comparisons show that there is a significant relationship ($p << 0.05$) between the acute effects found with the *D. magna* and the two crustacean microbiotests; correlation coefficients ranged from 0.84 to 0.92. In the majority of cases, effect ratios between the conventional *D. magna* and the microbiotests were within a factor 2 for both pure chemicals and environmental samples. The evidence provided in this paper demonstrates that the new crustacean microbiotests can be used as low cost alternatives to the conventional *D.magna* acute assay.

37. PAUL, A.J. & D.W. SCHINDLER, 1994. Regulation of rotifers by predatory calanoid copepods (subgenus *Hesperodiaptomus*) in lakes of the Canadian Rocky Mountains. *Can.J. Fish. Aquat. Sci.* **51**, 2520-2528. <<Alberta Environm Protect, 6TH Floor, 9820-106th St, Edmonton, Alb. T5K 2J6, Canada.>> The abundance of planktonic rotifers in alpine lakes is regulated by predation from *Diaptomus* (subgenus *Hesperodiaptomus*) *arcticus* (a large calanoid copepod) regardless of nutrient conditions. In large *in situ* enclosure experiments (2250 L). *Hesperodiaptomus arcticus* suppressed densities of the soft-bodied rotifer *Polyarthra dolichoptera* significantly (two to three orders of magnitude) and the loricate rotifer *Keratella quadrata* less so (up to one order of magnitude) relative to populations in predator-free enclosures. In 69 lakes from the Canadian Rocky Mountains, the presence of *Keratella* or *Polyarthra* was negatively correlated with *Hesperodiaptomus* density. A maximum-likelihood logistic regression model predicts that as *Hesperodiaptomus* densities increase the probability of occurrence for both rotifer genera decreases, with *Polyarthra* declining more rapidly than *Keratella*.

38. POUYAT, R.W., R.W. PARMELEE & M.M. CARREIRO, 1994. Environmental effects of forest soil-invertebrate and fungal densities in oak stands along an urban-rural land use gradient. *Pedobiologia* **38**, 385-399. << US Forest Serv, Inst Ecosyst Studies, NE Forest Expt Stn, Box Ab, Millbrook, NY 12545 USA>> The purpose of this research was to analyze soil-invertebrate and fungal densities in undisturbed forest stands along a soil environmental gradient characterized by i) higher heavy metal concentration, ii) higher organic matter and N concentration, and iii) slightly lower soil pH in urban than in rural stands. Bdelloid rotifers were among the microinvertebrates encountered. The observed patterns in soil invertebrate populations may be partly a trophic response to lower fungal densities in litter in urban stands.

39. RIEGER, R.M. & S. TYLER, 1995. Sister-group relationship of Gnathostomulida and Rotifera-Acanthocephala. *Invert. Biol.* **114**, 186-188. <<Innsbruck Univ, Inst Zool, A-6020 Innsbruck, Austria.>> The trophi of rotifers resemble the sclerotized jaws of gnathostomulids, but whether trophi are homologous to gnathostomulid jaws, and consequently show phylogenetic relationship between Gnathostomulida and Rotifera, has been unclear. We have found that the trophi of a rotifer in the genus *Seison*, which is ranked close to the ancestral stock of rotifers, have an ultrastructural feature similar to that reported in the literature for jaws of both scleroperalian and filospermoidean gnathostomulids, as well as for trophi in the more derived bdelloid rotifer genus Philodina. Specifically, these trophi and jaws have arrays of tube-like support rods composed of lucent material surrounding a dense core. Jaw-like structures in other small vermiform animals (certain polychaetes and molluscs) lack this special feature. We propose that jaw substructure shows a homology, and thus a sister-group relationship, between Gnathostomulida and the clade containing Rotifera plus Acanthocephala.

40. RICCI, C. & U. FASCIO, 1995. Life-history consequences of resource allocation of two bdelloid rotifer species. *Hydrobiologia* **299**, 231-239. <<Dipartimento Biol., Sez. Zool. Sci. Nat., Via Celoria 26, I-20133 Milan, Italy.>> Two bdelloid species, *Macrotrachela quadricornifera* (aquatic species) and *Philodina vorax* (terrestrial moss species), with similar survival but different age-specific fecundity schedules, were analyzed daily to determine growth rates and the volume invested in reproduction. The two species had similar growth patterns and started reproduction while still growing. In both, the size at maturity was independent of age. *M. quadricornifera* resumed growth after reaching a size plateau when reproduction was over, while *P. vorax* continued to reproduce until death. Although the net reproductive rate of *P. vorax* was consistently lower than that of *M. quadricornifera*, the same percent of adult volume was invested in reproduction over its life time because its eggs were relatively bigger. The difference in reproductive rates is probably related to different partitioning of equal amounts of relative biomass: more small eggs for the 'aquatic' rotifer vs. fewer big eggs for the 'terrestrial' rotifer. Egg size might be related to selective pressures of the environments.

41. RICO-MARTINEZ, R. & T.W. SNELL, 1995. Male discrimination of female *Brachionus plicatilis* Müller and *Brachionus rotundiformis* Tschugunoff (Rotifera). *J. Exp. Mar. Biol. Ecol.* **190**, 39-49. << Georgia Inst Technol, Sch Biol, Atlanta, GA 30332 USA.>> An analysis of mating behavior of three *Brachionus plicatilis* O.F. Müller and three *Brachionus rotundiformis* Tschugunoff strains showed that reproductive isolation exists between strains of these sibling species. An atypical *B. rotundiformis* strain appears to share some characteristics with both *B. plicatilis* and *B. rotundiformis* strains. This strain is able to cross-mate with one *B. plicatilis* strain, although no cysts were produced. The results of the mating behavior are discussed with regard to recent data on a surface glycoprotein responsible for mate recognition in *B. plicatilis*. Mating behavior of brachionid rotifers has great potential for maintaining reproductive isolation among species.

42. ROCHE, K.F., 1995. Growth of the rotifer *Brachionus calyciflorus* Pallas in dairy waste stabilization pond. *Wat. Res.* **29**, 2255-2260. <<Natl. Univ. Ireland Univ. Coll. Cork, Dept Zool., Lee Maltings, Prospect Row, Cork, Ireland.>> Organically overloaded temperate region waste stabilization ponds treating dairy effluent were studied over a period of 17 months. The phytoplankton consisted almost entirely of small Chlorococcales (e.g. *Chlorella*), with densities of up to ca. 8 million cells ml^{-1}. The metazoan zooplankton was dominated by *Brachionus calyciflorus* (commonly ca. 25,000, and up to ca. 160,000 individuals per litre) during the summer months, in the later ponds. *Daphnia magna*, a zooplankter previously dominant in the system, was not recorded, this was most probably due to the high organic loading. Despite high rotifer densities, the phytoplankton populations and suspended solids were not reduced to low levels by grazing.

43. RUBLEE, P.A. & A. PARTUSCH-TALLEY, 1995. Microfaunal response to fertilization of an arctic tundra stream. *Freshw. Biol.* **34**, 81-90. <<Univ. N. Carolina, Dept Biol., Greensboro, NC 27412 USA.>> Dominant heterotrophic microfauna observed colonising polyfoam artificial substrata included amoebae (approximately 40% of colonizing biomass), rotifers (36% of biomass) and ciliates (25% of biomass). Abundance of microfauna on epilithic surfaces in the river was higher on rocks from pools than on rocks from riffle areas, but abundance on the artificial substrata was higher than on the natural rocks. The results suggest that microfauna of arctic tundra streams are regulated by grazers and that their importance in transfers among trophic levels is greater in pools than in riffles.

44. SAINT-JEAN, L. & M. PAGANO, 1995. Egg mortality through predation in egg-carrying zooplankters. Studies on *Heterobranchus longifilis* larvae fed on copepods, cladocerans and rotifers. *J. Plankt.Res.* **17**, 1501-1512. <<Centre de Recherches Océanologiques, BP v 18, Abidjan, Côte d-Ivoire.>> Catfish larvae were fed with several planktonic taxa. Copepod subitaneous egg viability was conserved after gut passage, lowered for the rotifers *Brachionus calyciflorus* and *Epiphanes macrourus* and nil for cladocerans. Relevance in context of aquaculture is discussed.

45. SEGERS,H.H. 1994. Redescription of *Lecane fadeevi* (Neiswestnowa-Shadina, 1935) (Rotifera, Lecanidae). *Bull. Konink. Belg. Inst. Natuurwet., Biol.* **64**, 235-238. <<Dept MSE, Anim. Ecol. Zoogeog. & Nat. Conservat. Lab., Kl Ledeganckstr. 35, B-9000 Ghent, Belgium.>> K/W: *Lecane fadeevi*, Poland, redescription, rotifer, Russia, taxonomy.

46. SEGERS, H.H. 1995. A reappraisal of the Scaridiidae (Rotifera, Monogononta). *Zool. Scripta* **24**, 91-100. <<address above.>> The morphology, systematics and distribution of the rotifer genus *Scaridium* Ehrenberg, 1830 are revised. The genus is transferred from Notommatidae to Scaridiidae, which is reinstated. In all, five species are recognized, two of which, *S. montanum* sp. n. and *S. grandis* sp. n., are new to science. Descriptions, a brief biometrical analysis and a key to the species are provided. *Scaridium longicaudum* (O.F. Müller, 1786) is cosmopolitic, *S. bostjani* Daems & Dumont, 1974 is probably a cosmopolitic warm stenotherm, *S. elegans* Segers and De Meester, 1994 is pantropic, *S. montanum* sp. n. occurs in the Mediterranean region and *S. grandis* sp. n. is recorded from Cameroon, Nigeria and Thailand.

47. **SEGERS, H., S. MAAS & H.J. DUMONT, 1995.** Preliminary note on the freshwater zooplankton from the Bahamas. *Biol.Jaarb.Dodonaea* **62**, 164-168. <<address above.>> One cladoceran, four copepods and 12 rotifers are reported from the Western Bahamas, only one of which had previously been recorded from the islands.

48. **SEGERS, H., L. MENESES & M. DELCASTILLO, 1994.** Rotifera (Monogononta) from Lake Kothia, a High-Altitude Lake in the Bolivian Andes. *Arch. Hydrobiol.* **132**, 227-236. <<address above.>> The rotifer fauna of Kothia Lake, a high-altitude lake near La Paz, Bolivia, and of an adjacent weedy pond is studied. *Lecane boliviana* n. sp. is described and *Lepadella degreefi* De Smet redescribed. Ten species are recorded from the neotropical region for the first time. Overall, the fauna consists mainly of cosmopolitan, cold-stenothermal species together with one apparently endemic, one that was previously considered a Galapagos endemic, one antarctic and several arctic taxa.

49. **SHIEL, R.J. 1995.** A guide to identification of rotifers, cladocerans and copepods from Australian inland waters. *CRCFE Ident. Guide* **3**, 1-144. <<MDFRC, P.O. Box 921, Albury, NSW 2640 Australia.>>. A manual in a series aimed at providing a taxonomic background to all Australian invertebrate groups. The series is written specifically at the level of instrumentaility technical staff, University teaching staff, postgrads. The 105 page rotifer section summarizes the published keys in the 1986-93 Koste/Shiel series of papers, provides keys and figures of all the known Australian species, including families not yet treated in the detailed revision.

50. **SHIEL, R.J. 1995.** Billabongs. *Australasian Science* **16**, 10-13. <<address above.>> Another public awareness article, intended for senior high school level, includes rotifers in the aquatic food web of billabongs. Thrust of article is importance of billabongs in maintaining floodplain biodiversity in Australia's flood-drought freshwater ecosystems.

51. **SMITH, A.D. & J.J. GILBERT, 1995.** Relative susceptibilities of rotifers and cladocerans to *Microcystis aeruginosa*. *Arch Hydrobiol.* **132**, 309-336. <<USAID, Environm. Policy & Technol. Project, Amer. Embassy Moscow, Dept State, Washington, DC 20521 USA.>> Laboratory experiments tested the hypothesis that *Microcystis aeruginosa* would inhibit population growth (r(m)) of large cladocerans to a greater extent than that of rotifers. *Daphnia magna* and *D. pulex* were both inhibited by increasing concentrations of *Microcystis* within a naturally occurring range. Population growth of two rotifers, *Keratella crassa and K. cochlearis*, was similarly inhibited by increasing concentrations of *Microcystis*. Through differential inhibition of population growth (r(m)),and reductions in body size and filtering rates of cladocerans, *Microcystis* has the potential to alter zooplankton community structure by favoring rotifers.

52. **SNELL, T.W. & M.J. CARMONA, 1994.** Surface glycoproteins in copepods - potential signals for mate recognition. *Hydrobiologia* **293**, 255-264. <<Georgia Inst. Technol., Sch.Biol., Atlanta, GA 30332 USA.>> We examined surface glycoproteins on the urosomes of several species of marine and freshwater copepods to develop insight into their role in mate recognition. Most fluorescence was observed in the urosome at the caudal rami, gonopore, margin of the genital segment, and urosome segment junctions. The signal contrast (signal/background ratio) along the urosome ranged from 3-51 which seems ample for males to discriminate a glycoprotein signal from noise. Our observations clearly demonstrate that glycoproteins on the urosome of females from all six species are present at sites expected to be important in mate recognition.

53. **SNELL, T.W. & M.J. CARMONA. 1995.** Comparative toxicant sensitivity of sexual and asexual reproduction in the rotifer *Brachionus calyciflorus*. *Env. Toxicol. Chem.* **14**, 415-420. <<address above.>> We compared the effects of four toxicants on a sexual and sexual reproduction of the rotifer *Brachionus calyciflorus*. Toxicants has a differential effect on sexual and asexual reproduction, with sexual reproduction consistently the most sensitive. Comparison of toxicant effect levels revealed that sexual reproduction was more strongly reduced at each toxicant concentration. The four toxicants tested inhibited sexual reproduction 2 to 68 times more than asexual reproduction at the lowest observed effect concentrations. Toxicants inhibited sexual reproduction in its initial step: sexual female production. Because sexual reproduction is more sensitive, toxicity tests based exclusively on asexual reproduction may not be protective of rotifer life cycles.

54. **SOHLENIUS, B., S. BOSTROM & A. HIRSCHFELDER, 1995.** Nematodes, Rotifers and Tardigrades from Nunataks in Dronning Maud Land, East Antarctica. *Polar Biology* **15**, 51-56. <<Swedish Museum Nat Hist, Dept Invertebrate Zool, Box 50007, S-10405 Stockholm, Sweden.>> Four species of nematodes, sixteen species of rotifers and seven species of tardigrades were found in samples from nunataks in Vestfjella and Heimefrontfjella in Dronning Maud Land, East Antarctica. The distribution of the fauna was very aggregated and some samples contained no animals. The degree of similarity in species composition between various nunataks was low. The highest abundances and number of species were found on the largest and highest nunataks in the most southern position.

55. **STEINER, W.A. 1994.** The influence of air pollution on moss-dwelling animals .4. Seasonal and long-term fluctuations of rotifer, nematode and tardigrade populations. *Rev. Suisse Zool.* **101**, 1017-1031. <<Swiss Fed Res Stn Arboriculture, Viticulture & Hort., Dept Entomol. & Nematol., CH-8820 Wadenswil, Switzerland.>> The variation of moss-dwelling aquatic communities was studied at two microsites over a period of seven years. Nematodes and tardigrades were identified to the species level; rotifers were treated as a group. Seasonal trends in population fluctuations are described.

56. **STEMBERGER, R.S., 1995.** The influence of mixing on rotifer assemblages of Michigan lakes. *Hydrobiologia* **297**, 149-161. << Dartmouth Coll., Dept Biol., Hanover, NH 03755 USA.>> Seasonal changes in the rotifer assemblages of 42 lakes were closely related to lake mixing characteristics, basin morphometry, and

the presence of an oxygenated coldwater refuge. The disappearance of coldwater assemblages from dimictic lakes coincided with oxygen depletion in the hypolimnion or with erosion of the hypolimnion through mixing. Coldwater species disappeared from large discontinuous polymictic lakes when deep epilimnetic mixing occurred in late summer and fall. Large lakes of the region contain many of the coldwater species of the Laurentian Great Lakes but some taxa are conspicuously absent. Cold stenothermal rotifers persist in the lakes of the region despite adverse environmental conditions. Their life histories and ability to form resting stages permit them to escape periods of oxygen depletion and thermal stress.

57. STEMBERGER, R.S. & J.M. LAZORCHEK, 1994. Zooplankton assemblage responses to disturbance gradients. *Can. J. Fish.Aquat. Sci.* **51**, 2435-2447. <<address above.>> Principal component analysis (PCA) of species abundance data of 19 New England lakes contrasted productive warmwater lakes dominated by rotifers, small cladocerans, and cyclopoid copepods and nauplii with cold-water salmonid systems dominated by calanoid copepods and large cladocerans, and with few rotifers. The use of 12 aggregate zooplankton assemblage variables based on taxonomic group, body size, life-history stage, and feeding guilds improved the amount of the explained cumulative variance (63.2%) over species data (40.3%) in the first two axes of the ordination. In a second PCA the environmental variables were constrained with respect to the zooplankton variables. This analysis identified total phosphorus, chlorophyll a, cold-water fish assemblages, number of introduced fish species, piscivore numbers, and the percentage of disturbed shoreline as dominant gradients. Small-bodied assemblages represented by small cladocerans, rotifers, ostracods, nauplii, and cyclopoid copepodites were associated with the most disturbed systems. The pattern of distribution among large- and small-bodied taxa from the PCA was used to formulate metrics which were then correlated to the gradients.

58. STERNER, R.W. & D.O. HESSEN, 1994. Algal nutrient limitation and the nutrition of aquatic herbivores. *Ann. Rev. Ecol. Syst.* **25**, 1-29. <<Univ. Minnesota, Gray Freshwater Biol. Inst., Box 100, Country Rd 15 & 19, Navarre, MN 55392 USA.>> We review studies relating to the nutritional physiology of aquatic herbivores, especially freshwater pelagic species, and we relate element content to secondary production and nutrient recycling. A variety of evidence from many types of studies-physiological modelling, whole-ecosystem surveys, laboratory growth studies, etc-is assembled into an internally consistent picture of mineral limitation of aquatic herbivores. Herbivores with high nutrient demands (the best example is probably *Daphnia* and phosphorus) appear frequently to be limited not by the food quantity or energy available to them but by the quantity of mineral elements in their food. *Brachionus plicatilis* is mentioned.

59. TANAKA, H., H. KAGAWA, H. OHTA, K. OKUZAWA & K. HIROSE, 1995. The first report of eel larvae ingesting rotifers. *Fish. Sci.* **61**, 171-172. <<Natl. Res. Inst. Aquaculture, MIE 51601, Japan.>> K/W: Japanese eel, *Anguilla japonica*, larvae, feeding, rotifer, maturation.

60. TELESH, I.V., A.L. OOMS-WILMS & R.D. GULATI, 1995. Use of fluorescently labelled algae to measure the clearance rate of the rotifer *Keratella cochlearis*. Fresh. Biol. **33**, 349-355. <<Netherlands Inst Ecol, Ctr Limnol, Rijksstraatweg 6, 3631 AC Nieuwersluis, Netherlands.>> *K. cochlearis* ingested both *Chlorella vulgaris* and *Stichococcus bacillaris*. Clearance rates on tracer foods varied between 2.4 and 6.9 µl ind(-1) h(-1), which are comparable with those determined using other techniques, however only a little more than one-third of the total amount of algal cells of both C. vulgaris and S, bacillaris were well stained with the dye (DTAF), despite the use of a higher concentration of dye and a longer staining period than recommended in the literature. The FLA method can be successfully applied in grazing studies involving size selection and competition for food among zooplankton. The method complements existing techniques for measuring the clearance and ingestion rates of filter-feeders.

61. VANDIJK, G.M & B. VANZANTEN, 1995. Seasonal changes in zooplankton abundance in the lower Rhine during 1987-1991. *Hydrobiologia* **304**, 29-38. <<Natl. Inst. Publ. Hlth & Environm. Protect , Water & Drinking Water Res. Lab., POB 1, 3720 Ba Bilthoven, Netherlands.>> Zooplankton was dominated by rotifers at two stations, although during the winter periods the contribution of copepods was considerable. The rotifers were dominated by *Brachionus angularis*, *B. calyciflorus*, *Keratella cochlearis* and *K. quadrata*; the copepods by cyclopoid nauplii; the cladocerans by small-sized species mainly belonging to *Bosmina*. In spring, the rotifer density and water temperature and rotifer density and chlorophyll a concentration were positively correlated. Furthermore, both rotifer density and chlorophyll a were inversely correlated with discharge. The possible role of environmental factors (water temperature, chlorophyll content, discharge and biotic factors) controlling the river zooplankton dynamics is indicated.

62. VASCONCELOS, V.M. 1994. Seasonal fluctuation of planktonic rotifers in Azibo Reservoir (Portugal). *Hydrobiologia* **294**, 177-184. << Inst. Zool. Dr Augusto Nobre, Fac. Ciencias, P-4000 Oporto, Portugal.>> The reservoir rotifercommunity was similar to that of other Portuguese reservoirs with *Keratella cochlearis*, *Polyarthra* spp., *Asplanchna priodonta* and *Collotheca pelagica* dominant, although densities varied strongly. Maximum rotifer density was 640 ind l^{-1} in 1987 and 315 ind l^{-1} in 1988. During the first year two density peaks were observed, while in the second year fluctuations were irregular. Phytoplankton availability was considered the main reason for the fluctuation of rotifer density, although temperature, dissolved oxygen and cladoceran interference may also have played a role. A high density of *Anabaena flos-aquae* might have facilitated the dominance of *K. cochlearis* in 1988.

63. WALZ, N. 1995. Rotifer populations in plankton communities: energetics and life history strategies. *Experientia* **51**, 437-453. << Institut fur Gewasserökol. & Binnenfisherei, Muggelseedamm 260, 12587 Berlin , GERMANY >> K/W: body size, bottum-up control, cladocerands, competition, food quality, food quantity, predtion, rotifers, top-down control.

64. WILLIAMSON, C.E. 1995. What role does UV-B radiation play in freshwater ecosystems? *Limnol. Oceanogr.* **40**, 386-392. <<Lehigh Univ., Div Earth & Environm. Sci., 31 Williams Dr, Bethlehem, PA 18015 USA.>> Increases in incident W-B radiation (280-320 nm) have been observed at temperate as well as polar latitudes in recent decades. Although UV-B radiation makes up only a small portion of the total energy of solar radiation and attenuates rapidly in the water column, the high sensitivity of living organisms to UV-B radiation makes the observed increases potentially important in aquatic ecosystems. To date, research has focused largely on the primary producers in marine ecosystems in Antarctica where ozone depletion and subsequent increases in UV-B radiation have been most pronounced. This review addresses the potential role of UV-B radiation in freshwaters by taking into account some of the information available in marine systems and applying some of the recent advances in our understanding of the ecology of freshwaters. The potential for complex rather than simple responses of freshwater ecosystems to W-B radiation is emphasized. Includes rotifers in discussion of zooplankton community.

65. **YEATES, G.W. 1995.** Effect of sewage effluent on soil fauna in a *Pinus radiata* plantation. *Aust. J. Soil Res.* **33**, 555-564. <<Landcare Res, Private Bag 11052, Palmerston North, New Zealand.>> This study used late summer and autumn samples to assess changes in litter and soil fauna under a 17-year-old *Pinus radiata* plantation on dune sands of the Waitarere-Hokio association after 7 years of spray irrigation of sewage effluent. Populations estimated included 12 groups of litter arthoropods, earthworms, enchytraeids, tardigrades, rotifers and nematodes. Rotifers were most abundant in the unirrigated control area. It appears that effluent enhanced physical breakdown of the *P. radiata* litter. Movement of the decayed fragments into the upper layers of sand may have produced conditions unfavourable for enchytraeids and rotifers.

66. **YOSHIMURA, K., T. IWATA, K. TANAKA, C. KITAJIMA & F. ISIZAKI, 1995.** A high density cultivation of rotifer in an acidified medium for reducing undissociated ammonia. *Nipp. Suis. Gakk.* **61**, 602-607. <Fukuoka Mariculture Corp, Genkai, Fukuoka 81135, Japan.> Two experiments were carried out in order to investigate the effect of acidification of the media in high density cultures of the rotifer *Brachionus rotundiformis* on the reduction of poisonous undissociated ammonia. The concentration of undissociated ammonia in the medium without pH adjustment (Exp. I) and of 8 pH (Exp. II) increased to 27 and 16 ppm, and the growths of rotifer population were inactive and their maximum densities were 8,000 and 3,000 individ./ml, respectively. On the other hand, the concentration of undissociated ammonia in the medium of 7 pH remained less than 10 ppm, and in the medium of 6 pH, it was only 2 ppm. The growths of rotifer population in their media were remarkably active, and their maximum densities reached 22,000 to 34,000 individ./ml (Exp. I) and 9, 000 to 13,000 individ./ml (Exp. II).

bionet.rotifera

We (Russ Shiel & Bob Wallace) proposed a newsgroup to the BIOSCI administrator in April, in the hope that we could canvas enough international votes to start up an information line for our favourite animals. The proposal was posted to **bionet.announce** and **bionet.general** for discussion, and eventually votes were

called for. 80 'Yes' votes were required to establish the newsgroup, but we polled only 60-some votes globally.

While the low response rate is a disappointment, it may not reflect lack of interest, simply a low rate of connection of rotifer workers to the Internet. It isn't so much the global family of rotifer workers who could benefit more from a **bionet.rotifera** newsgroup - we already contact each other as required by e-mail - but a newsgroup would open up our interests to a wider audience. An electronic *Rotifer News* could be part of such a newsgroup.

We'll keep you posted on when/if we propose the newsgroup again - we must wait 3 months in any event. If there are any comments or suggestions, please pass them on to one of the regional editors.

FIRST ANNOUNCEMENT

LIVE FOOD ORGANISMS AND MARINE LARVICULTURE

Symposium of Live Food Organisms & Environmental Control for Larviculture of Marine Animals

September 1-4, 1996
Nagasaki, Japan

Organized by the
Faculty of Fisheries
Nagasaki University

SCOPE

Larval rearing of marine animals is performed world-wide to produce seed for aquaculture, as well as for stock enhancement in local marine habitats. On a small scale, larval rearing is also conducted to obtain fundamental knowledge on the life cycle of specific animals. A variety of problems remain to be solved scientifically and technically to improve the management and rearing success of economically important species. This symposium will focus on fundamental topics in this field, including the biology of animals used for live food and environmental control of the culture microcosm during larval rearing. In the first part of the symposium, we anticipate several reviews on larval rearing methods and recent technological advances in several countries. Secondly, we expect several papers on the artificial control of the rearing environment. Thirdly, there will be presentations on the physiology, ecology, taxonomy, life cycle and nutrition of live planktonic animals used as feed in aquaculture. The major subject will be marine rotifers, but we would also like to incorporate other planktonic species. The final topic will be a round table discussion concerning the future prospects for the application of technology to the rearing of aquatic animals.

PROGRAM

September 1
Registration. Welcome Party
September 2-3
Symposium Presentations
Session 1. Keynote Lectures
Present Status of Larval Rearing Technology
(Japan, Korea, South East Asia, U.S., Europe)
Session 2. Rearing Environment
Environmental Control (Larval Rearing, Live Feed Culture)
Metamorphosis Induction of Marine Invertebrates
Biocontrol
a. Crustacea
b. Phytoplankton
Session 3. Live Feed
Marine Rotifers
a. Life Cycle
b. Food, Nutrition
c. Speciation
d. Physiology
e. Mass Culture
Other Aquatic Plankton Species
a. Brine Shrimp
b. Freshwater Rotifers
c. Phytoplankton
d. Others
Session 4.
Round Table Discussion-Summary of Symposium

September 4
Excursion; Nishimura Pearl Co. Ltd.,
Chlorella Industrial Co., Ltd.
Saga Prefectural Sea Farming Center

PRESENTATIONS

Each session will include oral or poster presentations, and will include both review and general papers. Oral presentations are mostly for invited speakers.

CONFERENCE PROCEEDINGS

Manuscripts of oral and poster presentations will be published in a special issue of *Bulletin of the Faculty of Fisheries, Nagasaki University*.

DEADLINES

2nd announcement to be mailed — Jan. 10, 1996
Submission of abstracts — Apr. 1, 1996
Payment of registration fee — Apr. 1, 1996
3rd announcement to be mailed — Jun. 1, 1996
Submission of manuscripts — Sep. 2, 1996

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