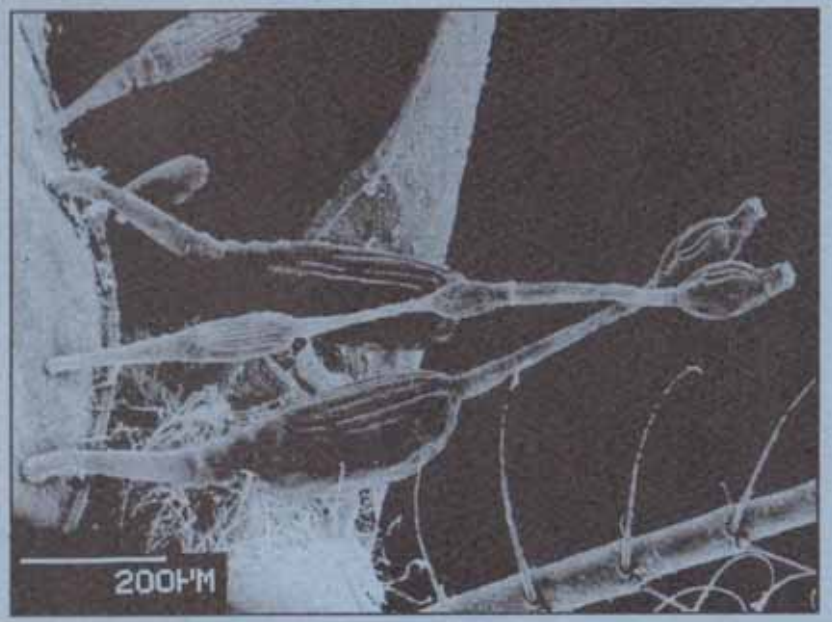
ROTIFER NEWS

A newsletter for rotiferologists throughout the world



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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: Seisonidae family portrait from Guilio Melone, University of Milano

Filinia longiseta G. Melone

Editorial

This slightly delayed Christmas issue (!) includes a participant's eye view of the June '97 VIIIth Int. Rotifer Symposium at St John's University in Minnesota, an overview of attendance at all the Rotifer Symposia to date, and the decision on venues for the IXth (2000) and Xth (2003) meetings...see you all there!

As forewarned in Issue #29, the circulation of *Rotifer News* has been pruned! Only those (caring?!) rotifer-workers worldwide who specifically paid a subscription at the Minnesota meeting, or who responded by returning the postcard included with their issue, are receiving #30. The response rate for the postcards has been disappointing....35 returned of 120 sent. It would seem that a lot of people are no longer working on rotifers.....but on the bright side, all but 3 of the returned cards indicated the addressees were still working on or interested in our favourite animals, and wished to continue receiving the newsletter. Please forward anything of interest for inclusion in Issue #31 by the end of June 1998.

Russ Shiel
Production Editor

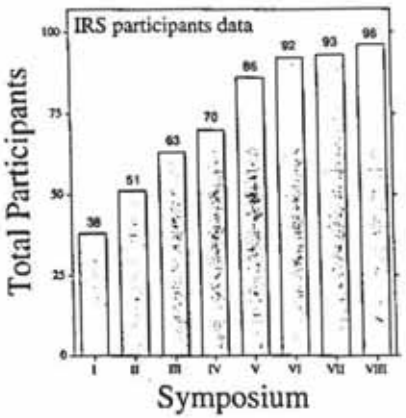
Obituary - Prof. Hans Buchner (1906 - 1997)

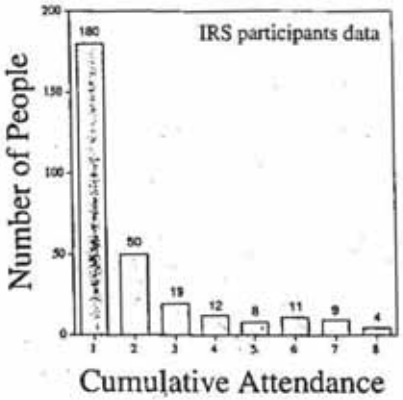
I have the sorrowful duty to inform you that Prof. Hans Buchner died on 29.12.1997 in Munich in the age of 91 years. He worked a full lifetime on control of rotifer sexuality, but he could do it only in his free time. His main job was a school professor. As known to me, his first publication on "Experimental studies on cyclic sexuality of the rotifers" was from 1934 and his latest "Studies on the control of heterogeneous reproduction in rotifers" in 1992, 58 years in between! He was known personally to only a few of the international rotifer family. He only participated on the legendary First Rotifer Meeting in Lunz (Austria) in 1976. After his retirement from school obligations he worked on at the Zoological Institute in Munich until about 3 years ago. When I was in Munich my room was on the same floor as his small laboratory. When I learned to know him he was already 72. He came nearly every day for several hours to work, brought a piece of bone to our department dog, and from time to time we had a coffee or tea break together. His scientific merits have to be appreciated in another place. All who had the luck to know him personally will remember him as a broad-minded, friendly man. He always was interested in young people. He was a teacher with a high talent. He combined the qualities of a good scientist with his great humanity, what is not a common thing today. At his funeral his photo was distributed with this epigram: "Only important in life are the traces of love we are leaving behind when we pass away". He left us so many traces!

Norbert Walz

THE ROTIFER SYMPOSIA, 1976-1997

The following two figures summarize participation in the eight International Rotifer Symposia (I–VIII) that have been held over the past 2 decades (1976 to 1997). The data were complied from (1) participation lists from previous symposia (when available), (2) the authors whose names appear in each symposium volume, and (3) my fading memory. I conclude several things for these data.



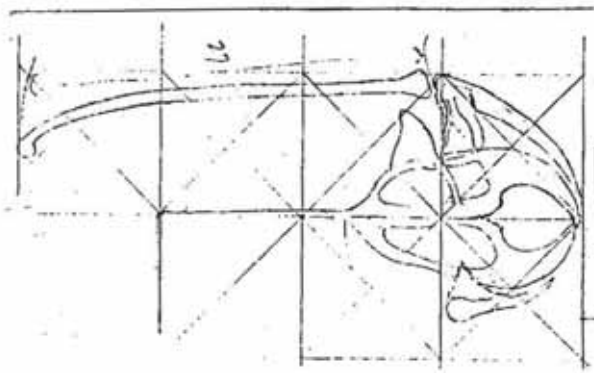


Cumulative Attendance Figure: (1) There have been 293 people who have attended one or more of the symposia since we began this activity in 1976 at Lunz Am See, Austria. (2) It looks as if most people attend only one meeting and then never come back again. I assume that some of these losses are due to retirement, pursuit of very different activities, and death, and that some workers are only peripherally interested in rotifers. Nevertheless, 180 people spread over 8 meetings averages to about 22 per meeting. Thus, this attrition may not be as severe as it seems. I suspect, but have not bothered to check that many of these "one-time-attendees" correlate to the host country. (3) On the other hand, there are 44 people who fall into the category of "hard-core" Rotiferologists; that is, people who have attended four or more of the symposia. (4) Twenty four people appear to be fanatical about these meetings or just like to travel (have attended 6 or more meetings). (5) It is sad to report that there are only four people left who have attended all eight meetings: John Gilbert, Claudia Ricci, Terry Snell, and Bob Wallace. However, there are an additional nine who have attended seven of the meetings: Henri Dumont, Jim Green, Charles King, Linda May, Maria Rosa Miracle, Tom Nogrady, Birger Pejler, Russ Shiel, and Peter Starkweather.

Symposia Total Attendance Figure: (1) After a steady rise through the first five or six meetings, we appear to have leveled off at just under 100 participants. So far we have not had the need to go to concurrent sessions, but I suspect that this is due to the use of poster sessions and evening workshops to get some of the papers presented. (2) While I will admit to the potential for errors in my list of those in attendance at the symposium, I believe that they are reasonably accurate. In any case, according to my records total of 39 different countries are represented by the participants in the eight symposia! Not surprising the host countries tend to provide the largest contingents. According to my count the following countries have participated in one or more of the symposia. (NB: The numbers reported here will not add up correctly as I have not been able to assign a country of record for some people.)

Argentina 3	France 12	Poland 14
Australia 1	Germany 27	Portugal 2
Austria 12	India 7	Romania 1
Belgium 24	Indonesia 2	Russia 5
Brazil 1	Israel 1	South Africa 1
Byelorussia 1	Italy 14	Spain 25
Canada 7	Japan 5	Sweden 10
Chile 1	Kuwait 3	Switzerland 1
China 3	Latvia 1	The Netherlands 6
Czeck Republic 1	Mexico 3	Thialand 2
Denmark 1	New Zealand 1	UK 18
Estonia 2	Norway 3	USA 44
Finland 2	Norway 7	Yugoslavia 2

Finally, it looks as if we have a very healthy population of workers in the field of rotiferology. Corrections and comments to Rotifer News, especially thus with additional or alternative interpretations of these conclusions are welcome. — Sincerely, Bob Wallace



From the pen of F.J. Myers, via Paul Turner (*Encentrum macretrophi*)

Rotifer VIII - St John's University, Minnesota, June 22-27 1997

The Eighth International Rotifer Symposium, hosted by Dr. Elizabeth Wurdak, was held during June 22-27, 1997, under the auspices of St. John's University, in Collegeville, about 70 miles northwest of Minneapolis and St. Paul, Minnesota. This was the first time for one of our symposia to be held in North America. The conference was attended by 93 persons from 21 countries. In this respect the number of persons attending the symposia appears to be levelling off; Bob Wallace will have a report about attendance at this and the previous seven symposia elsewhere in this issue of Rotifer News. [My how our family has grown!]

While previous symposia were held in Europe in places with very long histories, that of Collegeville only goes back to the middle of the last century when the Minnesota Teritory was first opened for settlement. Benedictine monks first arrived in 1856 and set up a school for boys and young men in St. Cloud a few miles east of Collegeville where they moved a few years later. Like other pioneers, they endured many hardships during their first years in the heavily forested land. As recently as 1875, travel from one farm to another required considerable time. Today, adjacent farms stretch from horizon to horizon.

St. John's University campus is today located on 2480 acres of woodlands and lakes including a 150 acre restoration project of wetlands, a tall-grass prairie and an oak savanna. Most of the participants were quartered comfortably on two floors of St. Mary hall. A short walk took us to the restaurant in the large Quadrangle and Great hall building. From there, a bit longer walk took us to the auditorium at the Science Center where our meetings were held. Poster sessions were combined with morning and afternoon coffee breaks in an adjoining room.

On Sunday evening, June 21st, the day of arrival for most of us, we gathered at Brother Willie's Pub in the Sexton Commons building for the Evening Reception and Welcoming by our hostess. The joyful evening was spent seeing old friends and meeting new ones.

On the following morning, the Opening Welcome was given by Brother Dietrich Reinhart, President, St. John's University and Dr. Elizabeth Wurdak. Oral communications followed.

About 60 oral communications were given during the week. Each generated interesting questions and discussions. Posters were set up in two sessions of about a dozen posters each. This offered an opportunity to display graphics, methods, the results of particular studies and hands-on demonstration of instruments. The informal setting was ideal for leisurely circulation and discussion.

We divided into two groups on Wednesday afternoon for the mid-symposium excursions and break; one went to the Twin Cities to the Science Museum in St. Paul and the Mall of America in Minneapolis and dinner; the other went on

a Mississippi River Cruise to a camp site and a picnic dinner. At the end of the boat trip, in recognition and appreciation of their contributions to the success of the symposium, Liz Wurdak and Bob Wallace were each given a double frame of two Eric Hollowday originals. On Friday we bussed to St. Joseph near St. Cloud to the College of St. Benedict, an undergraduate college for women. It offers the same curiculum as St. John's. We were treated to a splendidly set banquet hosted by Dr. Mary Lyons, President. During the dinner, John Gilbert spoke for all of us in appreciation of Liz Wurdak's contributions which made the symposium possible. Bob Wallace spoke on behalf of Birger Pejler, who could not be with us, and Ludmilla Kutikova. He presented them certificates of achievement for their life-long study of rotifers. After the dinner, we adjourned to the College Discotheque for a pleasant evening of dancing and visiting.

On Saturday, June 28th, we went on a post conference excursion to Lake Itaska State Park, about 110 miles north of Collegeville. The Park's biologists gave us a tour of their well equipped laboratory to which they bring students from the University of Minnesota for hands-on experience in ecology studies. They then took us to the headwaters of the Mississippi River in the Park.

The conference presented a singular oportunity for the discussion of matters related to rotifers and the exchange of ideas. The process continued during the entire week, at all meals and coffee breaks, on walks from one building to another, on bus trips and wherever we were.

Finally, I can't resist saying how I marvel at the number of colleagues who attend our conferences and the variety of disciplines. The attention given to our little rotifer friends has grown so exponentially since my contacts with Frank J. Myers in the 1930's when he gave me the addresses of 15 researchers with whom I should maintain contact.

Howard (Chico) Taylor

IXTH INT. ROTIFER SYMPOSIUM -THAILAND 2000

Location: Khon Kaen University (KKU), Khon Kaen, Thailand, hosted by Dr Laorsri Sanoamuang.

KKU is the first regional university in the northeast of Thailand. The university was established in 1964 as a decentralized development plan for higher education in Thailand. The campus covers an area of approximately 2,500 acres. It is located in a village of Ban Sithan about 4 kilometers from downtown Khon Kaen (population approx. 350,000) and 450 kilometers northeast of Bangkok. At present, KKU consists of 17 faculties with 12,000 students.

More information on the symposium, including deadlines, circulars, etc, will appear in later issues of *Rotifer News*.

The venue for Rotifer Symposium X (2003) will be in Austria, to commemorate the first meeting held at Lunz in 1976

ROTIFEROLOGY IN ARGENTINA

The first record of a rotifer species from Argentina was done at the end of the XIX century. Wierzejski (1892) recorded species of *Asplanchna*, *Polyarthra*, *Cephalodella*, *Euchlanis* and *Colurella* from Mendoza and Jujuy, in northern and western Argentina.

After this pioneer contribution, and during the first half of the XX century, few studies were carried out by foreign naturalists. Daday (1902) reported some rotifer species from Patagonia, and Alhstrom (1940, 1943), in his revisions of the genera *Keratella* and *Brachionus*, studied specimens from San Luis and Buenos Aires.

During the 1950's Thomasson published his studies on the so called Araucanian lakes at the Andean ranges (Thomasson 1953, 1955, 1957, 1959). At the same time, Dr S.R. Olivier, a professor from the University of La Plata, began his studies on the rotifer fauna of Buenos Aires province (Olivier 1955, 1961). Through the accumulation of his studies, he published the first comprehensive paper on rotifers of Argentina including descriptions and keys to genera and species, in 1965. Since this time a period of studies made by Argentinean researches has began. After the publication of his guide book, S. R. Olivier left studies on rotifers (he became an oceanographer) and donated part of his library to the National Institute of Limnology, Santo Tomé. Other researchers began to be interested in this group of invertebrates.

The bulk of the knowledge about Argentinean rotifers is mainly the product of ecological studies on zooplankton from rivers and lakes. Hence, the samples were not always obtained in the proper way to be used for taxonomic studies, mesh size too big, lack of narcotization and restriction to limnetic area, as some examples. Moreover, for a long time taxonomic studies have been not encouraged in Argentina. Since the earliest times, all the current Argentinean rotiferologists have received the generous help and encouragement from the German researcher Dr. Walter Koste.

The references on rotifers studies since 1965 to 1990 were compiled by Jose de Paggi (1990) and after this a dozen papers could be added. About 300 species of Monogononta were recorded but the identification of some species should be confirmed. Considering the latitudinal extension and climatic diversity of Argentina this figure is probably a very low estimate of its actual rotifer fauna. Bdelloidea are practically unknown.

An important part of the recorded species were found in La Plata River basin, principally in the Parana River and its floodplain. The rotifer fauna of this region is close to the tropical Brazilian fauna, exhibiting a high diversity of species of *Brachionus* and *Lecane*. Most of the numerous shallow lakes in Paraguay and Parana Rivers are densely vegetated, however littoral and, specially, soft bodied rotifers are insufficiently studied. In southern Argentina several endemic species of *Keratella* and *Brachionus* have been found (*K. ona*, *K. yamana*, *K. kostei*, *K. thomassoni*, *B. kultrum*).

During recent years various aspects of the ecology have been studied: succession of rotifer assemblages in Andean lakes and floodplain lakes (Modenutti, 1994, Jose de Paggi, 1993), population dynamics (Modenutti & Dieguez, 1995) rotifers from eutrophic rivers (Kuczynski, 1996), effects of predators on morphology of *Keratella tropica* (Marinone & Zagarese, 1991, Zagarese & Marinone, 1992), coloniality in *Conochilus* as a response to predation by copepods (Dieguez & Balseiro, in press).

The current staff of Argentinean rotiferologist is rather small; they work a universities and institutes far away each from other - hundreds of kilometers - in La Plata, Buenos Aires, Morón, Santo Tomé and Bariloche. Large gaps in the knowledge of the Argentinean rotifer fauna exist as to: high mountain, lakes, rice fields, shallow lakes of arid and semi-arid regions, coastal lagoons and also floodplains rivers, which are only partially known.

Susana Jose de Paggi

Call for material

For a study on trophi morphology in Floscullariacea, I am desperately seeking material of weird Floscullariacea. What I need most of all at the moment is:

Beauchampia crucigera — *Conochiloides dossuarius*
Octotrocha speciosa — *Horaella* species (whatever)

Any person having 3 to many specimens of any of these taxa is requested (begged!) to provide the material. This will, of course, be acknowledged.

For the Guide on Trichocercidae, I seek representatives *of Ascomorphella volvocicola* and *Elosa* (any taxon), for the same (trophi SEM). Material of weird *Trichocerca*'s is equally welcome.

If you can help with any of these, please send material to Hendrik Segers, Lab. of Animal Ecology, R.U.G., K.L. Ledegankstraat 35, B-9000 Gent, Belgium.

e-mail addresses

The following list of rotifer workers' e-mail addresses is taken from correspondence to MDFRC....if you are recently connected to the Internet, or did not attend the 1997 Minnesota rotifer meeting, please advise your e-mail address.... if anyone is missing from the list, has changed their address, or other amendment is required, please contact Russ Shiel directly <shielr@mdfrc.canberra.edu.au>.

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News'n'Views

A POST-SYMPOSIUM VISIT TO SEATTLE
Jim Green

After the splendid symposium at St. Johns, Mary and I took off for the North. First we went to the Rockies, to see Lake Louise and MoraineLake, and then to the Katmai Park in Alaska for a complete change fromrotifers - big brown bears. These are the most impressive of land carnivores, weighing up to 1500 lbs, and standing up to 8 feet tall. When you get close (as we did by accident) they induce a somewhat larger adrenaline rush than the average rotifer. On our way back to England we had to spend a night in Seattle, and we began to think of contacting Tommy and Yvette Edmondson, who we first met in 1959 when we were both working in the Institute at Pallanza.

When we arrived at our hotel we found that our travel agent had, in the words of the receptionist "been very creative". We had been allocated 'The Romance Suite'. We were not quite sure what this entailed, but after we had settled in there was a knock at the door, and a man appeared carrying a bottle of champagne on ice and a large plate of chocolate coated strawberries. We thought this ought to be shared, and, quite unreasonably, in the early evening we phoned Tommy and Yvette. They rose to the occasion magnificently, and drove some considerable distance to join us for dinner.

They were in fine form, and after dinner we chatted for many hours about rotifers and lakes, as we finished the champagne and strawberries. They explained that they had not attended the symposium because they were not working on rotifers at the moment. Tommy was also in process of reorganising after a fire in his department. Fortunately his room was not at the centre of the fire, but it did suffer water damage. This might well dismay a lesser man, but Tommy regarded it as a stimulus to reorganise.

As a boy I read that arachnologists live to a vigorous old age. Tommy and Yvette indicate that rotiferologists may well do the same.

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Found by Teri Holland, e-mailed by David Jenkins 15.xii.97. Taxonomic review is invited....tentatively named for Jenny Schmid-Araya, who first proposed the presence of such organisms at Rot. VIII!

Meeting on Shallow Lakes (3 - 8 August 1998

Venue: Blossin near Berlin, Germany.
Topic: Trophic Interactions in Shallow Freshwater and Brackish Lakes.
The second announcement with more informations can be obtained from Norbert Walz: <walz@igb-berlin.de>

or the web site can be visited: http://www-2.igb-berlin.de, where also registration can can be made.

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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, 5, 6, 7, 11, 12, 16, 18, 19, 20, 21, 22, 26, 33, 34, 36, 37, 39, 53, 54, 55, 60, 62, 65, 71, 74, 75, 78, 79, 80, 81, 88, 91, 92, 96, 98, 99, 100;

Anatomy/Morphology/Physiology: 4, 44, 49, 51;

Biochemistry/Genetics/Pharmacology: 30;

Biogeography/Taxonomy: 51, 63, 72, 82, 86;

Ecology/Population dynamics/Food webs: 2, 8, 9, 10, 15, 23, 25, 27, 28, 29, 30, 31, 32, 35, 36, 38, 40, 41, 42, 43, 44, 45, 47, 48, 50, 52, 57, 58, 59, 64, 66, 67, 68, 69, 70, 73, 74, 76, 77, 83, 84, 85, 87, 89, 90, 94, 97;

Reproduction: 46, 66;

Water quality/Toxicology: 3, 12, 13, 14, 17, 24, 31, 48, 61, 83, 93.

1. ABUREZQ, T.S., A.B. YULE & S.K. TENG, 1997. Ingestion, fecundity, growth rates and culture of the harpacticoid copepod, *Tisbe furcata*, in the laboratory. *Hydrobiologia* 347, 109-118. <<Kuwait Inst Sci Res, Mariculture & Fisheries Dept, Food Resources Div, POB 1638, Salmiya 22017, Kuwait.>> The ingestion, fecundity, growth rates and culture of the harpacticoid copepod, *Tisbe furcata*, fed different algal species at different cell densities were studied. The rotifer *Brachionus plicatilis* is mentioned.

2. ADRIAN, R. 1997. Calanoid-cyclopoid interactions - evidence from an 11-year field study in a eutrophic lake. *Freshw. Biol.* 38, 315-325. <<Forsch. Verbund. Berlin Ev., Inst. Gewässerökol. Binnenfischerei, Muggelseedamm 260, D-12562 Berlin, Germany.>> Describes population dynamics of copepods. Rotifers are mentioned as food items.

3. ADRIAENS, E., J. VOORSPOELS, J. MERTENS & J.P. REMON, 1997. Effect of absorption enhancers on ciliated epithelium - a novel *in vivo* toxicity screening method using rotifers. *Pharmac. Res.* 14, 541 - 545. <<State Univ. Gent, Pharm. Technol. Lab., Harelbekestr 72; B-9000 Ghent; Belgium.>> Not seen. Keywords abstracted: rotifers, *Brachionus calyciflorus*.

4. ALBRECHT, H. U. EHLERS & H. TARASCHEWSKI, 1997. Syncytial organization of acanthors of *Polymorphus minutus* (Palaeacanthocephala), *Neoechinorhynchus rutili* [Eoacanthocephala), and *Moniliformis moniliformis* (Archiacanthocephala) (Acanthocephala). *Parasitol. Res.* 83, 326 - 338.<<Univ. Göttingen, Zool. Inst. Mus. 2, Berliner Str. 28, D-37073 Göttingen, Germany.>> The syncytial organization of the epidermis with intraepidermal skeletal condensations and infoldings of the apical plasma membrane are characteristics inherited from a stem species common to Acanthocephala, Seison, and Rotifera.

5. AWAISS, A. & P. KESTEMONT, 1997. Production dynamic and nutritive quality of the freshwater rotifer *Brachionus calyciflorus*. *Aq. Living Resources* 10, 111-120. << Univ. Abdou Moumouni Dioffo, Dept Genie Rural Eaux & Forets, Fac. Agron., BP 10960, Niamey, Niger.>> Female origin (young amictic females or females first cultivated with *D. chlorelloides* affects significantly the results of production. At the end of the production cycle, rotifer density reached 245 and 188 ind. ml^{-1}, respectively. Regarding nutritional quality of rotifers, crude protein contents did not vary significantly throughout the production cycle (53.5-54.1% of dry matter).

6. BALOMPAPUENG, M.D., A. HAGIWARA, A. NISHI, K. IMAIZUMI & K. HIRAYAMA, 1997. Resting egg formation of the rotifer *Brachionus plicatilis* using a semi-continuous culture method. *Fisheries Science* 63, 236-241. <<Nagasaki Univ, Fac Fisheries, Bunkyo 1-14, Nagasaki 852, Japan.>>An average harvest of 9.0×10^4 resting eggs per a gram (dry weight) *N. oculata* was achieved, which was 2.5 times more efficient than that from batch cultures. Two out of four cultures collapsed on 15-20th days, probably due to the bacterial effect. The semi-continuous cultures were stabilized by placement of a nylon filter to remove particulate organic materials. With a filter, 1.3 times more resting eggs were harvested on average.

7. BALOMPAPUENG, M.D., N. MUNUSWAMY, A. HAGIWARA & K.HIRAYAMA, 1997. Effect of disinfectants on the hatching of marine rotifer resting eggs *Brachionus plicatilis* Müller. *Aquacult. Res.* 28, 559-565. << Univ Madras, Dept Zool,Unit Live Feed Culture, Madras 600025, Tamil Nadu, India.>> Scanning electron microscopy indicated that stored resting eggs of the marine rotifer *Brachionus plicatilis* Müller were colonized by numerous bacterial cells that affect the hatchability of resting eggs. Among antibacterial drugs, sodium nifurstyrenate (Erubaju) enhanced the hatching success rate to 40 +/- 1.2% and 20 +/- 1.1% for the freshly-collected eggs and stored resting eggs, respectively. However, tetracycline and oxytetracycline did not significantly influence the hatching of the stored eggs. These observations are discussed in relation to the development of an improved method for the processing and hatching of rotifer resting eggs.

8. BALSEIRO, E.G., B.E. MODENUTTI & C.P. QUEIMALINOS, 1997. Nutrient recycling and shifts in N-P ratio by different zooplankton structures in a south Abdes Lake. *J. Plankt. Res.* 19, 805 - 817.|<<Ctr Reg. Unov. Bariloche, Unid. Postal, RA-8400 San Carlos Barilo, Rio Negro, Argentina.>> Zooplankton succession is characterized by a change in the dominance from the calanoid copepod *Boeckella gracilipes* in winter and spring, to the cladoceran *Bosmina longirostris* in midsummer, and the rotifer *Polyarthra vulgaris* in late summer. We observed that changes in the zooplankton constitution over the annual cycle may change the nutrient supply ratio. In South Andes lakes, *B. gracilipes* would decrease the P limitation, lowering the N:P ratio, whereas *B. longirostris* tends to increase the N:P ratio and therefore increase the P limitation during summer.

9. BASS, J.A.B., L.C.V. PINDER & D.V. LEACH, 1997. Temporal and spatial variation in zooplankton populations in the River Great Ouse: An ephemeral food resource for larval and juvenile fish. *Reg. Riv. - Res. Managem.* 13, 245-258. <<Inst. Terr. Ecol., Monks Wood Expt Stn, NERC, Inst. Freshwater Ecol, Eastern Rivers Lab, Abbots Ripton, Huntingdon PE17 2LS, Cambs, England.>>. At main river sites Rotifera were strongly dominant, with peak numbers of 2000 l^{-1} to more than 18000 l^{-1}, corresponding closely with spring and early summer maximum concentrations of chlorophyll a. As rotifers are the main food for newly hatched cyprinids, spatial and temporal variation in their abundance relative to the spawning locations and hatching times of cyprinid eggs may have important consequences for the growth and survival of young fish.

10. BONECKER, C.C., S. LUIZ, S.L.C BONECKER, R.L. BOZELLI, F.A. LANSAC-TOHA & L.F.M. VELHO, 1997. Zooplankton composition under the influence of liquid wastes from a pulp mill in Middle Doce River [Belo Oriente, MG, Brazil). *Arquiv. Biol. Tecnol.* 39, 893 - 901. <<Univ. Estadual Maringa, DBI, Nupelia, Posgrad Ecol. Amb. Aq. Cont., Av Colombo 5790, BL H-90, BR-87020900 Maringa, Parana, Brazil.>> We recorded 53 species: 22 testate amoebae, 20 rotifers, 6 copepods and 5 cladocerans. In general, testate amoebae were the most important in the high discharge and rotifers, copepods, and cladocerans, during low discharge periods. A high proportion of species were accidental, typically littoral, periphytic and benthonic species. Environmental conditions during the study did not explain the spatial and temporal composition of the zooplankton. The discharge of liquid wastes, despite probably altering some limnological characteristics of the water, did not influence the richness of this community.

11. CARDONA, L., X. TORRAS, E. GISBERT & F. CASTELLO, 1996. The effect of striped grey mullet (*Mugil cephalus* L) on freshwater ecosystems. *Isr. J. Aquacult.-Bamidgeh* 48, 179-185. <<Univ. Barcelona, Fac. Biol, Dept Anim. Biol., Aquacult. Lab., Avda Diagonal 645, E-08028 Barcelona, Spain.>>Rotifers were a component of the plankton in this study, which showed that striped grey mullet obtain food both from the benthos and plankton and that they dramatically affect plankton and benthos composition. The experiment also showed that striped grey mullet have a detrimental effect on large zooplankton and chironomid midges, which constitute a significant proportion of the diet of common carp and tilapia, two species usually raised together with striped grey mullet. The reduction in these food sources might

explain why the performance of common carp and tilapia is affected by the presence of striped grey mullet, despite the overall increase in fish yield.

12. CHENG, S.H., T. SUZAKI & A. HINO, 1997. Lethality of the heliozoon *Oxnerella maritima* on the rotifer *Brachionus rotundiformis*. *Fish. Sci.* 63, 543 -546. <<Univ. Tokyo, Fac. Agr., Fisheries Lab., Maisaka, Shizuoka 43102, Japan.>>A heliozoon was isolated from a mass culture tank for rotifers when the production of the rotifer became unstable. When the heliozoon was placed with the rotifer, the rotifer gradually ceased to move, sank to the bottom, and finally died. 24 hours' LC50 for the rotifer was about 10^4 individ./ml. We identified the species as *Oxnerella maritima*. This is the first record of a heriozoon killing the rotifer *Brachionus rotundiformis*.

13. CLEMENT, B. R.C. JANSSEN & A. LE DUDELE-PIERRE, 1997. Estimation of the hazard of landfills through toxicity testing of leachates. 2. Comparison of physico-chemical characteristics of landfill leachates with their toxicity determined with a battery of tests. *Chemosphere* 35, 2783-2796. <<Ecole Super. Ingeniers Chambery, Lab. Biol. Biochim. Appl., Le Bourget du Lac, France.>> Rotifers were included as test organisms in a battery of tests. The results of multivariate analyses showed a general relationship between both data sets, namely the most (or least) contaminated samples were also generally the most (or least) toxic. These analyses also suggested that ammonia, alkalinity, and chemical oxygen demand (GOD) were associated with increasing toxicity. Simple and multiple regression analyses allowed to confirm the importance of ammonia and alkalinity for causing toxicity to most organisms. Luminescent bacteria, however, were found to be more sensitive to the organic load of the leachates.

14. COLMEN-AREJO, M.F., M.G. GARCIA, A. BUSTOS, R. BORJA & C.J. BANKS, 1997. The influence of wastewater type and organic loading on the protozoan and metazoan population of a peat bed filter. *J. Env. Sci. & Health A: Env. Sci. & Eng. Tox. & Haz. Subst. Contr.* 32, 145 - 152. <<CSIC, Ctr Ciencias Medioambientales, Serrano 115 Duplicado, E-28006 Madrid, Spain.>> Three peat bed filters treating wastewaters with differing proportions of industrial input were compared experimentally by analysis of their population structure. All three plants showed a high ciliated protozoan population density (10^5/l), but the least loaded system, which received only domestic wastewater, exhibited a 10 fold greater abundance and a redominance of *Paramecium*. The plants with an industrial input performed less well and showed a population structure predominated by *Chilodonella* and *Colpidium* as well as having substantial populations of nematodes and rotifers. Protozoans may contribute towards an enhanced BOD and COD removal efficiency and can be used as indicators of optimum oxygenation conditions with the peat bed.

15. COOK, J.L. & S.J. HERRMANN, 1997. New record of *Prostoma graecense* (Nemertea, Hoplonemertea) from southern Colorado, with observations on its feeding behavior and habitat. *Southw. Nat.* 42, 162 - 169. <<Texas A&M Univ. Dept Entomol., College Stn, TX 77843. USA.>> The freshwater nemertine *Prostoma graecense* is reported for the first time from the Rocky Mountain region of the United States. The community of the habitat containing *P. graecense* included larvae of four species of flies (Diptera), one aquatic

oligochaete, one nematode, and one rotifer. *Prostoma graecense* appeared to rely on insect larvae as a primary food source. Feeding behavior and habitat characteristics of *P. graecense* are described.

16. DAVIS, D.A. & C.R. ARNOLD, 1997. Tolerance of the rotifer *Brachionus plicatilis* to ozone and total oxidative residuals. *Ozone - Science & Engineering* 19, 457-469.<<750 Channelview Dr, Port Aransas, TX 78373 USA.>> Ozone is utilized extensively by commercial operators for disinfection and treatment of culture water, but there is limited data on tolerance of rotifers to ozone, residual oxidants associated with using ozone in seawater and the efficacy of an ozone wash. A "no observable effect concentration" (NOEC) of 0.22 mg/L TRO was determined for maximum survival of the rotifers. High levels of ozone (greater than or equal to 1.63 mg/L) were found to inactivate rotifer eggs. Based on published values of the inactivation of bacterial and viral pathogens, a NOEC of 0.22 mg/L TRO would appear to be sufficient to inactivate a variety of surficial potential pathogens.

17. DEL VALLS, T.A., L.M. LUBIAN, J.M. FORJA & A. GOMEZ-PARRA, 1997. Comparative ecotoxicity of interstitial waters in littoral ecosystems using Micotox® and the rotifer *Brachionus plcatilis*. *Env. Toxicol. Chem.* 16, 2323 - 2332. <<Univ. Cadiz, Fac. Ciencias Mar., Dpto Quim. Fis., Aptdo 40, E-11510 Puerto Real, Cadiz, Spain.>> The toxic effects of sediment interstitial waters collected from seven littoral sites in the Gulf of Cadiz were tested with the Microtox(R) assay and a 7-d *Brachionus plicatilis* (Rotifera) decline test. A general agreement was found between toxicity values determined by *Brachionus plicatilis* and *Photobacterium phosphoreum*, except in the case of interstitial water toxicity from mixtures of heavy metals. The interstitial water guidelines, in terms of concentrations at or below which biological effects have been shown to be minimal (mg/L), are: DOG, 12.8; phosphate, 0.28; LAS, 80.4; ammonia, 12.1; chromium, 0.0045.

18. DENSON, M.R. & T.I.J. SMITH, 1997. Tank culture of larval sunshine bass. *Prog. Fish-Cult.* 59, 59 - 63. <<S. Carolina Dept Nat. Res., POB 12559, Charleston, SC 29422, USA.>> Techniques are described to intensively rear larval sunshine bass, the hybrid of female white bass *Morone chrysops* and male striped bass *M. saxatilis*. Cumulative survival from age 3-46 d was approximately 38%, which is comparable to that of extensive pond culture systems. The intensive tank culture techniques, when coupled with controlled spawning of domesticated broodstocks, should allow year-round production of juveniles for use in the expanding hybrid striped bass aquaculture industry.

19. DHERT, P., K. SCHOETERS, P. VERMEULEN, J. SUN, S. GAO, Z .SHANG, X. NAIHONG, H .VANDUFFEL & P. SORGELOOS, 1997. Production, disinfection and evaluation for aquaculture applications of rotifer resting eggs from Bohai Bay, PR of China *Aquacult. Internat.* 5, 105-112. <<State Univ Ghent, Lab Aquaculture, Rozier 44, B-9000 Ghent, Belgium.>> In the natural environment as well as in semi-controlled rearing conditions an increased resting egg production was noticed with declining food availability. Processed resting eggs had a hatching efficiency of 3 x 10^6 rotifers per gramme irrespective of their origin. The resting eggs used for storage could easily be disinfected without affecting their hatching characteristics. These results

indicate that this material could be used as inocula for mass cultures of live food for commercial hatcheries.

20. DIAZ, M., F.J. MOYANO, F.L. GARCIA-CARRENO, F.J. ALARCON & M.C. SARASQUETE, 1997. Substrate-SDS-PAGE determination of protease activity through larval development in sea bream. *Aquacult. Internat.* 5, 461-471.<<Univ Almeria, Escuela Politecn Super, Dpto Biol. Aplicada, La Canada S-N, Almeria 04120, Spain.>> Identification of alkaline proteases produced during larval stages of gilthead sea bream, *Sparus aurata* and food items *Brachionus plicatilis* and *Artemia* nauplii, was achieved using SDS-PAGE and specific inhibitors. Trypsin-like proteases were prominent during the 4 weeks after hatching, but the number of enzyme species was reduced in adult fish. Alkaline proteases present in the rotifer and *Artemia* showed clear differences when compared with those of the larvae and were not detected in extracts obtained from fed larvae. The results obtained provide information about the role of exogenous enzymes in larval feeding of sea bream.

21. DURAY, M.N., C.B. ESTUDILLO & L.G. ALPASAN, 1997. Larval rearing of the grouper *Epinephelus suillus* under laboratory conditions. *Aquaculture* 150, 63-76. <<SE Asian Fisheries Dev. Ctr, Dept Aquaculture, POB 256, Iloilo 5901, Philippines.>> A protocol for rearing orange-spotted rockcod, *Epinephelus suillus* in the hatchery is described. The feeding regime consisted of *Chlorella, Brachionus, Artemia* and minced fish. With this regime, survival rates at Day 24 were 19.8% in 3-ton tanks and only 7.4% in 0.5-ton tanks. From an initial length of 1.62 mm on Day 0, larvae grew to 10.94 mm on Day 24 and 51.4-65.1 mm on Day 60. Larval growth and survival rate were improved when larvae were fed screened (less than 90 µm) *Brachionus* during the first 2 weeks. Survival was even better among larvae fed *Brachionus* until Day 35. *Artemia*, at a density of 3 ml^{-1} given once daily to larvae in 24 ppt seawater improved growth and survival.

22. FERNANDEZ-DIAZ. C. & M. YUFERA, 1997. Detecting growth in gilthead seabream, *Sparus aurata* L., larvae fed microcapsules. *Aquaculture* 153, 93 - 102.<< CSIC, Inst Ciencias Marinas Andalucia, Aptdo Oficial, Puerto Real 11510, Cadiz, Spain.>>Rotifers were included in the live feeding regime. This study indicates that *S. aurata* larvae are able to grow when fed only microcapsules, although with a low growth rate probably due to a lower assimilation of the diet. Further experiments testing other sources of protein and additives are needed in order to understand the factors that are limiting larval growth.

23. FISCHER, J.M. & T.M. FROST, 1997. Indirect effects of lake acidification on *Chaoborus* population dynamics - the role of food limitation and predation. *Can. J. Fish. Aquat. Sci.* 54, 637 - 646. <<Univ. Wisconsin, Ctr Limnol., 680 N Pk St; Madison, WI 53706, USA.>> Although rotifer biomass increased significantly during the acidification, *C. punctipennis* did not respond in a consistent manner to variation in food availability. *C. punctipennis* abundance increased dramatically when abundance of the predator *Mesocyclops edax* declined to near zero. Invertebrate predation may create a juvenile bottleneck for populations of small-bodied *Chaoborus* species in moderately productive acidified lakes.

24. FLIEDNER, A., A. REMDE, R. NIEMANN, C. SCHAFERS & B. STEIN, 1997. Effects of the organotin pesticide azocyclotin in aquatic microcosms . *Chemosphere* 35, 209-222.<<Frauenhofer Inst. Umweltchemotoxikol., D-57392 Schmallenberg, Germany.>> Zooplankton was affected at nominal concentrations greater than or equal to 45 µg/L. Phyllopoda and nauplia of copepods reacted sensitively whereas direct effects on rotifers and ostracodes were not observed. Changes in meiozoobenthon structure were evident in microcosms treated with greater than or equal to 135 µg/L azocyclotin. The results indicate that under the experimental conditions nominal concentrations of 135 µg/L azocyclotin applied as soil slurry had severe effects on the biocenoses.

25. FOX, J.W. & D.C. SMITH, 1997. Variable outcomes of protist-rotifer competition in laboratory microcosms. *Oikos* 79, 489-495.<<Rutgers State Univ, Cook Coll., Dept Ecol. Evolut. & Nat. Resources, POB 231, New Brunswick, NJ 08906 USA.>> When grown monospecifically, the rotifer *Philodina* sp. and the protist *Paramecium multimicronucleatum* were similar in terms of mean efficiency of bacterial grazing in batch culture. When cultured together, the identity of the dominant species varied: *Philodina* dominated 3 of 5 replicates, while *Paramecium* dominated the remaining 2 replicates. The variable competitive outcome is predicted by variation in mean grazing efficiency when each species is raised alone.

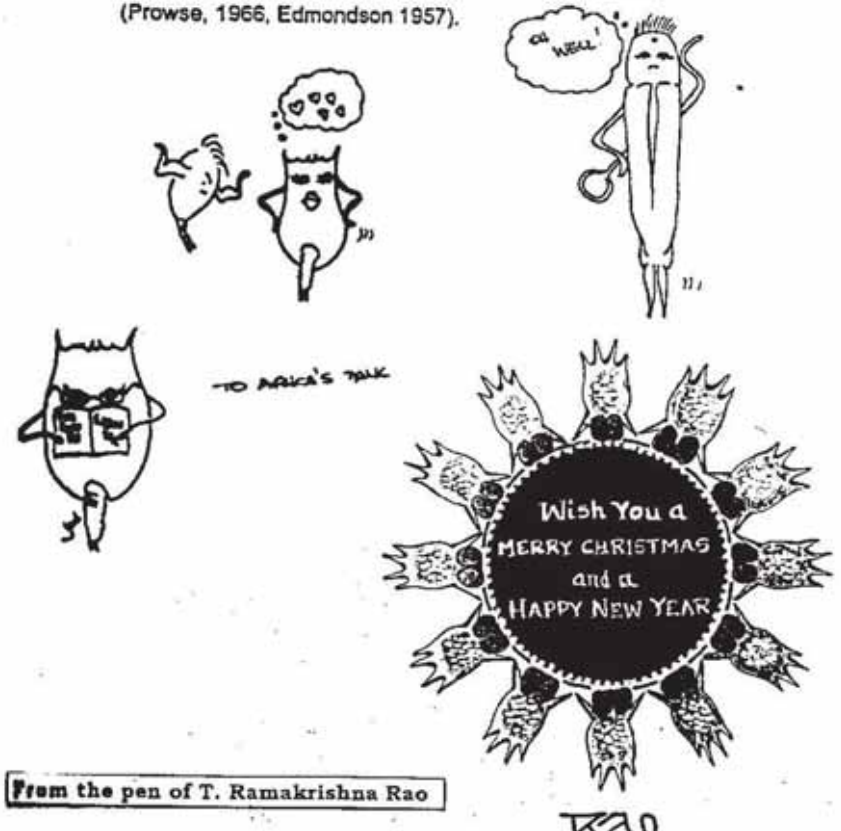
26. GATESOUPE, F.J. 1997. Siderophore production and probiotic effect of *Vibrio* sp. associated with turbot larvae, *Scophthalmus maximus*. *Aquat. Living Res.* 10, 239 - 246.<<IFREMER, Ctr Brest, INRA, Unite Mixte Nutr. Poissons, BP 70; F-29280 Plouzane, France.>>The proportion of *vibrio* E, dominant in healthy turbot larvae, was artificially increased in the rotifer enrichment medium. The main effect of this *vibrio* enrichment was to improve the resistance of larval turbot challenged with a pathogenic strain of *Vibrio splendidus, vibrio* P. There was also an increase of the growth rate due to either the siderophore treatment or the vibrio enrichment, as well. No further improvement was observed when the rotifers were simultaneously both treated and enriched. It was concluded that the probiotic effect of vibrio E may be at least partly due to competition for iron with the pathogen.

27. GILBERT, J.J. 1996. Effect of food availability on the response of planktonic rotifers to a toxic strain of the cyanobacterium *Anabaena flos-aquae*. *Limnol. Oceanogr.* 41, 1565-1572.<< Dartmouth Coll., Dept Biol. Sci., Hanover, NH 03755 USA.>> The ability of food concentration to modify the response of zooplankton to toxic cyanobacteria was examined using chronic (lifetime) toxicity tests with two rotifers, *Brachionus calyciflorus* and *Synchaeta pectinata*, and a strain of *Anabaena flos-aquae* producing the alkaloid neurotoxin, anatoxin-a. Results suggest that the degree to which toxic cyanobacteria affect the population dynamics of susceptible zooplankton taxa in natural communities may be greatly influenced by modifying environmental factors such as food availability and temperature, especially if these factors act additively or synergistically.

From the pen of Jenny Schmid-Araya
(with apologies for loss of clarity
during electronic transfer)

It is generally conceded that the Rotifera are the most important soft-bodied invertebrates (Hutchinson, 1967).

The significance of the Rotifera is based upon their abundance and their role as intermediates in the aquatic food web. Most rotifers are primary consumers feeding on various-sized phytoplankton, some feed on detrital elements and bacteria and some are raptorial predators (Edmondson 1957). Rotifers in turn are preyed upon by small fish and predaceous plankton (Prowse, 1966, Edmondson 1957).



From the pen of T. Ramakrishna Rao

RAO

Delhi, India
Dec. 1997

28. GLOCKLING, S.L. 1997. *Zoophagus cornus* - a new species from Japan. *Mycol. Res.* 101, 1179 - 1182. <<Forestry & Forest Prod. Res. Inst., POB 16; Ibaraki, Osaka 305, Japan.>>A new species of *Zoophagus, Z. cornus*, capturing loricate rotifers on short peg-like traps, was isolated from paddy field mud in Ibaraki, Japan. The fungus produced long, narrow, cylindrical, aseptate conidia. Azygospores containing a large vacuole were produced directly from the hyphae.

29. GLOCKLING, S.L. & M.W. DICK, 1997. New species of *Chlamydomyzium* from Japan and pure culture of *Myzocytiopsis* species. *Mycol. Res.* 101, 883 - 896. <<Forestry & Forest Prod. Res. Inst., POB 16, Ibaraki, Osaka 305; Japan.>> Four isolates of Myzocytiopsidales infecting *Rhabditis* nematodes, Distylae rotifers and nematode eggs, are described. Some of these, and other species of Myzocytiopsidales, were obtained in pure culture for the first time. Reinfection of host organisms from pure culture, fulfilling Koch's postulates was achieved for all species in axenic culture.

30. GOMEZ, A., M.J. CARMONA & M. SERRA, 1997. Ecological factors affecting gene flow in the *Brachionus plicatilis* complex (Rotifera). *Oecologia* 111, 350-356. << Univ. Valencia, Dept Microbiol. & Ecol., E-46100 Burjassot, Valencia, Spain.>>We investigated how adaptation to salinity and temperature acts as reproductive barriers in three sympatric species from the *Brachionus plicatilis* species complex. We found differences is the growth response of the three species to both factors and in the pattern of bisexual reproduction. These differences help to explain patterns of succession observed in the field. We conclude that these ecological factors. together with mate recognition systems, account for the absence of gene flow in these sympatric species.

31. GOMEZ, A., G. CECCHINE & T.W. SNELL. 1997. Effect of pentachlorophenol on predator-prey interaction of two rotifers. *Aquatic Toxicology* 37, 271-282. << Univ. Valencia, Dept Ecol. & Microbiol., E-46100 Burjassot, Valencia, Spain.>>*Asplanchna girodi* and *Brachionus calyciflorus* were used. The main toxic effects observed were on the predator and involved the number of predator-prey encounters. Encounters decreased in a dose-dependent manner, with a no observed effect threshold at 0.11 mg PCP l(-1). Decrease in encounter rate reduced the number of captures, ingestions, and time to first ingestion, parameters that are directly related to the predator's fitness. The importance of these results in assessing potential damage to functional relationships in aquatic ecosystems is discussed.

32. GOSSELAIN, V., L. VIROUX & J.-P. DESCY, 1998. Can a community of small-bodied grazers control phytoplankton in rivers? *Freshw. Biol.* 39, 9-24. <<Unit of Freshw. Ecol. , Fac. Univ. Notre-Dame de la Paix, 61 Rue de Bruxelles, 5000 Namur, Belgium.>> Rotifer grazing accounted for 40-130% of total zooplankton community grazing in this study in the Rive Meuse. Highest grazing rates (0.5-4.0 g C m^{-2} day^{-1}) were in summer, coinciding with most dense rotifer populations.

33. GRISEZ, L. J. REYNIERS, L. VERDONCK, J. SWINGS & F. OLLEVIER, 1997. Dominant intestinal microflora of sea bream and sea bass larvae, from two hatcheries, during larval development. *Aquaculture* 155, 387 - 399. <<Katholieke Univ. Leuven, Inst. Zool., Lab Ecolaquacultuur, Naamsestr 59; B-

3000 Louvain; Belgium.>> The intestinal microflora of larval sea bream (*Diventrarchus labrax*) and sea bass (*Sparus aurata*) from two marine hatcheries (Greece and Spain) was studied. Samples for bacteriological analysis were taken during feeding regimes of the larvae with rotifers and *Artemia*. When the larvae were fed with rotifers, the incidence of *Vibrio anguillarum, Vibrio tubiashii* and non-vibrio groups was high. Fluctuations in the composition of the dominant microflora appeared to reflect the bacterial composition of the ingested live feed. In both samples, *V. anguillarum* was dominant as associated with the feeding with rotifers.

34. HAGIWARA, A, M.D. BALOMPAPUENG, N. MUNUSWAMY & K. HIRAYAMA, 1997. Mass production and preservation of the resting eggs of the euryhaline rotifer *Brachionus plicatilis* and *B. rotundiformis*. *Aquaculture* 155, 223 - 230.<<Nagasaki Univ., Fac. Fisheries, Bunkyo 1-14, Nagasaki 852, Japan.>>The efficiency of resting egg production can be improved by employing semi-continuous culture method. Rotifer culture was stabilized by placing filtration mats to remove organic material. Thus harvests of 8.1 x 10^3 resting eggs/day/g (dry weight) *Nannochloropsis oculata* were achieved, which is 5.0 times more efficient than that from batch cultures. Resting eggs can be stored in sea water for more than 20 years at 5 °C under complete darkness. Hatch rates of the eggs, however, decreased when stored with abundant organic matter. Resting eggs could be canned under an atmospheric pressure of 48-61 kPa after lyophilization (-30 °C) without reducing their hatch rates.

35. HANSEN, A.M., F.O. ANDERSEN & H.S. JENSEN, 1997. Seasonal pattern in nutrient limitation and grazing control of the phytoplankton community in a non-stratified lake. *Freshw. Biol.* 37, 523 - 534. <<Odense Univ., Inst. Biol., DK-5230 Odense M, Denmark.>> Natural phytoplankton assemblage bioassays showed increasing importance of nutrient limitation during summer. High abundance of cladocerans and rotifers resulted in significant grazing impact, while cyclopoid copepods had no significant effect on the phytoplankton biomass. Regeneration of ammonium and phosphate by zooplankton were periodically important for phytoplankton growth. A comparison of nutrient regeneration by zooplankton with nutrient inputs from sediment and external sources indicated that zooplankton may contribute significantly in supplying N and P for the growth of phytoplankton.

36. HANSEN, B., T. WERNBERG-MOLLER & L. WITTRUP, 1997. Particle grazing efficiency and specific growth efficiency of the rotifer *Brachionus plicatilis* (Müller). *J. Exp. Mar. Biol.Ecol.* 215, 217-233. << Roskilde Univ. Ctr, Dept Chem. & Life Sci., POB 260, DK-4000 Roskilde, Denmark.>> A complete particle retention spectrum for the grazing of *Brachionus plicatilis* on phyto; plankton of different cell size revealed optimal grazing on an algae (*Petraselmis suecica*) with an equivalent spherical diameter (ESD) of 8.3 µm. Furthermore, although grazing sub-optimally, the rotifer grazed with an equal efficiency (60%) on two different algae *Rhodomonas baltica* and *Thalassiosira fluviatilis* with equivalent spherical diameters of 6.5 µm and 12.9 µm, respectively, when they were offered one algae at a time. as well as the high energy requirement during starvation supports the idea that the rotifer follows a life strategy with a fast growth response.

37. HAROON, A.K.Y. & K.A. PITTMAN, 1997. Diel feeding pattern and ration of two sizes of silver barb, *Puntius gonionotus* Bleeker, in a nursery pond and ricefield. *Aquacult. Res.* 28, 847 - 858. <<Fisheries Res. Inst., Riverine Stn, Chandpur 3602, Baburhat, Bangladesh.>> Feeding at high levels went on throughout the day and on moonlit nights for small fish, and their diet was dominated in both environments by aquatic macrophytes as well as *Microcystis, Spirogyra, Oedogonium* and *Cladophora*, rotifers, crustaceans and insects. Improved fish yields may be achieved by stocking small *P. gonionotus* where the available food resources include important amounts of zooplankton, and by allowing aquatic macrophytes and weeds to grow in the ricefield or pond after stocking, such that the growing fish can feed increasingly on these.

38. HARVEY, E.A. & C.E. EPIFANIO, 1997. Prey selection by larvae of the common mud crab *Panopeus herbstii* Milne-Edwards . *J. Exp. Mar. Biol. Ecol.* 217, 79 - 91. <<Univ. Delaware, Coll. Marine Studies, 700 Pilottown Rd, Lewes, DE 19958, USA.>>Mud crab larvae were fed mixed diets consisting of defined ratios of brine shrimp, *Artemia* sp., and rotifers, *Brachionus plicatilus* Müller. Early-stage larvae (zoeae I) showed a strong preference for rotifers. Late-stage larvae (zoea IV) showed strong preference for brine shrimp. Results of the study suggest that *P. herbstii* larvae are able to discriminate between rotifers and *Artemia*. This discrimination may be based on size and perhaps swimming speed, and the mechanism is non-visual. The relevant sensory system may involve mechanoreceptors, but this has not been verified experimentally.

39. HARZEVILI, A.R.S., H. VANDUFFEL, T. DEFOORT, P. DHERT, P. SORGELOOS, & J. SWINGS, 1997. The influence of a selected bacterial strain *Vibrio anguillarum* TR 27 on the growth rate of rotifers in different culture conditions. *Aquacult. Internat.* 5, 183-188. .<<State Univ Ghent, Lab. Aquaculture, Rozier 44, B-9000 Ghent, Belgium.>> (Not seen) Keywords: rotifer, *Brachionus plicatilis*, salinity, specific growth rate, *Vibrio anguillarum* temperature, survival, flora.

40. HOPP, U., G. MAIER & R. BLEHER, 1997. Reproduction and adult longevity of five species of planktonic cyclopoid copepods reared on different diets - a comparative study. *Freshw. Biol.* 38, 289-300.<<Univ. Ulm, Dept Biol. Ecol. Morphol. Anim. 3, Albert Einstein Allee 11, D-89069 ULM, GERMANY.>> Rotifers were included in a mixed diet fed to five planktonic cyclopoid copepods. All species had a significantly lower reproductive output and a shorter or unchanged adult lifespan on pure algae compared with the mixed diet. Adult lifespan was the same under both food regimes. The adult cyclopoids tested are primarily omnivorous, but utilize algae which are frequently sufficient for egg production.

41. HUXLEY, I., J.C. NEJSTGAARD, I. GISMERVIK & P.T. SOLBERG, 1997. Feeding and reproduction by *Calanus finmarchicus*, and microzooplankton grazing during mesocosm blooms of diatoms and the coccolithophore *Emiliania*. *Mar. Ecol.-Prog. Ser.* 147, 197 - 217. <<Univ. Bergen, Dept Fish. Mar. Biol., Bergen High Technol. Ctr, N-5020 Bergen, Norway.>> The copepod preferred ciliates greater than or equal to 30 µm, but ciliates <30 µm, diatoms and rotifers were also occasionally preyed upon at high rates. A method to

correct copepod feeding rate measurements for errors due to loss of microzooplankton grazing in the incubation bottles is presented.

42. JACK, J.D. & J.J. GILBERT, 1997. Effects of metazoan predators on ciliates in freshwater plankton communities. *J. Eukary. Microbiol.* 44, 194-199. <<Western Kentucky Univ, Dept Biol., Bowling Green, KY 42101 USA.>> Studies have generally shown that metazoans can reduce ciliate population growth rates, but this impact varies greatly with the ciliate and metazoans involved. Smaller ciliates are generally more vulnerable to metazoan predators than larger species, although this relationship will be affected by the defenses a ciliate may possess. The structure of the metazooplankton community itself will also affect ciliate-metazoan interactions. The suppression of ciliate populations by metazoans has important ecological consequences, and more study is needed to understand the interaction of these groups in aquatic systems.

43. JEPPESEN, E., M. ERLANDSEN & M. SONDERGAARD, 1997. Can simple empirical equations describe the seasonal dynamics of bacterioplankton in lakes?- an eight-year study in shallow hypertrophic and biologically highly dynamic Lake Sobygard, Denmark. *Microb. Ecol.* 34, 11 - 26.<<Natl Environm. Res. Inst., Dept Lake/Est. Ecol., Vejlsovej 25, POB 314, DK-8600 Silkeborg, Denmark.>>The impact of different zooplankton varies considerably, with *Daphnia* seeming to have a negative impact on bacterioplankton abundance and, thereby, indirectly on bacterioplankton production, while *Bosmina*, rotifers, and cyclopoid copepods seem to stimulate both abundance and production. *Bosmina* apparently also stimulate the bacterioplankton specific growth rate.

44. JURGENS, K., H. ARNDT & H. ZIMMERMANN, 1997. Impact of metazoan and protozoan grazers on bacterial biomass distribution in microcosm experiments. *Aquatic Microb. Ecol.* 12, 131-138. <<Max Planck Inst. Limnol., POB 165, D-24302 Plön, Germany.>> Moderate biomasses of copepods, rotifers or small cladocerans (*Bosmina longirostris, Ceriodaphnia reticulata*) had no or only weak effects on protozoan development. In contrast, *Daphnia* (*D. galeata, D. magna*) in higher densities consumed protozoans and bacteria simultaneously. These model experiments illustrate the different impacts of metazoan and protozoan grazers which could both control bacterial production but produced a very different bacterial biomass distribution.

45. KARABIN, A., J. EJSMONT-KARABIN & R. KORNATOWSKA, 1997. Eutrophication processes in a shallow, macrophyte-dominated lake - nutrient loading to and flow through Lake Luknajno (Poland) - factors influencing zooplankton structure and density in lake. *Hydrobiologia* 342, 401-409. <<Polish Acad. Sci., Inst. Ecol., Hydrobiol. Stn, PL-11730 Mikolajki, Poland.>> Influence of abiotic (temperature, concentration of nutrients) and biotic (macrophytes, phytoplankton, fish predation) factors on the species composition and seasonal dynamics of the zooplankton community (Rotifera and Crustacea) was analyzed. Strong interrelations between phyto- and zooplankton as well as the long-term effect of predation by fish on zooplankton were observed. An analysis of the qualitative and quantitative structure of zooplankton was used to assess the trophic state of Lake Luknajno.

46. KIRK, K.L. 1997. Egg size, offspring quality and food level in planktonic rotifers. *Freshwater Biology* 37, 515-521. <<New Mexico Inst. Min. & Technol., Dept Biol., Socorro, NM 87801 USA.>> *Brachionus calyciflorus* and *Synchaeta pectinata* egg size was positively correlated with offspring quality. Neither rotifer species changed its egg size as predicted by food-level theory. The lack of fit to theory may have occurred because of constraints on minimum or maximum egg size, constraints on total reproductive effort, or because offspring fitness is influenced by traits in addition to neonate starvation time.

47. KOBAYASHI, T. 1997. Associations between environmental variables and zooplankton body masses in a regulated Australian river. *Mar. Freshw. Res.* 48, 523-529.<< NSW Environm. Protect. Author., Locked Bag 1502, Bankstown, NSW 2200, Australia.>> Mean body masses of protists, rotifers and copepods and of the community (including cladocerans) were correlated significantly with one to three examined variables that tended to intercorrelate. The mean body mass of rotifers showed a positive correlation with the biomass, that of protists was negatively correlated with temperature, that of copepods was negatively correlated with river flow rate and chlorophyll a concentration, while the mean body mass of cladocerans showed no significant correlation with any of the examined variables in both simple and partial correlations. Although the results of this study should be regarded as exploratory, the differing associational patterns indicate that there may be no single mechanism regulating the body sizes of populations and communities of river zooplankton.

48. KOIVISTO, S., M. ARNER & N. KAUTSKY, 1997. Does cadmium pollution change trophic interactions in rockpool food webs? *Environ. Toxicol. Chem.* 16, 1330-1336. <<Univ. Stockholm, Dept Syst. Ecol., S-10691 Stockholm, Sweden.>>Experimental food webs with two and three trophic levels were composed of phytoplankton, small-bodied zooplankton (*Chydorus sphaericus*, *Cyclops* sp., and rotifers), *Daphnia magna*, and *Notonecta* sp., a zooplanktivorous predator. The results showed that phytoplankton and *Daphnia* were consumer regulated in both control and cadmium treatments, although resource availability ultimately determined the biomass at each trophic level. Cadmium significantly reduced phytoplankton and *Daphnia* but did not change the trophic interactions between them.

49. KOTIKOVA, E.A. 1997. Distribution of catecholamine-ergic neurons in nervous system of Rotifera. Zool. Zh. 76, 1277-1282. <<Russian Acad. Sci., Inst. Zool., St Petersburg 199034, Russia.>>Three progressive stages of evolutionary differentiation of brain ganglion are described from five species of rotifer distant systematically from each other: the primitive species *Philodina* sp., *Dicranophorus forcipatus*, *Lecane arcuata*, *Brachionus quadridentatus* and *Asplanchnopus multiceps*. Differences could be detected in the pattern of brain neurons, mastax and food innervation. CA-ergic neurons comprise only a minor peripheric part of the brain. Variations are detected both in the innervation of different types of mastax and within one mastax type.

50. LAMHOAI, T., C. ROUGIER & G. LASSERRE, 1997. Tintinnids and rotifers in a northern Mediterranean coastal lagoon. Structural diversity and function through biomass estimations. *Mar. Ecol.- Prog. Ser.* 152, 1-25.

>>Univ. Montpellier 2, Umr CNRS 5556, Lab. Hydrobiol., Case 093, Pl E Natallion, F-340095 Montpellier 05, France.>> An ordination of taxa biomasses showed 2 main factors which might have contributed to the organization of tintinnid and rotifer assemblages: the geographical position, which integrated the lagoon-sea water exchange, and the thermal period, which reflected both the populations' development cycles and the environmental constraints. The capacity of the tintinnids and rotifers to quickly colonise the habitat (reproduction modes, resistance forms) and to use a wide range of food resources (organic matter, bacteria, pico- and nanoplankton) likely enhances their ability to serve as trophic Links between primary and secondary producers. Hence, their function in the lagoon ecosystem is not minor.

51. LEBEDEVA, L.I. & O.N. ORLENKO-NOGINOVA, 1997. Morphometry of *Brachionus plicatilis* (Rotifera, Brachionidae) from the Caspian Sea region. Zool. Zh. 76, 771 - 776. <<Moscow M.V. Lomonosov State Univ., Fac. Biol., Moscow 119899, Russia.>> Only forms from two ponds could be referred to S-type, the rest occurred an intermediate position between S and L types. The range of the lorica length in all the investigated *B. plicatilis* populations was 164-383 µm, width 123-254 µm. We refer the Mangyshlak race to a relatively large variety of this species. In laboratory culture the lorica dimensions of the Mangyshlak race rotifers differed little from those in nature.

52. LEBLANC, J.S., W.D. TAYLOR & O.E. JOHANNSSON, 1997. The feeding ecology of the cyclopoida copepod *Diacyclops thomasi* in Lake Ontario. *J. Gt Lakes Res.* 23, 369 - 381. <<Univ. Waterloo, Dept Biol., Waterloo; ON N2L 3G1; Canada.>> Prey items were generally microplankton-sized (15-100 µm), motile, and without any hard external covering. *Diacyclops* had no effect on non-motile algae, small flagellates (15 µm), or on organisms with tests or lorica. *Keratella cochlearis* was the most abundant rotifer through most of the stratification period but was not consumed by *Diacyclops*. However, we present evidence that *Diacyclops* preys on the eggs of this species without consuming the females to which the eggs are attached.

53. LEE, C.S., P.S. LEUNG & M.S. SU, 1997. Bioeconomic evaluation of different fry production systems for milkfish (*Chanos chanos*). *Aquaculture* 155, 367-376. <<Ocean Inst., Makapuu Point, Waimanalo, HI, 96795, U.S.A.>> The industry has relied on wild-caught milkfish fry, which is unpredictable, until hatchery fry became available in 1987. Two milkfish fry production systems, intensive and semi-intensive system, are available. The production cost for 1000 fry is US$27.40 for the intensive and US$6.67 for a semi-intensive system. It is concluded that semi-intensive or outdoor system is a profitable operation for milkfish fry production in Taiwan.

54. LEU, M.Y. 1997. Natural spawning and mass larviculture of black porgy *Acanthopagrus schlegeli* in captivity in Taiwan. *J. World Aquacult. Soc.* 28, 180-187. <<Natl Mus. Mar. Biol. Aquarium, Husb. Ctr, Pingtung 941. Taiwan.>> Hatched larvae were fed initially on rotifers, *Brachionus plicatilis*, followed by *Artemia* nauplii, and finally weaned onto an artificial diet. Juveniles grew to size of 83.7-101.4 mm total length with survival rate of 27.9-28.2% in 100 d. The results indicate that the present technique can be used for mass seed production of black porgy.

55. LIE, O., H. HAALAND, G.I. HEMRE, A. MAAGE, E. LIED, G. ROSENLUND, K. SANDNES & Y. OLSEN, 1997. Nutritional composition of rotifers following a change in diet from yeast and emulsified oil to microalgae. *Aquacult. Internat.* 5, 427 - 438.<< Inst. Nutr., Dir. Fisheries, POB 185, N-5024 Bergen, Norway.>> Changes in rotifer nutrient composition are discussed in relation to nutritional requirements of fish larvae.

56. LIU, J.K. & J.L. LEI, 1997. Effects of artificial regulations of rotifers n-3 hufa content on the growth and survival of larval black sea bream (*Sparus macrocephalus). Chin. Sci. Bull.* 42, 1130-1132.<<Acad. Sinica, Inst Oceanol; Qingdao 266071, P.R.China.>> (Not seen) Keywords: rotifer, Brachionus phicatilis, highly unsaturated fatty acid (hufa), larval black sea bream.

57. LUNING-KRIZAN, J. 1997. Selective feeding of third- and fourth-instar larvae *Chaoborus flavicans* in the field. *Arch. Hydrobiol.* 140, 347-365.<<POB 1977, Marathon, ON P0T 2E0, Canada.>> Regardless of the prey frequencies, *Chaoborus* always showed negative electivity towards *Ceriodaphnia*, copepods, and rotifers, but positive electivities towards *Bosmina*. Electivities shifted from negative to positive during the study period for *Daphnia, Diaphanosoma*, and copepod nauplii and the reverse for *Chydorus*. Selective predation by the midge larvae could probably be explained by differential vulnerabilities of the prey due to induced anti-predator defenses.

58. MANN, R.H.K., J.A.H. BASS, D. LEACH 7 A.C. PINDER, 1997. Temporal and spatial variations in the diet of 0 group roach (*Rutilus rutilus*) larvae and juveniles in the river Great Ouse in relation to prey availability. *Reg. Riv. Res. Managem.* 13, 287-294. <<NERC, Inst. Freshwater Ecol., Eastern Rivers Lab., ITE Monks Wood, Abbots Ripton, Huntingdon PE17 2lS, Cambs, England.>>Roach showed marked ontogenetic changes in their diet. Initial prey were diatoms and Rotifera, followed by Cladocera and other small aquatic invertebrates. From late June onwards, roach in the main river channels switched to feeding on detrital aufwuchs and associated meiofauna on the surface of submerged aquatic plants. This switch did not occur in a marina habitat, where planktonic Cladocera dominated the diet. Between-year differences were observed in the numbers of prey eaten per fish, which largely reflected variations in the abundance of the prey organisms in the water column, or associated with submerged macrophytes.

59. MAROZ, A. & L. FISHELSON, 1997. Juvenile production of *Amphiprion bicinctus* (Pomacentridae, Teleostei) and rehabilitation of impoverished habitats. *Mar Ecol. Prog. Ser.* 151, 295-297.<<L. Fishelson, Underwater Observaquarium, Elat, Israel.>> By establishing reproductive pairs in captivity and providing them with a diet of rotifers and various stages of nauplius and adult *Artemia salina*, reproduction was achieved at frequencies of 2 to 3 times per month per pair, resulting in large numbers of larvae. This method of production in captivity followed by resettlement in impoverished natural habitats may be effective for community rehabilitation.

60. MAYER, C.M. & D.H. WAHL, 1997. The relationship between prey selectivity and growth and survival in a larval fish. *Can. J. Fish. Aquat. Sci.* 54, 1504-1512. <<Cornell Biol. Field Stn, 900 Shackelton Point Rd, Bridgeport, NY 13030, USA.>> All sizes of walleye larvae avoided rotifer and

nauplii prey. Small and large larvae selected for intermediate-sized (0.4-0.9 mm) cladoceran prey and selected against large prey (0.9 mn) of both taxa. Larval walleye that were fed exclusively cladoceran prey survived better than fish that were fed other prey. Early juveniles selected primarily on the basis of prey size, choosing large copepods and cladocerans. Prey taxa did not affect early juvenile growth or survival. Prey taxa and prey size interacted with predator size to influence selectivity and its effect on growth and survival. Consequently, these factors must be considered in combination when examining the importance of foraging decisions in young fish.

61. MAYHEW, M. & T. STEPHENSON, 1997. Low biomass yield activated sludge - a review. *Environm. Technol.* 18, 883-892. <<Cranfield Univ., Sch. Water Sci., Cranfield MK43 0AL, Beds, England.>> Manipulation of the activated sludge process to promote the growth of protozoa, nematodes, rotifers or oligochaeta reduces biomass production by predation of the microorganisms. Promotion of microorganism species that have a high maintenance energy by the provision of support matrices or increasing sludge retention time has the potential to prevent biomass accumulation. Uncoupling of microbial metabolic pathways by both transition from anaerobic to aerobic conditions and by chemical addition prevents biomass production successfully. The alterations required for increasing retention times or introducing a second bacterial predation chamber may not be possible at established plants. The increased operation costs and capital works may not be economically viable. The most efficient and cost effective solution has yet to be optimised.

62. MERCHIE, G., P. LAVENS & P. SORGELOOS, 1997. Optimization of dietary vitamin C in fish and crustacean larvae - a review. *Aquaculture* 155, 165-181. <<P. Lavens, State Univ. Ghent, Lab. Aquaculture, Rozier 44; B-9000 Ghent, Belgium.>> PLC techniques were adapted and standardized for quantification of ascorbic acid (AA) and its derivatives in both diets and target organisms. In most of the species examined, the initial level of AA in *Brachionus* and *Artemia* impaired the determination of the AA requirements for optimal growth and survival. Results indicated that, within the concentration range tested, 20 mg AA/kg diet is sufficient for normal growth and survival. For production of postlarval shrimp, this level amounted to a minimum 20 and 130 mg AA/kg diet for *P. monodon* and *P. vannamei*, respectively, while a level of 2000 mg AA/kg diet was needed to enhance the resistance of shrimp postlarvae to stress conditions and bacterial infections.

63. MICHALOUDI, E., M. ZARFDJIAN & P.S. ECONOMIDIS, 1997. The zooplankton of Lake Mikri Prespa. *Hydrobiologia* 351, 77-94. <<Aristotelian Univ. Thessaloniki, Dept Zool., POB 134, Thessaloniki 54006, Greece.>> 45 invertebrate species (28 Rotifera, 11 Cladocera, 6 Copepoda and 1 mollusc) were recorded, half of them first records for the lake. The total abundance and biomass ranged from 61-905 ind l^{-1} and 58-646 µg l^{-1}, respectively. Spatial variation in plankton is described.

64. MULLER-SOLGER, A., M.T. BRETT, C. LUECKE, J.J. ELSER & C.R. GOLDMAN, 1997. The effects of planktivorous fish (golden shiners) on the ciliate community of a mesotrophic lake. *J. Plankt. Res.* 19, 1815-1828. <<Univ Calif Davis, Div Environm Studies, Davis,CA 95616 USA.>>We

monitored plankton and nutrient dynamics in mesocosms with and without fish for 6 weeks. Total macrozooplankton biomass acid the proportion of large crustaceans decreased dramatically in the golden shiner treatment, while rotifer biomass decreased only in the second half of the experiment. In the mesocosms with golden shiners, total ciliate biovolume increased. Golden shiners had a strong negative impact on macrozooplankton, a variable impact on rotifers, weak positive impacts on ciliates and phytoplankton, and no discernible impact on dissolved inorganic nutrient concentrations. The results of this study help integrate aspects of previous research in mesotrophic lakes and provide evidence for cascading trophic interactions from fish to protozoans in a mesotrophic lake.

65. OIE, G., P. MAKRIDIS, K.I. REITAN, Y. OLSEN, 1997. Protein and carbon utilization of rotifers (*Brachionus plicatilis*) in first feeding of turbot larvae (*Scophthalmus maximus* L.). *Aquaculture* 153, 103-122. << Norwegian Univ. Sci. & Technol, Brattora Res Ctr, N-7055 Dragvoll, Norway.>> The effect of three different rotifer enrichments was examined on growth, survival, pigmentation and viability of first feeding turbot larvae. The diets differed in rotifer content of protein, lipid and ratio of protein/lipid. Independent of algal addition, the highest growth rate and survival was obtained by feeding rotifers containing the highest protein content. Calculation of protein and carbon conversion efficiency showed higher utilization in larvae maintained without algae (18-28% for protein, 12-19% for carbon) than in larvae maintained with algae (6-9% for protein, 4-7% for carbon). No significant differences in pigmentation rate and stress sensitivity were observed among the larvae of the various treatments.

66. OLTRA, R. & R. TODOLI, 1997. Effects of temperature, salinity and food level on the life history traits of the marine rotifer *Synchaeta cecilia valentina*, n. subsp. *J. Plankt. Res.* 19, 693-702.<< Univ Valencia, Fac Ciencias Biol, Area Ecol, E-46100 Burjassot, Valencia, Spain.>> Temperature and salinity had a significant negative effect ($P < 0.001$) on the average lifespan (LS) and on the number of offspring per female (R-0). There is also a clear negative effect on the intrinsic growth rate (r) due to salinity. The effect of temperature depends on the food level and, as occurs with R-0, the maximum values of r occur with the lower algal concentration at 20 °C, whereas at 24 °C they are obtained with the higher algal concentration. These r values, from 1.04 to 1.10 day(-1), were reached at 24 °C, salinities of 20-25 ppt and with high food concentration..

67. OOMS-WILMS, A.L. 1997. Are bacteria an important food source for rotifers in eutrophic lakes? *J. Plankt. Res.* 19, 1125-1141. <<POB 3088, NL-2001 Db Haarlem, Netherlands.>>In situ grazing measurements using fluorescent particles of 0.5, 2.4 and 6.3 µm diameter in eutrophic Lake Loosdrecht showed that *Anuraeopsis fissa* filtered the smallest, bacteria sized particles as efficiently or more efficiently than the larger particles. In contrast, three other rotifer species (*Brachionus angularis, Filinia longiseta* and *Pompholyx sulcata*) filtered the bacteria-sized particles less efficiently than the larger particles. Both *Keratella cochlearis* and *Conochilus unicornis* only ingested the bacteria-sized particles. It is concluded that bacteria are not a suitable food source of high quality for *A. fissa* because its population does not grow even though the bacterial concentration was higher than its

estimated threshold food concentration. Bacteria seem to be a more important food source for younger individuals of *A. fissa* than of *K. cochlearis*.

68. PETZ, W. 1997. Ecology of the active soil microfauna (Protozoa, Metazoa) of Wilkes Land, East Antarctica. *Polar Biol.* 18, 33-44. <<Salzburg Univ., Inst. Biol., Hellbrunnerstr. 34; A-5020 Salzburg, Austria.>> Animal frequencies varied between habitats but every group occurred in at least 74% of the samples, rotifers (95%) and testaceans (92%) being most frequent. Highest abundances were recorded in moss: 354 ciliates/g dry soil (19 species), 671 testaceans (5 species), 513 nematodes, 1,311 rotifers and 4,607 tardigrades, which thus dominated. Rotifers were most abundant in the other habitats. The microfauna was not randomly distributed because individual numbers were often strongly intercorrelated. Water and organic matter content were relevant environmental parameters; air temperature and pH probably had indirect effects.

69. PINTO-COELHO, R.M., R.T. DEMOURA & A. MOREIRA, 1997. Bacterioplankton and bacteria contribution to phosphorus and nitrogen internal cycling in a tropical and eutrophic reservoir: Pampulha Lake, Brazil. Int. Rev. Ges. Hydrobiol. 82, 185-200. << Univ. Fed. Minas Gerais, Inst. Ciencias Biol., Dept Biol. Geral., Belo Horizont., MG, Brazil.> Free living bacteria are able to consume promptly most phosphorus excreted by zooplankton. Zooplankton excretion can affect significantly turn over rates of total phosphorus in Pampulha Reservoir. In some periods, specially during the dry season when zooplankton biomass was very high, phosphorus release by zooplankton, during one single day, can be as high as 40% of the total phosphorus content in lake water (Turn over time = 2.5 days).

70. PLASSMANN, T. G. MAIER, H.B. STICH, 1997. Predation impact of *Cyclops vicinus* on the rotifer community in Lake Constance in spring. *J. Plankt. Res.* 19, 1069-1079. <<Inst Seenforsch, Untere Seestr. 81, D-88085 Langenargen, Germany.>>*C. vicinus* fed selectively on *Synchaeta* spp.; *Keratella* and *Polyarthra* spp. were not selected for. Predation rates increased with prey density up to a maximum of 37 *Synchaeta* day^{-1} at a density of 1.6×10^4 Synchaeta m^{-2}, i.e. at similar to 1200 *Synchaeta* l^{-1}. Calculation of cropping rates suggests that *Cyclops* alone can control the abundance of *Synchaeta* in spring, i.e. that mainly *Cyclops* is responsible for the decline of *Synchaeta* species in Lake Constance in May.

71. POUSAO-FERREIRA, P., F. CAIRRAO, F. NERY & L. NARCISO, 1997. The fatty acid profile of *Sparus aurata* larvae is correlated to the composition of the enrichment diets of *Brachionus plicatilis* and *Artemia* sp. *Ciencieas Marinas* 23, 83-92. <<CIMSUL, IPIMAR, AV 5 Outubro S-N, P-8700 Olhao, Portugal.>> Rotifers were fed four enrichment diets (marine *Chlorella* sp., and three commercial emulsions: Algal Rotifero™, Frippak™ booster and Selco™). The enrichment of Artemia sp. (Artemia Systems™, AF type) was carried out with instar I nauplii at a density of 250-300 nauplii/ml in 20-1 conical tanks, using two commercial emulsions (Troffic™ and Selco™) and a microalgae (Chlorella sp.). The results showed that enriched preys were deficient in PUFA n-3 and may not provide the nutritional requirements of sea bream larvae, although the enrichment methodology seems to be efficient in order to incorporate in the larvae the fatty acid treatment.

72. POURRIOT, R., V. HOREAU & C. ROUGIER, 1997. *Filinia* (Rotifera, Monogononta) populations in French Guyana: *F. novaezealandiae*, *F. saltator*, with remarks on the variability of some characters. *Arch. Hydrobiol.* 139, 563-575. << Univ Paris 06, Ura 1367, B 123, 4 Pl Jussieu, F-75252 Paris 05, France.>> Two species of *Filinia*, *F. novaezealandiae* and *F. saltator*, were collected in April and September 1991 in Petit Saut reservoir on the Sinnamary River (French Guayana). Their main characters (length of the lateral and caudal bristles, body length, numbers of unci teeth) are studied. Several converging observations (previous and present) suggest that the length of bristles depends probably on predator abundance. The variability of the number of teeth on the unci observed in many species of this genus is discussed.

73. POURRIOT, R., C. ROUGIER & A. MIQUELIS, 1997. Origin and development of river zooplankton: Example of the Marne. *Hydrobiologia* 345, 143-148. <<address above.>> A typical lake community, characterized both by an abundance of microcrustaceans and a high zooplankton concentration was found immediately downstream of the reservoir Marne (Der-Chantecocq Lake). Here, large microcrustaceans and large rotifers rapidly disappeared, and small rotifer species (<120 µm) dominated the plankton. Their populations proliferated as far as 100 km downstream but were considerably reduced where the river is channeled, algal resources decline and turbidity increases. The dominance of small organisms in river plankton is assumed to be the result of fish predation on large zooplankton as well as of a short generation time which allows their in situ reproduction, in spite of a short residence time of the water.

74. PRIVILEGGI, N., D. OTA & E.A. FERRERO, 1997. Embryonic and larval development of the grass goby *Zosterisessor ophiocephalus* (Teleostei, Gobiidae). *Ital. J. Zool.* 64, 201-207.|<<Univ. Trieste, Dip. Biol., Via Giorgieri 7, I-34127 Trieste, Italy.>> Describes growth and development of the goby. The first exogenous feeding on rotifers occurs at day 2 post-hatching, while yolk sac absorption and the negative phototaxis are at day 4. Larvae metamorphose into juveniles at day 13 when all the fins appear. They feed on *Artemia* and show an increased growth rate. At day 26, the juvenile bodies become compressed dorso-ventrally. The juveniles shift to benthic habits and can be fed on artificial feed pellets. At day 82, the final body shape and colour patterns are acquired and territorial behaviour is displayed.

75. RAINUZZO, J.R., K.I. REITAN & Y. OLSEN, 1997. The significance of lipids at early stages of marine fish - a review. *Aquaculture* 155, 103-115. <<SINTEF, Appl. Chem., Sect. Aquaculture, N-7034 Trondheim, Norway.>> The present work reviews the significance of lipids at different early stages of marine fish larvae. Lipids affect the spawning and the egg quality of many fish species and a deficiency in (n - 3) highly unsaturated fatty acids (HUFA) in broodstock negatively affects fecundity, fertilization rate and hatching rate of the species studied. Lipids as a source of energy at the embryonic and larval stage (before first-feeding) are evaluated in relation to other sources of energy such as protein and carbohydrates. The quantitative and qualitative lipid class and fatty acid composition of diets influenced the lipid and fatty acid composition of both LT- or ST-enriched rotifers. The nutritional improvement of *Artemia* is also important and may follow the general methods used for rotifers.

76. RAMCHARAN, C.W., R.L. FRANCE & D.J. MCQUEEN, 1996. Multiple effects of planktivorous fish on algae through a pelagic trophic cascade. *Can. J. Fish. Aquat. Sci.* 53, 2819-2828. <<Louisiana State Univ., Dept Zool. Physiol., Baton Rouge, LA; 70803; USA.>> Fish biomass was negatively related to daphnid biomass and body size, but was positively related to bosminid and rotifer biomass. Fish-induced reductions in zooplankton biomasses were indirectly responsible for changes in the phytoplankton. By reducing herbivory, fish caused decreases in both zooplankton grazing and nutrient recycling. Our results show that changes in fish communities can influence water clarity, but that the simple trophic cascade is confounded by several other direct and indirect mechanisms involving shifts in grazing pressure, nutrient excretion, and phytoplankton cell size.

77. RAMIREZ, J.J. & A. DIAZ, 1997. Zooplankton seasonal fluctuation in Parque Norte lake, Medellin, Colombia. *Rev. Biol. Trop.* 45, 549-563. <<Univ. Antioquia, Dept Biol., Aptdo Aereo 1226, Medellin, Colombia.>>Zooplankton composition is very similar to another eutrophic tropical lakes with hard and alkaline waters. Community diversity was low, more associated with evenness in surface and bottom and it was affected by dominance of *B. plicatilis*. Width niche for this organism and *I. decipiens* was small in both depth. Directional overlap niche index between these two taxa were small too. Cluster analysis for samples showed four groups in surface and bottom organized in accordance with absolute abundance and influenced by *B. plicatilis* for representing of total zooplankton 56.6% in surface and 70.8% in bottom.

78. REITAN, K.I., J.R. RAINUZZO, G. OIE & Y. OLSEN, 1997. A review of the nutritional effects of algae in marine fish larvae. *Aquaculture* 155, 207 - 221. <<Norwegian Univ. Sci. Technol., Dept Bot., N-7034 Trondheim, Norway.>> In the first-feeding of larval turbot and halibut, microalgae are used in the production of rotifers (*Brachionus plicatilis*) in order to transfer essential nutrients from the algae to the live food. Microalgal addition to the first-feeding tanks along with the rotifers improved growth and survival of larvae, whereas short-term enrichment of rotifers with algae did not improve growth and survival of larvae in tanks without algae added. The algae in larval tanks tended to modify and stabilize the nutritional quality of the rotifers in the period before they were consumed by the larvae. The algae in larval tanks most probably modified the bacterial flora of the water and the rotifers.

79. ROBICHAUD-LEBLANC, K.A., S.C. COURTENAY & J.M. HANSON, 1997. Ontogenetic diet shifts in age-0 striped bass, *Morone saxatilis*, from the Miramichi River estuary, Gulf of St Lawrence. *Can. J. Zool.* 75, 1300-1309. <<S.C. Courtenay, Gulf Fisheries Ctr, Sci. Branch, POB 5030; Moncton, NB E1C 9B6, Canada.>> Larval striped bass (25 mm TL) fed primarily on immature and adult copepods. The onset of exogenous feeding correlated both spatially and temporally with a peak in the abundance of prey. Chesson's alpha index indicated progressive selection of larger prey with increasing size of larval striped bass, from small rotifers to larger calanoid copepods to the relatively large calanoid *Eurytemora* sp. Mysids and sand shrimp were the principal prey of striped bass 50 mm TL. Contributions by other prey groups (molluscs, polychaetes, amphipods, insects, and larval fish) were minor. Feeding ceased when water temperatures declined below about 3 °C in Nov.

80. RODRIGUEZ, C., J.A. PEREZ, M. DIAZ & M.S. IZQUIERDO, H. FERNANDEZ-PALACIOS & A. LORENZO, 1997. Influence of the EPA/DHA ratio in rotifers on gilthead seabream (*Sparus aurata*) larval development. *Aquaculture* 150, 77-89. <<A. Lorenzo, Univ. La Laguna, Dept Biol. Anim., La Laguna 38270, Spain.>> A feeding experiment was carried out to investigate the influence of the eicosapentaenoic acid (EPA, 20:5n-3) to docosahexaenoic acid (DHA, 22:6n-3) ratio (EPA/DHA) on 17-day-old *S. aurata* larval development. Larvae were fed rotifers (*Brachionus plicatilis*) enriched with four different lipid emulsions containing the same amount of total n-3 highly unsaturated fatty acids (n-3 HUFA) but different EPA/DHA ratios. Results obtained suggest that for the same level of total n-3 HUFA, larval growth performance can be improved by a decrease in EPA/DHA ratio in rotifers, indicating the importance of DHA during the first days of *S. aurata* larval development.

81. ROSENLUND, G., K. SANDNES &Y. OLSEN, 1997. Nutritional composition of rotifers following a change in diet from yeast and emulsified oil to microalgae. *Aquacult. Internat.* 5, 427-438. <<Inst. Nutr., Directorate Fisheries, POB 185, N-5024 Bergen, Norway.>> This study showed that transfer of *B. plicatilis* to microalgae (*I. galbana*) feeding had a positive effect on nutritional value. Macronutrients were maintained at adequate levels, and algal feeding improved the nutritional quality of rotifers with respect to water-soluble vitamins. Changes in rotifer nutrient composition are discussed in relation to nutritional requirements of fish larvae.

82. SANOAMUANG, L.-O. & H SEGERS, 1997. Additions to the *Lecane* fauna (Rotifera: Monogononta) of Thailand. *Int. Rev. Ges. Hydrobiol.* 82, 525-530.<<Khon Kaen Univ., Fac. Sci., Dept Biol., Khon Kaen 40002, Thailand.>>*Lecane superaculeata* n. sp. is described from three localities in Thailand. It resembles the small, cosmopolitan *L. aculeata*, but is distinguished by its larger size and conspicuous anterolateral spines. Additional records of some recently described Thai *Lecane* species and comments on Oriental endemics are presented. *L. eswari* Dhanapathi is newly recorded for the country.

83. SARNELLE, O. 1997. *Daphnia* effects on microzooplankton: Comparisons of enclosure and whole-lake responses. *Ecology* 78, 913-928. <<Univ. Calif. Santa Barbara, Dept Ecol. Evolut. & Mar. Biol., Santa Barbara, CA 93106 USA.>>The effects of the herbivorous zooplankter, *Daphnia*, on a natural community of microzooplankton (rotifers, ciliates, and nanoflagellates) were compared in enclosures of two sizes (15 and 10 000 L) and in a eutrophic lake before and after a fish kill. Comparisons of enclosure results with temporal correlations in lake data and with microzooplankton abundances before and after a fish kill indicated better congruence between lake data and the large-enclosure results. More importantly, large-enclosure results agreed more closely with whole-lake dynamics than with small-enclosure results. Consequently, large-scale enclosure experiments may provide reliable predictions of whole-lake phenomena, but small-scale (microcosm) experiments may not.

83. SCHREIBER, H., D. SCHOENEN & W. TRAUNSPURGER, 1997. Invertebrate colonization of granular activated carbon filters. *Water Res.* 31,

743-748. <<Univ. Bonn, Inst. Hyg., Sigmund Freud Str. 25, D-53105 Bonn, Germany.>> GAC filters are colonized by invertebrates. Dominating organism groups were rotifers and nematodes. Depending on operational characteristics, mainly regeneration intervals and backwashing procedures, the filter colonization can lead to an output of organisms in high numbers with the filtrate. Examples are given for the development of filter colonization and for the influence of different backwashing procedures to reduce numbers of invertebrates in GAC filters. These findings underline the establishment of a complex food web in a GAC filter, the consequences of which still remain to be investigated in detail.

84. SCHMID-ARAYA, J.M. 1998. Small-sized invertebrates in a gravel stream: community structure and variability of benthic rotifers. *Freshw. Biol.* 39, 25-39. <<School of Biol. Sci., Queen Mary & Westfield College, Univ. of London, Mile End Rd. London E1 4NS UK.>> 42 monogonont species and 27 of Bdelloidea are reported from streambed surface and hyporheic zone. Analyses of distribution demonstrated a temporal near-random pattern.

85. SCHMID, P.E. & J.M. SCHMID-ARAYA, 1997. Predation on meiobenthic assemblages - resource use of a tanypod guild (Chironomidae, Diptera) in a gravel stream. *Freshw. Biol.* 38, 67-91. <<School of Biol. Sci., Queen Mary & Westfield College, Univ. of London, Mile End Rd. London E1 4NS UK.>>Three predatory chironomid species constituted numerically 8.8% of the macro-and meiobenthic community at the sediment surface and in the hyporheic zone of Oberer Seebach, a gravel stream in Lower Austria. 97 prey species and instars were identified by gut analyses, of which forty-one benthic rotifer species constituted 69.5% of individuals and twenty-three chironomid species and their instars, 22.9%. Species-rich prey assemblages such as benthic rotifers and larval chironomids increased the probability of non-selective feeding upon a wide spectrum of prey species by tanypods. Prey choice was governed by prey availability and tanypod individuals fed on many species at rather even proportions independent of each other.

86. SEGERS, H. & J. MERTENS, 1997. New Rotifera from the Korup National Park, Cameroon. *J. Nat. Hist.* 31, 663-668.<< Lab. Anim. Ecol. Zoogeog. & Nat. Conservat., Dept MSE, Kl Ledeganckstr. 35, B-9000 Ghent, Belgium.>>*Lecane snowi* n.sp., *L. namatai* n.sp. and *L. pluto* n.sp. are described from ponds in the Korup National Park in Cameroon. The proportion of endemic *Lecane* spp. in the African fauna now stands at 14.1%, i.e. approaching the endemicity of the Oriental and Neotropical regions, 18.6 and 21.8% respectively. This is in contrast with previous works reporting an impoverished African rotifer fauna. The records also highlight the contribution to regional biodiversity of the fauna of ephemeral

87. SHUTER, B.J. & K.K. ING, 1997. Factors affecting the production of zooplankton in lakes. *Can. J. Fish. Aquat. Sci.* 54, 359-377. <<Ontario Minist. Nat. Resources, Harkness Lab. Fisheries Res., Box 5000, Maple, ON L6A 1S9, Canada.>>Multiple regression analysis and analysis of covariance were used to assess the degree to which observed variation in rates of production among 108 lake zooplankton populations could be accounted for by variation in physical and biological factors. Our findings suggest a simple model of the seasonal production cycle for limnetic zooplankton in which weight-specific

rates of biomass production are largely set by temperature, and levels of biomass accumulation are largely set by food resource availability and individual body size. We briefly discuss the implications of this model for predicting the effects of climate change on lake productivity.

88. SKJERMO, J. , I. SALVESEN, G. OIE, Y. OLSEN & O. VADSTEIN, 1997. Microbially matured water: A technique for selection of a non-opportunistic bacterial flora in water that may improve performance of marine larvae. *Aquacult. Internat.* 5, 13-28. <<Univ. Trondheim, Biol. Stn, Appl. Chem., N-7018 Trondheim, Norway.>> Experiments conducted supported the proposed hypothesis that microbial maturation selects for nonopportunistic bacteria, which protects the marine larvae from proliferation of detrimental opportunistic bacteria.

89 SOHLENIUS, B., S. BOSTROM & A. EKEBOM, 1997. Metazoan microfauna in an ombrotrophic mire at Abisko, Northern Sweden. *Eur. J. Soil. Biol.* 33, 31-39. <<Swedish Mus. Nat. Hist.,Dept Invertebrate Zool, Box 50007, SE-10405Stockholm, Sweden.>> The metazoan microfauna (nematodes, rotifers and tardigrades) in an ombrotrophic mire at Stordalen, Abisko, in northern Sweden is reported.

90. SONDERGAARD, M., E. JEPPESEN & S. BERG, 1997. Pike (*Esox lucius* L) stocking as a biomanipulation tool. 2. effects on lower trophic levels in Lake Lyng, Denmark. *Hydrobiologia* 342, 319-325.<<Natl Environm. Res. Inst., Dept Lake Estuarine Ecol., Vejlsovej 25, POB 314, DK-8600 Silkeborg, Denmark.>>It is concluded that pike stocking can be used as a lake restoration tool to increase lake water transparency by creating a trophic cascade. The effect of stocking, however, seems to last only during the season in which it has been undertaken, the impact being most significant at high stocking densities. The method is therefore regarded to be most useful in shallow, turbid lakes in which the nutrient loading has been sufficiently reduced to allow a substantial and permanent macrophyte coverage if clearwater conditions are established.

91. TULLI, F. & E TIBALDI, 1997. Changes in amino acids and essential fatty acids during early larval rearing of dentex. *Aquacult. Internat.* 5, 229-236. <<Univ. Udine, Dipt. Sci. Prod. Anim., Via San Mauro 2, I-33010 Pagnacco, Italy.>>Samples of fertilized dentex, *Dentex dentex*, eggs and larvae fed enriched rotifers and *Artemia* according to standard hatchery procedures were analysed for free, total amino acid and fatty acid contents. The essential amino acid profile of enriched live food did not show major imbalances when compared to that of dentex larvae. In contrast, the level of docosahexaenoic acid (22:6 omega 3, DHA) and the DHA:EPA (eicosapentaenoic acid, 20:5 omega-3) ratio in larvae given rotifers and *Artemia* were significantly lower relative to the corresponding Values in the unfed larvae.

92. VERDONCK, L., L. GRISEZ. E. SWEETMAN, G. MINKOFF, P. SORGELOOS, F. OLLEVIER & J. SWINGS, 1997. Vibrios associated with routine productions of *Brachionus plicatilis*. *Aquaculture* 149, 203-214. <<State Univ. Ghent, Microbiol. Lab., Ledeganckstr 35; B-9000 Ghent, Belgium.>> Surveys for bacteriological analysis were carried out in 1990-1991 in two different marine fish hatcheries located in Greece and northern Spain.

Samples were taken from 12 different routine productions of *Brachionus plicatilis* before and during enrichment. Isolates were characterized by whole cell fatty acid methyl ester analysis and by BIOLOG metabolic fingerprinting. *Vibrio anguillarum* and/or *Vibrio alginolyticus* were dominant *Vibrio* species in the rotifer samples taken after enrichment and rinsing, before being delivered to the fish larvae. None of the *Vibrio anguillarum* strains belonged to the pathogenic serotypes for juvenile and adult fish.

93. VERSTEEG, D.J., D.T. STANTON, M.A. PENCE & C. COWAN, 1997. Effects of surfactants on the rotifer, *Brachionus calyciflorus*, in a chronic toxicity test and in the development of QSARs. *Env. Toxicol. Chem.* 16, 1051-1058. << Procter & Gamble Co., Ivorydale Tech. Ctr, Dept Environm. Sci., Cincinnati, OH 45217 USA.>> Results demonstrate a relationship between alkyl chain length and toxicity within a surfactant class. Between classes, N-containing amines and quaternary ammonium compounds had greatest toxicity, in general, followed by the nonionic compounds. Anionic compounds were typically least toxic. A good quality (R-2 = 0.86), three-variable, parametric OSAR model was developed using the ADAPT software package.

94. WALZ, N. 1997. Rotifer life history strategies and evolution in freshwater plankton communities. In B. Streit, T. Staedler, M. Lively (eds.) *Evolutionary Ecology of Freshwater Animals*. Birkhäuser Verlag, Basel/Switzerland: 119-149. ISBN 3-7643-5694-4. <<Institut fur Gewasserökol. & Binnenfisherei, Muggelseedamm 260, 12587 Berlin, Germany.>> A review of the importance of rotifers in freshwater plankton, detailing 'bottom-up' and 'top-down' interactions - with a n exhaustive bibliography

95. WEGLENSKA, T., J. EJSMONT-KARABIN & J.I. RYBAK, 1997. Biotic interactions of the zooplankton community of a shallow, humic lake. *Hydrobiologia* 342, 185-195. <<Polish Acad. Sci., Inst. Ecol., Dept Hydrobiol., Dziekanow lesny, PL-05092 Lomianki, Poland.>> Zooplankton of the shallow Lake Flosek is controlled by the complicated net of feed-back relations, resulting in a rather stable community structure which can explain its rather insignificant changes in the period of about 20 years after the liming of water in this lake.

96. WOUTERS, R., A. VANHAUWAERT, E. NAESSENS, X. RAMOS, A. PEDRAZZOLI & P. LAVENS, 1997. The effect of dietary N-3 HUFA and 22/6N-3/20/5N-3 ratio on white shrimp larvae and postlarvae. *Aquacult. Internat.* 5, 113-126. <<Ctr Nacl Acuicultura Invest. Marinas, Casilla 0901, Edgar Arellano M, Guayaquil, Ecuador.>>The influence of varying dietary n-3 HUFA concentrations and ratios of 22:6n-3/20:5n-3 (DHA/EPA) on culture performance and fatty acid composition of white shrimp (*Penaeus vannamei*) larvae and postlarvae was verified in two experiments. In a first experiment, shrimp (zoea 2 - postlarvae 11) were fed rotifers (*Brachionus plicatilis*) and *Artemia* spp. nauplii that were enriched with different self-emulsifying concentrates. The effect of the DHA/EPA ratio within the experimental limits could not be demonstrated. Analysis of the fatty acid composition of the shrimp showed notable changes of n-3 HUFA concentrations during the metamorphosis from mysis to postlarvae, and a different response to the dietary concentrations of DHA compared to EPA.

97. WU, L., P. XIE, M. DAI & J. WANG, 1997. Effects of silver carp density on zooplankton and water quality - implications for eutrophic lakes in China. *J. Freshw. Ecol.* 12, 437-444.<<Mt Union Coll., Dept Biol., Alliance, OH 44601, USA.>> A factorial experiment demonstrated that by reducing planktivorous fish to below the current density (190 g/m(2)), the zooplankton community can be shifted from the dominance of small-bodied *Moina* sp. to dominance of large-bodied *Daphnia* sp. Further, the water clarity can be increased.

98. YAMAGUCHI, Z.K. 1996. Recent advances in microalgal bioscience in Japan, with special reference to utilization of biomass and metabolites: A review. *J. Appl. Phycol.* 8, 487-502.<<Univ. Tokyo, Grad. Sch. Agr. Life Sci., Mar. Biochem. Lab., Bunkyo Ku, Tokyo 113, Japan.>>The current use of microalgae as live feeds for larvae in aquaculture is also summarized. With respect to microalgal metabolites the present status of research is described with a greater emphasis on bioactive compounds, pigments and oils as potential drugs, coloring matters and biofuels, respectively.y

99. YASUNOBU, H., H. NAGAYAMA, K. NAKAMURA & K. HATAI, 1997. Prevention of a fungal infection in the swimming crab *Portunus trituberculatus* larvae by high pH of rearing water. *Nippon Suisan Gakkaishi* 63, 56-63.<<Hyogo Prefectural Fisheries Expt Stn, Akashi, Hyogo 674; Japan.>> Experimental infections using zoea-I demonstrated that the infection with *H. okinawaensis* was controlled by keeping the pH of reaing water at 9.25. Acute toxicities of pH 9.25 to swimming crab zoea, rotifer *Brachionus plicatilis rotundiformis*, brine shrimp *Artemia salina*, and unicellular alga Nannochloropsis sp. were not observed. Survival rates of swimming crab larvae from zoea-I to juvenile crab-I in the center were apparently raised by applying this pH adjustment at 9.25.

100. YOSHIMURA, K., K. USUKI, T. YOSHIMATSU, K. TANAKA, & A. ISHIZAKI, 1997. Quantitative determination and separation of wastes in high density culture medium for marine rotifer. *Nippon Suisan Gakkaishi* 63, 912-919. << Fukuoka Mariculture Corp, Fukuoka 81135, JAPAN.>>In high density culture of rotifer, a large amount of suspended organic matter accumulates in the culture medium. Such wastes are mainly composed of rotifer feces, amictic egg shells, microbes (bacteria, protozoa, fungi etc.), the food organism *Chlorella* and flocks of various sizes are formed and coagulate. A filtration unit was developed, which was composed of nylon filtration mats and stainless steel frames to aid mixing of the culture medium. While the flocks increased in the culture medium without filtration, the flocks larger than 30 μm could be efficiently removed with filtration and culture was feasible at a rotifer density of 10^4 ind./ml.

New taxa reported

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

Lecane enowi Segers & Mertens, 1997: Cameroon (#86)
Lecane namatai Segers & Mertens, 1997: Cameroon (#86)
Lecane pluto Segers & Mertens, 1997: Cameroon (#86)
Lecane superaculeata Sanoamuang & Segers, 1997: Thailand (#82)

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