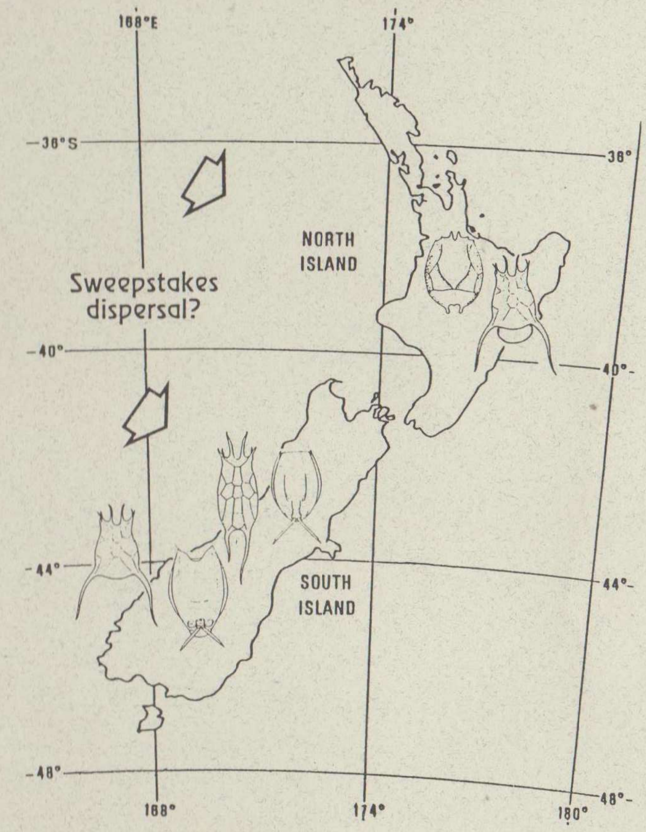
ROTIFER NEWS

A newsletter for rotiferologists throughout the world



ISSUE 23: JULY-AUGUST 1993

In this Issue:

- **New subscribers to Rotifer News**
- **New addresses of "old" subscribers**
- **News'n'Views, including snippets on New Zealand's rotifers and the work of C.R. Russell**
- **Updated Bibliography**

PRODUCED AT

The Murray-Darling Freshwater Research Centre

ROTIFER NEWS

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

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

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

* * * * * *

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ROTIFER NEWS, ISSUE 23, JUL.-DEC. 1993

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The cover: New Zealand and some Australian "endemics" recently found (see text).

Editorial

Apologies for the delay in preparation of this issue - your production editor was enjoying the lakes of New Zealand during May-June, thanks to John Green, the University of Waikato, SIL and the N.Z. Limnological Society. This short visit prompted a brief review of the work of C.R. Russell in the period 1944-61 (pages 4-5), stimulated also by La-orsri Sanoamuang's efforts for her PhD at Canterbury University. A further consequence has been everything 2 months out of phase, including *Rotifer News*. With this issue late, rather than rush to have issue **24** ready for Jan-Feb. 1994, it will be prepared for Mikolajki, to be distributed there in June.

There has been minimal communication from the outside world - mostly from regional editors, although some of you are consistent and prompt in sending publications. This support is appreciated. Other than published papers, which are included in the listing later, that which has arrived is included in 'News'. The largest bibliography to date results from publication of the Banyoles proceedings. Some publications arrived too late and will be included in issue **24**. More input from you, the reader, is required for the next issue!! The "less-good" news I will put under a separate heading.....

Continuation of Rotifer News

Prior to Rotifer VII, there will need to be some serious *global* thought to continuation of the newsletter. It was my feeling at Banyoles that the efforts of earlier editors, particularly Bob Wallace, not be wasted. In agreeing to produce *Rotifer News* until the next meeting, I presumed support from the global community. From the original mailing list of >275 people, around 150 have responded to questionnaire or cards in the last few issues. Of these, only 58 are "paid-up" subscribers to Dec. 1993, having contributed to production costs of the newsletter. A further 30 are "lapsed" subscribers, having paid up to 1992. All respondees are receiving the newsletter. Reminders are included with this issue.

Unfortunately, the change in hemisphere has meant hugely increased mailing costs - Australia is the worst possible place to produce *Rotifer News*, because only a few of the readers are in the southern hemisphere. I stress here that I would be happy to continue producing the newsletter if it is serving a purpose and **IF PRODUCTION COSTS ARE COVERED**. It's not happening....there is little communication from the global community, and costs are being met largely by my research budget at MDFRC. Clearly the stringent economies of research in Australia don't permit supporting a non-viable newsletter - so I have to put it to you now, and will discuss the future of *Rotifer News* at Mikolajki........

* TO CONTINUE THIS NEWSLETTER REQUIRES SUPPORT FROM YOU, THE READERS, AND CONTINUED INPUT FROM THE REGIONAL EDITORS;
* IF YOU CAN SUPPORT PRODUCTION FINANCIALLY BY PAYING ONE OR MORE YEARS' SUBSCRIPTIONS, PLEASE DO - SEE INSIDE BACK COVER;
* THIS IS THE NEXT-TO-LAST *ROTIFER NEWS* WHICH CAN BE PRODUCED AT MDFRC UNDER THE PRESENT CONDITIONS.

Russ Shiel

Rotifer VII: The 1994 Mikolajki meeting

Expressions of interest for the next rotifer meeting have been coming in thick and fast. As at September 2, 87 Pre-registration forms had been received, with a further 33 expressions of interest. All respondees will by now have received the second circular from Jolanta with details of the Mikolajki meeting. The main topics are included in the copy of the 2nd Circular inside the back cover of this issue. If you require information on Rotifer VII, contact:

Jolanta Ejsmont-Karabin, Institute of Ecology PAS
Hydrobiological Station, ul Lesna 13, 11-730
Mikolajki, POLAND

Remaining deadlines and key dates

Submission of abstracts	15 Jan 1994
Payment of registration fee	15 Jan 1994
3rd announcement to participants	March 1994
Conference	6-11 June 1994
Submission of manuscripts	8 June 1994
Post-conference field trip	11 June 1994

The John J. & Anna H. Gallagher Fellowship

The Academy of Natural Sciences of Philadelphia is pleased to offer a postdoctoral fellowship for research on the systematics of rotifers or other microscopic invertebrates. Position is open until filled; successful candidate may begin as soon as possible. Send CV, statement of research interests, description of project to be completed during fellowship period, and names of three referees to:

Chairman, Gallagher Fellowship Committee
Academy of Natural Sciences
1900 Benjamin Franklin Pkwy.
Philadelphia, PA 19103-1195, USA.

New faces

Rather than repeat the listing of global rotifer workers from issue **22**, the list below is new faces or new addresses only, i.e. new responses to earlier newsletters, returnees to the fold, and one 'old face' which the gremlins managed to lose for each of the past issues. See if you can guess who it is.........

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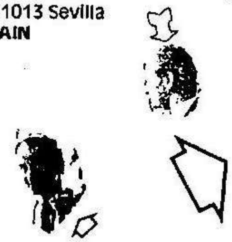

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C.R. Russell and the New Zealand Rotifera

(Russ Shiel)

Cecil R. Russell in his later years was the 'Honorary Keeper of Rotifers' at the Canterbury Museum, in Christchurch, New Zealand. His keen interest in rotifers came after an engineering career, but his engineering mind continued to produce small aids specifically for his work on rotifers, as shown by his inventive methodology papers on pumps, centrifuges and camera modifications.

Commencing in 1944 with a description of *Keratella sancta* Russell, he wrote a series of papers listing the N.Z. rotifer fauna, most first records for New Zealand. Like other rotifer workers in the southern hemisphere he was handicapped by the lack of others of similar interest and by limited access to nortern hemisphere literature. Nevertheless, he established contact with the specialists, including Ahlstrom, Donner & Hauer, and acquired a reasonable taxonomic base, including the works of Hudson & Gosse, Harring & Myers, and the papers of the contemporary specialists. Russell's interest in rotifers continued until his death on August 31, 1961. Several papers appeared posthumously. His reference collection is in the Canterbury Museum along with his lab. notebooks and slide collection. Unfortunately, his correspondence was not included.

Study of Russell's laboratory notebooks indicates that he had a discriminating eye, noting many features of the New Zealand rotifers (including trophi morphology) which differed from type descriptions. However, he did not produce detailed figures, indeed, figures are notably sparse in the lab. notebooks, and almost completely absent in his published papers. The lack of figures makes it difficult to compare species with the same name in different places. This is compounded by the problem that some taxa listed as "cf." in his notes lost the "cf." in final publications. Thus, there remains some doubt whether all the 'cosmopolitan' taxa recorded from New Zealand really are, and the degree of endemism of the local fauna remains unknown. Regardless of whether all the identifications are accurate, Russell listed some 300 taxa from N.Z. That there remain many to be discovered was made clear by Sanoamuang & Stout (1993), who reported 30 new records from 35 lakes on the South Island. With publication of the first papers

from her PhD at Canterbury University, La-orsri Sanoamuang has made the first intensive effort on the New Zealand rotifers since the death of Cecil R. Russell in 1961.

C.R. Russell Bibliography

RUSSELL, C. R. 1944. A new Rotifer from New Zealand. *J. Roy. Microsc. Soc.* : 121-123.

RUSSELL, C.R. 1945. A reference list of the Rotatoria of New Zealand, with ecological notes. *Trans. R. Soc. N.Z.* **75**, 102-123.

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RUSSELL, C. R. 1950. An improved form of plankton pump apparatus. *Aust. J. Instr. Technol.* **6**, 179-185.

RUSSELL, C. R. 1950. The design of a photomicrographic camera for general laboratory use. *Aust. J. Instr. Technol.* **6**, 107-113.

RUSSELL, C. R. 1950. Additions to the Rotatoria of New Zealand, Part III. *Trans. Roy. Soc. N. Z.* **78**, 161-166.

RUSSELL, C. R. 1951. The Rotatoria of the Upper Stillwater Swamp. *Rec. Canterbury Museum* **5**, 245-251.

RUSSELL, C. R. 1951. An index of the rotifers in the C.B. Morris collection of microscope slides at the Cawthron Institute, Nelson. *Trans. R. Soc. N.Z.* **79**, 52-54.

RUSSELL, C. R. 1952. Additions to the Rotatoria of N. Z. Part IV. *Trans. Roy. Soc. N. Z.* **80**, 59-62.

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RUSSELL, C. R. 1956. Some additions to the Rotatoria of the Chatham Islands. *Rec. Cant. Mus.* **7**, 51-53.

RUSSELL, C.R. 1956. A centrifuge for the separation of small aquatic animals from debris. *The Microscope* **10**, 3 pp.

RUSSELL, C. R. 1956. Some rotifers from the Fiordland District. *Rec. Cant. Mus.* **7**, 55-59.

RUSSELL, C. R. 1956. Some rotifers from the Gold Coast. *J. West Afr. Sci. Assoc.* **2**, 139-144.

RUSSELL, C. R. 1957. Some rotifers from the South Pacific islands and northern Australia. *Trans.R. Soc. N. Z.* **84**, 897-902.

RUSSELL, C. R. 1957. Additions to the Rotatoria of N. Z. Part VII. *Trans. R. Soc.N. Z.* **84**, 939-940.

RUSSELL, C. R. 1958. Some rotifers from Campbell Island. *Rec. Dom Mus.* **3**, 137-140.

RUSSELL, C. R. 1958. Some rotifers from Malaya. *Trans. R. Soc. N. Z.* **85**, 433-437.

RUSSELL, C. R. 1959. Additions to the Rotatoria of New Zealand. VIII. *Trans. R. Soc. N.Z.* **87**, 69-73.

RUSSELL, C. R. 1960. An index to the Rotatoria of New Zealand and outlying islands from 1859-1959. *Trans. R. Soc. N.Z.* **88**, 443-461.

RUSSELL, C.R. 1961. A simple method of permanently mounting rotifer trophi. *J. Quek. Micr. Cl.* Ser. 4, **5**, 377-378.

RUSSELL, C.R. 1961. The mounting of rotifers or other small animals in glycerine jelly. *J. Quek. Micr. Cl.* Ser. 4, **5**, 384-386.

RUSSELL, C. R. 1961. The Rotatoria of Queensland, Australia. *Trans. Roy. Soc. N. Z.* N.S. **1**, 235-9.

RUSSELL, C. R. 1962. Additions to the Rotatoria of New Zealand, Part IX. *Trans. R. Soc. N.Z.* **1**, 337-341.

News, Notes and Requests

A summary of communications from global rotifer workers. Please communicate anything of interest - methods, work in progress, requests for material, literature, etc. Help to make this a **News***letter.*

1. *Rotifer Symposium VI*, edited by J. Gilbert, E. Lubzens & R. Miracle (Proceedings of the 1991 Banyoles meeting) finally appeared on my desk (probably much later than in the rest of the closer world.....), with some 76 contributions and 572 pp., by far the largest of the Proceedings volumes, and an up-to-date summary of what the global community is doing to our favourite animals. The increasing size of the Proceedings raises the problem of increasing cost of the volumes for non-participants at the Symposia. Contact for the volume: Kluwer Academic Publishers, PO Box 322, 3300 AH Dordrecht, The Netherlands.

2. *"Rotifera"*, edited by T. Nogrady (142 pp.), No. 4 in the *Guides to the Identification of the Microinvertebrates of the Continental Waters of the World,* also has been published and is a worthwhile prelude to the taxonomic volumes which will follow. Others in the series which are available: Cladocera: Cladocera: 1. Macrothricidae (N. Smirnov) and 3. Sididae (N. Korovchinsky); 2. Copepoda: Centropagidae: Calanoida (I.A.E. Bayly). Contact for the volume: SPB Academic Publishers, PO Box 97747, 2509 GC The Hague, THe Netherlands.

3. From Hendrik Segers in Belgium, a note on the continued success of the 6-month course offered by the Animal Ecology Lab. at Ghent: **"International training course on lake management: the zooplankton"**, focussing on zooplankton identification (Cladocera, Copepoda, Rotifera, for students from developing countries. If you are interested in attending such a course, contact Prof. Dr H.J. Dumont, c.c. Mrs S. Maas, Lab. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Ghent, Belgium (Fax: 32-92-645-343)

4. From Peter Funch Andersen in Copenhagen, a copy of *Remissversion Rotifera*, a comprehensive listing of the Rotifera of Fennoscandia and Denmark compiled by Birger Pejler, and published by the Nordic Code Centre. For information, contact:

Nordic Code Centre, Swedish Museum of Natural History
S-104 05 Stockholm, SWEDEN

5. From Ros Pontin temporarily in Albury: "Home thoughts from abroad - a second look at Australia and its rotifers"

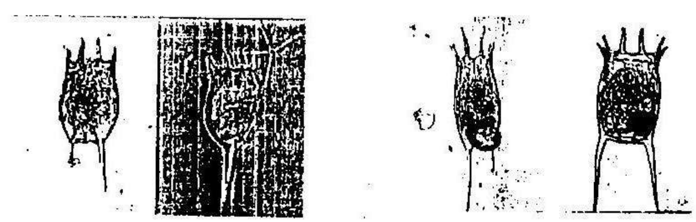
Once again, I am Albury, N.S.W. spending a couple of months at The Murray-Darling Freshwater Research Centre working with RJS. The weather so far has been very English - changeable and lots of rain - but there have been days of Aussie weather - hot sun, blue skies, clear air (which is what I came for). The rain has filled all the waterways, pools and billabongs, so there is plenty of scope for keen rotifer hunters.

The Australian freshwater microfauna needs a lot of attention both taxonomic and ecological, and Russ struggles to keep afloat, not only in Rotifera, but also in Microcrustacea and Protozoa. Every sample seems to yield new records and/or species. I am trying to build on my preliminary investigations two years ago looking at rotifer communities in some of the macrophytes in the floodplain pools of the River Murray. It's difficult, but fascinating. I hope I may have something to tell you about it when I see you in Mikolajki in 1994.

I have been looking at Rotifera Vol. 1 in the *Guides*....I welcome its arrival on the scene - a first perusal suggests a clear and interesting volume which I shall enjoy reading further. And what a charming dedication - to the International Rotifer Family. I must make haste to buy my own copy instead of stealing Russ's (*there will be a bag-search at the airport* - Ed.)

One constant of my visits to Oz seems to be the sight of Russ preparing another *Rotifer News*. This takes a great deal of time and also money. Elsewhere in this issue Russ has some comments to make on future issues - if any. At the rotifer symposium in Banyoles there seemed to be a general feeling that *Rotifer News* was a "Good Thing". People liked to be kept in touch, many also value the reference list which is included in the issues. However, it seems we are happy to receive it, but not to contribute to it, nor, more importantly, to pay for it. At present, most of its cost is borne by Russ's research grant or this Centre's money. This cannot continue. We must make up our minds if we want *Rotifer News* sufficiently to pay for it and we must devise a surer method and time of payment. And we must **all** (*quick searching in purse*) make our contribution.

It will be good to see you all again in Poland (well some of you) (*does this include Alois?* - Ed.). Till then, good hunting.



RECENT PUBLICATIONS

Recent rotifer-related publications provided by regional editors, by rotifer workers or abstracted by CSIRO Search Party, Melbourne (from ABN, BIOSIS, Current Contents & Streamline), are listed alphabetically. A brief summary is given where possible. Although care is taken to transcribe bibliographic information, errors may occur, particularly when poor copy faxes have been received. If errors in mailing addresses are noted, please advise one of the regional editors or Russ Shiel at MDFRC (addresses on front cover). Your assistance in communicating your publications would be appreciated!!

Ed. note: In multi-authored papers, only the address for reprints is included. Every effort has been made to include a summary, however some authors sent lists only, and these did not contain summaries. The major subject areas in each citation are categorized below - many papers include several topics.

Aging/Biochemistry/Behaviour/Genetics/Morphology/Pharmacology/Reproduction/Ultrastructure: 13, 20, 26, 27, 51, 52, 56, 60, 61, 73, 77, 81, 83, 93, 94, 95, 98, 103, 104, 106, 107, 109, 115, 118, 121, 122, 134, 135, 136, 137, 138;

Aquaculture: 4, 6, 9, 10, 22, 38, 43, 58, 75, 83, 124, 125, 132, 142;

Seisonidae/Bdelloidea: 17, 39, 56, 68, 81, 96, 131;

Biogeography/Evolution/Taxonomy/Phylogeny: 5, 8, 12, 15, 42, 54, 59, 65, 67, 68, 97, 101, 103, 104, 105, 108, 110, 111, 112, 113, 114, 116, 117, 118, 120, 122, 123, 128, 129, 130, 133;

Biomanipulation/Eutrophication/Perturbation: 8, 16, 19, 25, 35, 36, 46, 50, 100, 126, 141;

Ecology/Population dynamics/Food webs/Predation: 1, 2, 3, 7, 11, 13, 14, 19, 25, 28, 29, 30, 31, 32, 33, 34, 37, 41, 44, 45, 48, 49, 53, 57, 63, 64, 69, 70, 71, 72, 74, 76, 78, 82, 84, 85, 86, 87, 88, 89, 91, 92, 99, 101, 102, 109, 116, 119, 126, 127, 128, 130, 139, 140;

History of research: 55;

Methods: 1, 17, 75, 90, 105;

Toxicology: 18, 21, 23, 24, 40, 47, 62, 79, 80; 102

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1. **ALIMOV, A.F. 1992.** Characteristics of populations and hydrobiont communities: relation to the weight of animals. *Dokl. Akad. Nauk* **323**, 588-591. <Zool. Inst., Acad. Sci. Russ., St Petersburg, Russia.> [Russian] Quantitative characteristics of populations and animal communities were used to develop mathematical models. Correlation between characteristics of the size of a population of animals and their weight is presented for Rotifera, Cladocera, Insecta (larvae), Amphipoda, and Mollusca. It is possible to develop quantitative relationships between autecological and synecological characteristics.

2. **ARMENGOL-DIAZ, J., A. ESPARCIA, E. VICENTE & M.R. MIRACLE, 1993.** Vertical distribution of planktonic rotifers in a karstic meromictic lake. *Hydrobiologia* **255**, 381-388. <Univ. Valencia, Area Ecol., E-46100 Burjassot, Spain.> In Lake La Cruz, rotifers concentrate at depths with intense gradients. Vertical movements are described. A shift in the dominance of congeneric or related species can occur in consecutive years. *Anuraeopsis miraclei*, an oxycline-bound species with high abundance in 1987, was displaced by *A. fissa* in 1988. *A. fissa*, which was a metalimnetic species during early summer, reached peak densities (3×10^4 ind l-1) at the oxycline, equalling the abundance of *A. miraclei* the preceeding year.

3. **ARNDT, H. 1993.** Rotifers as predators on components of the microbial web (bacteria, heterotrophic flagellates, ciliates) - a review. *Hydrobiologia* **255**, 231-246. <Austrian Acad. Sci., Gaisberg 116, A-5310 Mondsee, Austria.> 10-40% of rotifers' food can consist of heterotrophic organisms of the microbial web. Filter-feeding nanophagous rotifers (e.g. brachionids) seem to be significant feeders on the smaller organisms of the microbial web (bacteria, flagellates, small ciliates), whereas grasping species (e.g. synchaetids and asplanchnids) seem to be efficient predators on larger organisms (esp. ciliates). Rotifers provide degraded algae, bacteria and protozoans to the microbial web and may promote microbial activity.

4. **AWAISS, A. 1992.** Possibility of production and nutritional quality of the brackish-water rotifer *Brachionus plicatilis* O.F. Müller fed on defatted and micronised rice bran. *Rev. Hydrobiol. Trop.* **25**, 55-61. <Unite D'Ecol. des Eaux Douces, Fac. Univ. Notre-Dame-De-La-Paix, 61 Rue De Bruxelles B-5000 Namur, Belgium.> After a 25 days culture of the rotifer *B. plicatilis*, ricebran allowed a yield of about 1.3 g wet weight/l. Rotifers reared during 28 days on ricebran, as exclusive food supply contained high amounts of unsaturated fatty acids, mainly linolenic family and essential amino acids, particularly tryptophan (TRP). This latter represented 10% of the protein weight.

5. **BALVAY, G. & J.-C. DRUART, 1992.** Plankton of Lake Annecy: records and inventory. *Arch. Sci.* (Geneva) **45**, 135-169. <Inst. Limnol., Stat. D'Hydrobiol. Lacustre I.N.R.A., B.P. 511, 74203 Thonon-Les-Bains Cedex, France.> The published literature on the plankton of Lake Annecy [France] has been reviewed; since 1883, 437 phytoplanktonic species, 52 Rotatoria species and 40 Entomostraca species have been recorded. In case of synonymy, some species have been reclassified under their present name, as far as possible.

6. **BINHABIB, M.A. & M.S. RAHMAN, 1993.** Culture of rotifers with reference to some physico-chemical properties of water in nursery pond. *Hydrobiologia* **255**, 177-184. <Bangladesh Agr. Univ., Dept Fish. Biol. & Limnol., Mymensingh 2202, Bangladesh.> Rotifers were cultured with five different organic and inorganic fertilizers in nursery ponds. Of the fertilizers used, mustard oil cake gave significantly ($p<0.01$) higher production of rotifers than that of mohua oil cake followed by cow-dung, wheat bran, mixture of NPK and control. The residual effect of nine different physico-chemical properties of water on the production of rotifers was 78.92% which indicates that these properties of water had only 21.08% influence on the production of rotifers.

7. **BONACINA, C., I. FERRARI & G. ROSSETTI, 1993.** Structure and seasonal succession of the zooplankton in the lakes of Suviana and Brasimone, North Apennines. *Riv. Idrobiol.* **30**, 77-101. <Ist. Ital. Idrobiol., CNR, Pallanza, Italy.> [Italian] Rotifers are dominated by *Synchaeta*, *Polyarthra*, *Keratella*, *Asplanchna*. In both lakes there is a substantial coincidence of successional trends in the dominant species, except for a certain spring anticipation in the beginning of the growing season. This phase is characterized by the outburst of the microfilter-feeders, which then decline as preditors and competitors increase.

8. **BOZELLI, R.L. 1992.** Composition of the zooplankton community of Batata and Mussura Lakes and of the Trombetas River, State of Para, Brazil. *Amazoniana* **12**, 239-261. <Max-Planck-Inst. Limnol., Postfach 165, W-2320 Plön, Germany.> Batata Lake has received tailings from bauxite processing 1979-1989. Rotifers were highest in number of species, followed by cladocerans and copepods. The three environments differed in zooplankton community composition. Interference from the bauxite tailings could not be clearly identified because for the zooplankton community such interference appears to be a sporadic factor which occurs more intensely during periods such as drawdown.

9. **CARIC, M., J. SANKO-NJIRE & B. SKARAMUCA, 1993.** Dietary effects of different feeds on the biochemical composition of the rotifer *Brachionus plicatilis* Müller. *Aquaculture* **110**, 141-150. < Biol. Inst., P.O. Box 39, 50000 Dubrovnik, Croatia.> Growth rate, doubling time, lipid, carbohydrate and protein content of rotifers fed *Phaeodactylum tricornutum* and *Nannochloropsis* sp. indicate that these monocultures are the most suitable diets for the rotifer. Rotifers fed on these algae are expected to satisfy the nutritional demand of fish larvae.

10. **CARMONA, M.J., M. SERRA & M.R. MIRACLE, 1993.** Relationships between mixis in *Brachionus plicatilis* and preconditioning of culture medium by crowding. *Hydrobiologia* **255**, 145-152. <Univ. Valencia, Area Ecol., E-46100 Burjassot, Spain.> Results show that a preconditioned medium has inducing properties that are comparable to the crowding

effect. In order to isolate the effect on mixis of the preconditioning, we also carried out an experiment involving individual cultures. Isolated individuals of *B. plicatilis*, CU strain, placed in 1 ml of medium renewed daily showed no mixis, but mixis was induced when medium preconditioned to high density was used following the same experimental procedure.

11. **CHRISTOFFERSEN, K., B. RIEMANN, A. KLYSNER & M. SONDERGAARD, 1993.** Potential role of fish predation and natural populations of zooplankton in structuring a plankton community in eutrophic lake water. *Limnol. Oceanogr.* **38**, 561-573. <Freshw. Biol. Lab., Univ. Copenhagen, 51 Helsingorsgade, DK-3400 Hillerød, Denmark.> Rotifer community depression in fishless enclosures probably was a combined effect of mechanical interference with *Daphnia* and food competition. The initial buildup of a high macrozooplankton biomass and the dominance of cladocerans in the enclosures without fish, prevented cyanobacteria from forming large colonies. In contrast, cyanobacteria bloomed in the enclosures with fish. The observed changes in the plankton communities support the theory of cascading trophic interactions.

12. **CLEMENT P. 1993.** The phylogeny of rotifers - molecular, ultrastructural and behavioural data. *Hydrobiologia* **255**, 527-544. <Univ. Lyon 1, LTCC, Trajets Comport. Connaiss. Lab. F-69622 Villeurbanne, France.> This work discusses the nature and significance of molecular, ultrastructural, and behavioural characters that can be used in phylogenetic analyses of rotifers. Rotifers appear to be the first known Metazoa without collagen. Ultrastructural features of integuments of gastrotrichs, acanthocephalans and rotifers are compared. Molecular and ultrastructural data suggest that rotifers are primitive Metazoa, probably derived by neoteny from ancestral, ciliated larvae. Further, information on sensory organs and the behaviour of rotifers may offer unique insights into the evolution of the phylum.

13. **CONDE-PORCUNA, J.M., R. MORALES-BAQUERO & L. CRUZ-PIZARRO, 1993.** Effectiveness of the caudal spine as a defense mechanism in *Keratella cochlearis*. *Hydrobiologia* **255**, 283-287. <Univ. Granada, Fac. Ciencias, Dept Biol. Anim. & Ecol., E-8071 Granada, Spain.> The temporal distribution of spined and unspined forms of *K. cochlearis* in Cubillas reservoir during an annual cycle, and the stomach contents of *Asplanchna girodi*, were studied. The results suggest that the length of the caudal spine plays a critical role in the defense against predation by *A. girodi*. Short-spined forms showed a higher susceptibility to predation than unspined forms, which may have important consequencies for spine length variation in *K. cochlearis* populations.

14. **CUKER, B.E. 1993.** Suspended clays alter trophic interactions in the plankton. *Ecology* **74**, 944-953. <Cent. Mar. Environ. Stud., Hampton Univ., Hampton, VA 23668, USA.> It was anticipated that turbidity from clay would release crustacean zooplankton from visual planktivores. Instead, crustacean zooplankton appeared to be governed primarily by *Chaoborus* predation. Suspended clay weakened the link between visually predaceous fish and *Chaoborus*, which in turn strengthened the effect of *Chaoborus* predation on crustacean zooplankton. Since fish selectively cropped larger instars of Chaoborus, rotifers (primarily *Keratella cochlearis*), which are mostly eaten by smaller instars of *Chaoborus*, were unaffected by clay.

15. **DARTNALL, H.J.G. 1993.** The rotifers of Macquarie Island. *ANARE Res. Notes* **89**, 1-41. <Copper Beeches, 76 Lewes Road, Ditchling, Sussex BN6 8TY, U.K.> Describes and figures 39 taxa of rotifers from subantarctic Macquarie (54°30'S, 158°57'E, midway between Australia, New Zealand and Antarctica); 38 are new records for the Island. [Repeated from issue #22 with summary].

16. **DERGACH, S.M. & N.A. PETROVA, 1992.** Effects of dredging on the development of zooplankton and zoobenthos in the Gulf of Ob. *Gidrobiol. Zh.* **28**, 65-69. <Sib. Res. Des.-Constr. Inst. Fish., Tyumen, Russia.> [RUSSIAN]. While performing dredging in the Nadymsky bar of the Ob inlet [Russia], the abundance of zooplankton near suction-tube dredger became 1.5 times lower. A month and a half after completion of dredging the damaged parts of the bottom were populated with benthic organisms [*Asplanchna priodonta, Brachionus calyciflorus, Keratella quadrata*] whose number and biomass did not differ from those at control stations.

17. **DORE, B. & F. CARNEMOLLA, 1993.** Polar resin embedding for *Macrotrachela quadricornifera*. *Hydrobiologia* **255**, 57-58. <Univ. Turin, Fac. Sci. , Dept Biol. Anim., Vaccad Albertina 17, I-10123 Turin, Italy.> A new glycol methacrylate (GMA) polar resin technique was used for light microscopy and histochemistry of *M. quadricornifera*. Animals were treated with cold aqueous solution of ethylene glycol (EG), then embedded in the cold. Animals required no conventional chemical fixation as EG stabilizes, dehydrates and cryopreserves their structure. Enzymatic activities & morphology are preserved. Moreover, resin reticulate protects tissues against agressive reagents. It is possible to perform different staining procedures, in sequence, on the same section.

18. **DRENNER, R.W., K.D. HOAGLUND, J.D. SMITH, W.J. BARCELLONA, P.C. JOHNSON, M.A. PALMIERI & J.F. HOBSON, 1993.** Effects of sediment-bound bifenthrin on gizzard shad and plankton in experimental tank mesocosms. *Environ. Toxicol. Chem.* **12**, 1297-1306. <Dept Biol., Tex. Christian Univ., Fort Worth, TX 76129, USA.> 8-d LC50s for gizzard shad were 521 and 207 ng/L, using bifenthrin (insecticide) concentrations in water 1 h after addition and average concentrations during the study, respectively. Bifenthrin significantly reduced copepod nauplii density and turbidity, increased rotifer density and Secchi depth, and affected chlorophyll.

19. **EJSMONT-KARABIN, J., J. KROLIKOWSKA & T. WEGLENSKA, 1993.** Patterns of spatial distribution of phosphorus regeneration by zooplankton in a river-lake transitory zone. *Hydrobiologia* **251**, 275-284. <Polish Acad. Sci., Inst. Ecol., Hydrobiol. Stn, Lesna 13, PL-11730 Mikolajki, Poland.> Studies on phosphorus regeneration by zooplankton occupying the Krutynia River - lake Kujno transitory zone demonstrated 3 regions: 1. riverine, P regeneration rate low, dominated by small, pelagic rotifers. Species diversity index (SDI) calculated for phosphorus regeneration was also low; 2. covered with macrophytes, large-bodied littoral zooplankton became more important and the rate of the process and SDI markedly higher; 3. littoral-pelagic belt, characterized by the highest P regeneration and SDI and a relatively higher contribution of pelagic forms of zooplankton to the process of phosphorus regeneration.

20. **ENESCO, H.E. 1993.** Rotifers in aging research - use of rotifers to test various theories of aging. *Hydrobiologia* **255**, 59-70. <Concordia Univ., Dept Biol., 455 Maisonneuve Blvd, W/Montreal H3G 1M8, Quebec, Canada.> Four theories of aging are discussed. The rate of living theory, programmed aging, and two molecular theories of aging are discussed. A molecular explanation of aging does not necessarily exclude the idea of programmed aging. It is probable that an eventual understanding of the aging process will rest on both a physiological and molecular basis.

21. **FERNANDEZ-CASALDERREY, A., M.D. FERRANDO & E. ANDREU-MOLINER, 1993.** Chronic toxicity of methylparathion to the rotifer *Brachionus calyciflorus* fed on *Nannochloris oculata* and *Chlorella pyrenoidosa*. *Hydrobiologia* **255**, 41-49. <Univ. Valencia, Fac. Biol. Sci., Dept Anim. Biol. Anim. Physiol.,Dr Moliner 50, E-46100 Burjassot, Spain.> All demographic parameters were affected by methylparathion exposure on rotifers fed on both species of algae, but the toxic effect was larger when animals were fed on *C. pyrenoidosa*; in this case, animals showed a decreased in fertility and also a delayed first reproduction. Sublethal methylparathion levels produced a reduction in most of the parameters selected, especially after exposure to 7 mg l^{-1}, where the animals died before reproducing.

22. **FERNANDEZ-REIRIZ, M.J., U. LABARTA & M.J. FERREIRO, 1993.** Effects of commercial enrichment diets on the nutritional value of the rotifer *Brachionus plicatilis*. *Aquaculture* **112**, 195-206. <Inst. Investig. Marinas, C.S.I.C., Eduardo Cabello 6, 36208 Vigo, Spain.> Enrichers used were: Protein Selco (microcapsules), Dry Selco (microparticles) and SuperSelco (an emulsion containing high levels of n-3 HUFA). The fatty acid content of the rotifers increased after the enrichment with all of the enrichers and this increase was particularly apparent in the case of n-3HUFAs (20:5n-3 and 22:6n-3).

23. **FERRANDO, M.D., C.R. JANSSEN, E. ANDREU & G. PERSOONE, 1993.** Ecotoxicological studies with the freshwater rotifer *Brachionus calyciflorus*. II. An assessment of the chronic toxicity of lindane and 3,4-dichloroaniline using life tables. *Hydrobiologia* **255**, 33-40. <Univ. Valencia, Fac. Biol. Sci., Dept Anim. Biol. Anim. Physiol., Dr Moliner 50, E-46100 Burjassot, Spain.> All the demographic parameters studied decreased with increasing toxicant concentrations. The use of life table techniques with *B. calyciflorus* as a test method for the determination of chronic toxicity of xenobiotics is discussed.

24. **FERRANDO, M.D., C.R. JANSSEN, E. ANDREU & G. PERSOONE, 1993.** Ecotoxicological studies with the freshwater rotifer *Brachionus calyciflorus* III. The effects of chemicals on the feeding behaviour. <Address above.> *Ecotoxicol. Environ.* SAF **26**, 1-9. ENGLISH The effect of short-term exposure to xenobiotics on the feeding behavior of the freshwater rotifer Brachionus calyciflorus was studied. The filtration and ingestion rates of this rotifer decreased after an exposure of 5 hr to sublethal concentrations of copper, pentachlorophenolate, 3,4-dichloroaniline, and lindane. The effective concentrations at which feeding rate was reduced to 50% of that in controls (EC50) for the respective chemicals are 0.032, 1.85, 41.2, and 8.5 mg/liter. The potential use of feeding behavior as test criterion for toxicity screening tests with aquatic invertebrates is discussed.

25. **FUSSMANN, G. 1993.** Abundance, succession and morphological variation of planktonic rotifers during autumnal circulation in a hypereutrophic lake (Heiligensee, Berlin). *Hydrobiologia* **255**, 353-360. <Free Univ. Berlin, Inst. Zool., Königen Luise Str. 1-3, W-1000 Berlin 33, Germany.> Abundances of 26 species occurring in the plankton, as well as physical and chemical parameters (water temperature, O_2, total phosphorus, SRP, NO_3^-, NO_2^-, NH_4^+, chlorophyll a) were determined at different depths. Mixing and re-stratification allowed mass production of algae and rotifers. The prevailing phenomenon was the dramatic decrease of the total number of individuals and of species towards completion of autumnal turnover. The impact of falling temperature, increasing mixing depth and mass production of phytoplankton on the rotifer plankton community is discussed.

26. **GALINDO, M.D. & C. GUISANDE, 1993.** The reproductive biology of mictic females in *Brachionus calyciflorus* Pallas. *J. Plankt. Res.* **15**, 803-808. <Univ. Sevilla, Fac. Biol., Dept Ecol., Apdo 1095, E-41080 Seville, Spain.> At limited food concentration, lifespan and survivorship increased due to greater length of pre-reproductive and post-reproductive periods. At non-limiting food conditions, the reproductive biology of mictic females was reduction of survivorship pattern due to high male reproduction rate in a few age classes.

27. **GALINDO, M.D., C. GUISANDE & J. TOJA, 1993.** Reproductive investment of several rotifer species. *Hydrobiologia* **255**, 317-324. <Address above.> Four studied rotifer species responded similarly to changes in food concentration. Below a certain food level, egg and body volumes were small but increased to a maximal size, which differed in the four species as the food concentration was raised. At higher food levels, there was a reduction in egg and body volumes. The food levels for maximum egg and body volumes are interpreted as optimal ones; below these, food limitation reduces the size of the reproducing adult and, consequently, the size of eggs. Above this optimal level, higher food levels accelerated the rotifer life cycles, resulting in adults maturing at smaller sizes with a larger number of smaller eggs.

28. **GALKOVSKAYA, G.A., Z.I. GORELYSHEVA & I. KUFEL', 1992.** Peculiarities of diurnal distribution of Rotatoria and algae in water of Mikhailovskoe Lake, Poland. *Gidrobiol. Zh.* **28**, 16-25. <Inst. Zool., Acad. Sci. B., Minsk, Beloruss.> [RUSSIAN]. The data on the distribution of planktonic Rotatoria in the water thickness of the lake by day and at night are presented. Analysis of correlation of Rotatoria number with algae of different size fractions permits a conclusion that the favourable conditions of nutrition of algae (size 5-10 μm) are created at night.

29. **GILBERT, J.J. & J.D. JACK, 1993.** Rotifers as predators on small ciliates. *Hydrobiologia* **255**, 247-253. <Dartmouth Coll., Dept Biol. Sci., Hanover NH 03755, USA.> Results of experimental studies indicated that rotifers may prey extensively on ciliates in natural plankton communities, ingesting 25 to 50 individuals in the 45-60 μm size range day-1.

30. **GREEN J. 1993.** Diveristy and dominance in planktonic rotifers. *Hydrobiologia* **255**, 345-352. <Queen Mary & Westfield Coll., Ctr Res. Aquat. Biol., Mile End Rd, London E1 4NS, England.> The diversity of planktonic species in a body of water can be estimated in two ways: momentary diversity and long term diversity. The relationship between the two varies mainly with salinity. Dominance is generally inversely related to diversity. In considering the total possible range of dominance for a given number of species the mean values are surprisingly restricted. An abnormally high dominance for a number of species can be an indication of pollution or some other form of environmental stress.

31. **GUIMARAES, M.C. 1992.** Planktonic rotifer community structure in Alto Cavado Reservoir in relation to trophic status. Publ. Inst. Zool. 'Dr Augusto Nobre', Fac. Cienc. Porto 0 (231), 1-14. <Inst. Zool. "Dr Augusto Nobre", Fac. Sci., 4000 Porto, Portugal.> Results showed that the peak of abundance of Rotifera group coincided with the highest temperatures and with the stratified period of the reservoir. We have identified 31 species, 35% of them constant in the reservoir. The dominants species were *Keratella cochlearis cochlearis, Polyarthra* spp., *Synchaeta* spp., *Asplanchna priodonta* and *Conochiloides dossuarius*. Values of density and species richness indicated a oligomesotrophic situation at Alto Cavado reservoir.

32. **GULATI, R.D., J. EJSMONT-KARABIN & G. POSTEMA, 1993.** Feeding in *Euchlanis dilatata lucksiana* Hauer on filamentous cyanobacteria and a prochlorophyte *Hydrobiologia* **255**, 269-274. <Vijverhof Lab., Inst. Limnol, Rijkstraatweg 6, 3631 AC Nieuwersluis, Netherlands.> Five taxa were used as ^{14}C tracer foods, together with 6-7 mg C l^{-1} of lake seston in each case, included four species of filamentous cyanobacteria. *Euchlanis* fed on all taxa offered. Clearance rates ranged from 51 to 99 μl ind^{-1} d^{-1} for the large animals and from 22 to 41 μl ind^{-1} d^{-1} for the small animals. The highest ingestion rate observed, 1.7 μg ind^{-1} d^{-1}, was for the large animals feeding on *Aphanizomenon*. Daily ration for both classes exceeded 100% body weight, reaching 690% for small animals fed *Aphanizomenon*. Small animals appeared to assimilate the ingested food more efficiently (assimilation efficiencies 37-100%) than the large animals (34-77%).

33. **HABDIJA, I., B. PRIMC-HABDIJA, R. ERBEN & I. BELINIC, 1993.** Trophic role of rotifers in the plankton of Lake Kozjak, Plitvice Lakes. *Hydrobiologia* **257**, 101-106. <Dept Zool., Fac. Sci., Univ. Zagreb, 41000 Zagreb, Croatia.> The trophic role of rotifers in the zooplankton community of dimictic, oligotrophic lake Kozjak, the largest lake of the Plitvice Lakes, NW Dinarid Mountains (Croatia), is analyzed. Their spatial and temporal biomass distribution in relation to that of protozoans, cladocerans and copepods shows that they form a significant part of the non-predatory zooplankton of this karstic standing water.

34. **HAVE, A. 1993.** Effects of area and patchiness on species richness: An experimental archipelago of ciliate microcosms. *Oikos* **66**, 493-500. <County Council Ringkjobing, Damstraedet 2, DK-6950 Ringkjobing, Denmark.> Two rotifer species were among the colonisers of 5 to 60 cm^2 microcosms submerged in a plastic barrel. The experimental universe was considered to be an archipelago analogue. A distance effect was observed on the species level but not on the average number of species. The results support the area-per-se hypothesis, because of homogeneity between microcosms (except for area). The results also demonstrate the importance of dispersal and spatial heterogeneity for overall population persistence and dynamics.

35. **HAVENS, K.E. 1992.** Acidification effects on the plankton size spectrum: an in-situ mesocosm experiment. *J. Plankt. Res.* **14**, 1687-1696. <Dept Biol. Sci., Water Res. Res. Inst., Kent State Univ., Kent OH 44242, USA.> Plankton size spectra were constructed in order to quantify acidification impacts on mean phytoplankton size (MESDp), mean zooplankton size (MESDz), and phytoplankton-zooplanton size difference (the P-Z distance). Acidification to pH 6.5 did not significantly affect the size spectrum parameters. However, at pH 5.5 and 4.5, MESDp increased, MESDz declined, and the P-Z distance was greatly reduced. These changes reflected a simultaneous shift to large phytoplankton (Peridinium) and small zooplankton (rotifers and nauplii) dominance at low pH.

36. **HAVENS, K.E. 1992.** Acidification effects on the algal-zooplankyon interface. *Can. J. Fish. Aquat. Sci.* **49**, 2507-2514. <Address above.> Algal biomass was reduced at pH 6.5 and lower, but showed no further decline across the gradient of pH 6.5-4.5. Algal C assimilation rates consistently declined with decreasing pH, reflecting a shift in dominance to larger, less productive cells at pH 5.5 and 4.5. Zooplankton biomass and productivity also declined with decreasing pH. In low-pH treatments, only cyclopoids and rotifers persisted. Overall, there were significant reductions in ratios of zooplankton/algal biomass and zooplankton/algal C assimilation (ecological transfer efficiency) with declining pH. The latter was a result of reduced grazer biomass, rather than reduced grazing efficiency; the mean zooplankton P/B ratio at pH 4.5 exceeded that measured in the higher pH treatments.

37. **HAVENS, K.E. 1993.** An experimental analysis of macrozooplankton, microzooplankton and phytoplankton interactions in a temperate eutrophic lake. *Arch. Hydrobiol.* **127**, 9-20. <Address above.> The results suggest that macrozooplankton (*Daphnia galeata mendotae*) and microzooplankton (*Keratella cochlearis* and *Vorticella* sp.) had opposite net effects on the phytoplankton; the former suppressed it while the latter enhanced it. Also, by suppressing microzooplankton, Daphnia likely had an indirect negative effect on the phytoplankton.

38. **HIRAYAMA. K. & I.F.M. RUMENGAN, 1993.** The fecundity patterns of S-type and L-type rotifers of *Brachionus plicatilis*. *Hydrobiologia 255*, 153-157. <Nagasaki Univ., Grad. Sch. Mar. Sci. & Engn., Nagasaki 852, Japan.> The data were obtained by individual cultures of S and L type strains at 17, 24 and 34 ^{o}C. The pattern was analyzed by using normal probability functions. When the age was transformed into logarithmic value, the S and L types had an identical pattern of fecundity at every temperature. This fact indicates that the difference of the growth response to the temperature between S and L type strains stemmed only from the differences in net reproduction rate, not from the pattern.

39. **HIRSCHFELDER, A., W. KOSTE & H. ZUCCHI, 1993.** Bdelloid rotifers in aerophytic mosses - influence of habitat structure and habitat age on species composition. *Hydrobiologia* **255**, 343-344. <Univ. Osnabrück, Fachbereich Biol. Chem., Spez. Zool., Barbarastr. 11, W-4500 Osnabrück, Germany.> The rotifer species composition from two different moss species growing on roofs of different ages was investigated.

40. HOAGLAND, K.D., R.W. DRENNER, J.D. SMITH & D.R. CROSS, 1993. Freshwater community responses to mixtures of agricultural pesticides: effects of atrazine and bifenthrin. *Env. Toxicol.* Chem. **12**, 627-637. <Dept For. Fish. Wildl., Univ. Nebraska, 101 Plant Industry, Lincoln, NE 68583-0814, USA.> The individual and combined effects of atrazine and bifenthrin on lake communities were investigated in a two-phased mesocosm study involving eighteen 5,500-L tanks containing natural plankton assemblages and bluegill. Individaul and combined effects of the pesticides are discussed. The observed interaction effects indicated that when either compound was introduced at ecologically realistic levels, its effects were essentially masked if the other toxicant was present at high concentrations, and that the two pesticides did not act synergistically.

41. HOFMANN, W. & M.G. HOFLE, 1993. Rotifer population dynamics in response to increased bacterial biomass and nutrients - a mesocosm experiment. *Hydrobiologia* **255**, 171-175. <Max Planck Inst. Limnol, Postfach 165, W-2320 Plön, Germany.> The impact of organic nutrients and massive addition of bacteria was followed in lake water mesocosms in a eutrophic lake. Increased DOM initiated a sequence of trophic responses indicated by rapid increases in bacterioplankton, protozoa, and algal biomass. The populations of *Keratella cochlearis* and *K. quadrata* showed a distinct response by rapid increase in birth rate followed by maxima of production and abundance. This succession clearly reflected the trophic position of these rotifer populations in the food chain. A reverse response was observed in *Conochilus unicornis*.

42. HOLLOWDAY, E.D. 1993. *Cephalodella edax* sp. nov., a rotifer parasitic in the motile colonial alga *Uroglena volvox* Ehrenberg. *Hydrobiologia* 255, 445-448. <45 Manor Rd, Aylesbury, HP20 LJB, BUCKS., England.> Diagnostic taxonomic details are given together with remarks on other rotifers known to occur in motile colonies of algae.

43. ICHIKAWA, T., T. YOSHIOKA, E. WADA & H. HAYASHI, 1992. Estimation of nitrogen uptake rate of small zooplankton using nitrogen-15 tracer. *Jpn. J. Limnol.* **53**, 273-280. <Dept Biol., Fac. Sci., Shinshu Univ., 3-1-1 Asahi, Matsumoto 390, Japan.> To detect low quantities of excess ^{15}N in less than several hundreds of small zooplankton individuals (as small as 5 μgN), an isotope dilution technique was adopted using a ratio mass spectrometer. We obtained uptakes rates of 8.5×10^{-8} mg atom-N.ind^{-1}.day^{-1} by *Kellicottia longispina* in Lake Nakatsuna and 4.2×10^{-7} by *Keratella quadrata* in Lake Suwa. Net production rates were calculated from the data of the uptake rates, carbon contents and nitrogen contents. Using a combination of the ratio mass spectrometer and the ^{15}N tracer experiment, the nitrogen uptake rates from nutrient salt to phytoplankton and further to zooplankton can be detected directly at the same time and on the same space scale.

44. IYER, N. & T.R. RAO, 1993. Effect of the epizoic rotifer *Brachionus rubens* on the population growth of three cladoceran species. *Hydrobiologia* **255**, 325-332. <Univ. Delhi, Dept Zool., Delhi 110007, India.> *Daphnia carinata, Moina macrocopa* and *Ceriodaphnia rigaudi* were used. Peak population numbers and initial population growth rates reached by all three cladocerans were lower in the presence of *B. rubens*, probably because of the adverse effects of the epizoic infestation, which was maximal on *D. carinata* and least on *C rigaudi*. In mixed-species cultures of D. carinata and *M. macrocopa*, the presence of *B. rubens* helped *D. carinata* coexist with *M. macrocopa*, which otherwise would have suppressed the *Daphnia*.

45. JACK, J.D. & J.J. GILBERT, 1993. Susceptibilities of different-sized ciliates to direct suppression by small and large cladocerans. *Freshw. Biol.* **29**, 19-29. <Dept Biol. Sci., Dartmouth Coll., Hanover, NH 03755-3576, USA.> Laboratory experiments compared the susceptibilities of six ciliates and the rotifer *Keratella cochlearis* to predation and interference from *Daphnia pulex* and *Bosmina longirostris*. Susceptibilities of the ciliates to D. pulex were similar to or less than that of the rotifer, and decreased with increasing ciliate size. In natural plankton communities, cladocerans could impose high mortality rates on ciliates and shift the size structure of ciliate assemblages towards larger and less susceptible species.

46. JACK, J.D., S.A. WICKHAM, S. TOALSON & J.J. GILBERT, 1993. The effect of clays on a freshwater plankton community: an enclosure experiment. *Arch. Hydrobiol.* **127**, 257-270. <Dept Biol. Sci., Gilman 6044, Dartmouth Coll., Hanover, NH 03755-3576, USA.> The addition of clay (20 and 50 mg/L) to large (850 L) enclosures containing a complete plankton community from Star Lake (Norwich, VT, USA) caused pronounced changes in zooplankton community structure. Cladocerans were greatly suppressed and copepods and some rotifers were also suppressed, though not as severely as the cladocerans. Some ciliates were greatly inhibited. The suppressive effects of the clay on ciliates are probably due to direct effects on the zooplankton. The presence of suspended particles

such as clays may be an important factor affecting the species structure of ciliates and metazoan zooplankton in plankton communities.

47. JANSSEN, C.R., M.D.F. RODRIGO & G. PERSOONE, 1993. Ecotoxicological studies with the freshwater rotifer *Brachionus calyciflorus*. 1. Conceptual framework and applications. *Hydrobiologia* **255**, 21-32. <State Univ. Ghent, Biol. Res. Aquat. Pollut. Lab., J Plateaustr. 22, B-9000 Ghent, Bekgium.> The use of the freshwater rotifer Brachionus calyciflorus as a test organism for ecotoxicological studies was examined. The implications and the possible ecotoxicological applications of the results are discussed.

48. JOHANNSSON, S., S. HANSSON & O. ARAYA-NUNEZ, 1993. Temporal and spatial variation of coastal zooplankton in the Baltic Sea. *Ecography* **16**, 167-173. <Dept Systems Ecol., Stockholm Univ., S-106 91 Stockholm, Sweden.> When analysing temporal variation monthly mean abundance of zooplankton sampled at a coastal station in the northern Baltic Sea between 1976 and 1988 showed the lowest between-year variation in the summers. The coefficients of variation were estimated at 50% for rotifers in June, 70% for cladocerans in August and between 30 and 50% for different copepodite stage in August. Spatial variation also was analysed.

49. KARABIN, A. & J. EJSMONT-KARABIN, 1991. Structure, dynamics and distribution of zooplankton and its many-years' changes in the Wigry Lake. *Ekol. Pol.* 39, 357-375 (1992). <Hydrobiol. Stat., Inst. Ecol., Pol. Acad. Sci., Lesna 13, 11-730 Mikolajki, Poland.> Changes in zooplankton structure over 60 years testify to advancing eutrophication of the lake. The progress of this process is not identical in all lake basins. The northern basin seems to be most eutrophicated, because the Czarna Hancza River which flows into this basin carries large pollution loads.

50. KELLER, W , N.D. YAN, T. HOWELL, L.A. MOLOT & W.D. TAYLOR, 1992. Changes in zooplankton during the experimental neutralization and early reacidification of Bowland Lake near Sudbury, Ontario. *Can. J. Fish. Aquat. Sci.* **49** (Suppl. 1), 52-62. <Ont. Ministry Environ., 199 Larch St., Sudbury, Ont. P3E 5P9, Can.> The zooplankton was sampled before and for 6 yr after neutralization of the lake from pH 4.9 to 6.9. Changes in community composition, including decreased abundance of acidophilic rotifers and increased abundance of other species after neutralization. Temporal patterns in the total abundances of crustaceans, rotifers, and ciliates appeared linked to biological interactions, including predation by fish and larval *Chaoborus*, not directly to water quality changes.

51. KLEINOW, W. 1993. Biochemical studies on *Brachionus plicatilis* - hydrolytic enzymes, integument proteins and composition of trophi. *Hydrobiologia* **255**, 1-12. <Univ. Köln, Inst. Zool., Lehrstuhl Tierphysiol., Weyertal 119, W-5000 Köln 41, Germany.> Hydrolytic enzymes (mostly glycosidases and proteinases) from *B. plicatilis* were examined in total homogenates and in fractions obtained by differential and by density gradient centrifugations. By this means (1) soluble, (2) membrane associated and (3) lysosomal enzymes could be distinguished. The first two classes are presumed to be involved in extracellular digestion processes. At least two types of integument-material with differing chemical properties occur in rotifers. Using similar methods trophi-material of the mastax was prepared for morphological as well as chemical examination. These investigations showed that the trophi contain chitin.

52. KLEINOW, W., B. KUCHENHOFF & H. WRATIL, 1993. Morphological studies of the mastax of *Brachionus plicatilis* (Rotifera). *Verh. Dtsch. Zool. Ges.* **86**, 164. <Address above.> Describes the ultrastructure of the mastax from electron micrographs of thin sections and by SEM. Fibril structure is described, suggesting a hydroskeleton, possibly used to close the mastax cavity ot allow the rotifer to chew.

53. KOBAYASHI, T. 1992. Plankton of Lyell Reservoir, New South Wales. *Proc. Linn. Soc. N.S.W.* **113**, 245-261. <AWT Science & Environment, PO Box 73, West Ryde, N.S.W. 2114, Australia.> Species composition, seasonal changes, interaction between phytoplankton and zooplankton, and the effect of artificial aeration are discussed. 45 taxa of phytoplankton, 10 rotifers, 5 copepods and 12 cladocerans were recorded. The microcrustacean zooplankton fed mainly on *Chroococcus, Oocystis, Melosira* and unicellular centric diatoms: diatoms were well digested, but gelatinous algae remained intact. *Microcystis* was ingested by *Boeckella triarticulata*. Artificial aeration did not prevent a bloom of *Microcystis* and a concomitant change in the abundance of cladocerans was not necessarily causally related.

54. KOSTE, W. & K. BÖTTGER, 1992. Rotifers from Ecuadorian waters 2. *Amazoniana* **12**, 263-303. <Ludwig Brill Str. 5, Quakenbrück 49610, Germany.> [German]. 257 species (including preservation artifacts) were identified, bringing to 300 the rotifers known from Ecuador. Remarks are made on some species, and five nov. spec. and nov. subspec. are described (see p. 27 this issue).

55. **KOSTE, W. & E.D. HOLLOWDAY, 1993.** A short history of western European rotifer research. *Hydrobiologia* **255**, 557-572. <45 Manor Rd, Aylesbury HP20 1JB, Bucks., England.> The course of rotifer research in western Europe including Denmark and the British Isles is traced from its commencement at the end of the 17th century to the middle of the 20th. The development of each discipline involved - taxonomy, anatomy, physiology, phylogenetic relationships, histology, embryology and ecology - is examined in an historical context.

56. **KOVAL'CHUK, A.A. 1992.** Respiration and production of Rotifera. *Gidrobiol. Zh.* **28**, 11-18. <Inst. Hydrobiol., Acad. Sci. Ukr., Kiev, Ukraine> [Russian] An estimation is presented for the formulas of calculation of oxygen consumption by Rotatoria depending on their individual mass. A dependence of oxygen consumption on the content of this gas in water is experimentally determined for Rotatoria *Philodina erythrophtalma*. A simple and reliable method for calculation of diurnal production of Rotatoria depending on the food base and their individual mass is presented.

57. **KOVAL'CHUK, A.A. & G.V. PARCHUK, 1992.** Rotifers of the Sasyk Reservoir and their role in production and destruction processes. *Gidrobiol. Zh.* **28**, 44-53. <Inst. Hydrobiol., Acad. Sci. Ukr., Kiev, Ukraine.> 81 species and intraspecies taxa are found in the desalinated Sasyk reservoir. The maxima of diurnal production and destruction of organic substances by rotifers in the course of seasonal succession in plankton and benthos are noted to be in disagreement. The contribution of rotifers to the production-destruction processes is much higher in benthos than in plankton.

58. **KRAUL, S., A. NELSON, K. BRITTAIN, H. AKOH & A. OGASAWARA, 1992.** Evaluation of live feeds for larval and postlarval Mahimahi (*Coryphaena hippurus*). *J. World Aquacult. Soc.* **23**, 299-306. <Larval Rex. Dept., Waikiki Aquarium, 2777 Kalakaua Ave., Honolulu, Hawaii 96815, USA.> *Brachionus plicatilis* rotifers (R) were among a range of live feeds assayed, using several enrichment media. Brine shrimp juveniles enriched with SuperSelco are a good food for postlarval mahimahi. Yolksac larvae of mahimahi are an even better food, promoting faster growth at less cost, for large scale mahimahi aquaculturists. The data suggest that climate and broodstock age may considerable influence on larval nutrition.

59. **KUTIKOVA, L.A. & G.I. MARKEVICH, 1993.** Principal directions of the evolution of Monimotrochida. *Hydrobiologia* **255**, 545-549. <Russian Acad. Sci., Inst. Biol. Inland Waters, Borok, 152742, Russia.> Phylogenetic relations among the main groups of Monimotrochida are considered. The principal directions of monimotrochid evolution were defined by comparative investigations of mastax morphology (SEM), basic body structures, and general biology. On the basis of these results we propose a revision of previous rotifer taxonomy. We suggest to place the Monimotrochida in the order Protoramida divided into two suborders Flosculariina and Conochilina.

60. **LADLE, R.J., R.A. JOHNSTONE & O.P. JUDSON, 1993.** Coevolutionary dynamics of sex in a metapopulation escaping the Red Queen. *Pros. R. Soc. Lond. Ser. B Biol. Sci.* **253**, 155-160. <Dept Zool., Univ. Oxford, South Parks Rd., Oxford OX1 3PS, UK.> The Red Queen hypothesis for the maintenance of sexual reproduction suggests that harmful parasites and pathogens exert selection pressures on their hosts which make asexual reproduction an unstable long term strategy. We propose, however, that host obligate asexuality can be favoured in the long term, despite the effects of parasites. The hypothesis presented may explain the persistence of anciently asexual taxa, such as the bdelloid rotifers, and the patterns of dispersal seen in obligately asexual groups in general.

61. **LUBZENS, E., Y. WAX, G. MINKOFF & F. ADLER, 1993.** A model evaluating the contribution of environmental factors to the production of resting eggs in the rotifer *Brachionus plicatilis*. *Hydrobiologia* **255**, 127-138. <Israel Oceanogr. .& Limnol. Res., Tel Shikmona, POB 8030, IL-31080 Haifa, Israel.> Resting eggs were produced only at two salinities (9 ppt & 18 ppt); number was affected by the amount of food provided. A model consisting of two generalized linear sub-models was built to evaluate the contribution of each tested food concentrations at the two salinities. The model identified the positive contribution of the relative number of females to males, and the negative association between high rotifer densities and the production of resting eggs. Results of the present study help in defining the optimal conditions for mass production of resting eggs, which are of potential importance in aquaculture.

62. **LUDWIG, G.M. 1993.** Effects of trichlorfen, fenthion and diflubenzuron on the zooplankton community and on production of reciprocal-cross hybrid striped bass fry in culture ponds. *Aquaculture* **110**, 301-319. <Fish Farming Exp. Lab., U.S. Fish. Wildlife Serv., P.O. Box 860, Stuttgart, AR 72160, USA.> Application resulted in an initial reduction in the concentration of rotifers and longer-term alteration of zooplankton successional stages, including changes in concentrations of rotifers, cladocerans, and copepods. Culture ponds without applied chemicals had the highest concentrations of small rotifers when fry were stocked, followed by high concentrations of cladocerans, copepod nauplii, and adult copepods. Fry survival in untreated ponds was higher than in chemically-treated ponds.

63. **MAKAREWICZ, J.C. 1993.** A lakewide comparison of zooplankton biomass and its species composition in Lake Erie 1983-87. *J. Gt Lakes Res.* 19, 275-290. <Dept Biol. Sci., State Univ. New York Brockport, Brockport, NY 14420, USA.> 118 species representing 53 genera from the Calanoida, Cladocera, Cyclopoida, Rotifera, and Harpacticoida comprised the offshore zooplankton community of Lake Erie. Twenty-eight common species plus their juvenile stages accounted for 94.4% of the total biomass and 92.5% of the total abundance. Zooplankton abundance and biomass decreased from the western basin to the eastern basin except in 1985. This decrease correlated with the decrease in phytoplankton biomass ($r = 0.81$).

64. **MADONI, P. & A. NAPODANO A, 1993.** Microzoobenthos in the Suviana and Brasimone Rerervoirs. *Riv. Idrobiol.* **30**, 137-156. <Ist. Ecol., Univ. Parma-Vialle Delle Sci., I-43100 Parma, Italy.> [Italian] Particular attention given to the Protozoa in the two reservoirs. Other groups, such as Nematoda and Rotifera, were also abundant in some periods. The species that compose microbenthic communities of the two lakes and their low density are typical of the sediments in which the processes of decomposition are moderate.

65. **MANUEL, J. DE & J. ARMENGOL, 1993.** Rotifer assemblages - a contribution to the typology of Spanish reservoirs. *Hydrobiologia* **255**, 421-428. <Univ. Barcelona, Fac. Biol., Dept Ecol., Av. Diagonal 645, E-08028 Barcelona, Spain.> From a 1987/88 survey of 100 reservoirs on the Iberian peninsula, several groups of reservoirs were differentiated. We studied the species composition of rotifer communities from each reservoir. Data from all reservoirs were integrated separately (stratification and mixing periods) in a principal components analysis. No distinct communities were evident for the different reservoir types, suggesting that each type contains a series of rotifer assemblages, with gradual changes in species composition occurring in response to changes in environmental conditions.

66. **MARAMALDO, R., F. LOMBARDO & I. ANSALONI, 1992.** Catalogue of the Franchini Collections I. Zoology and Parasitology. *Atti Soc. Nat. Mat. Modena* **122**, 1-48. (1991). Atti della Societa dei Naturalisti e Matematici di Modena. [Italian] (Not seen).

67. **MARKEVICH GI. 1993.** Phylogenetic relationships of Rotifera to other vermiform taxa. *Hydrobiologia* **255**, 521-526. <Russian Acad. Sci., Inst. Biol. Imland Waters, Borok 152742, Russia.> Arguments concerning similarities in general structure and embryogenesis in Bdelloida (Rotifera), Platyhelminthes, and Acanthocephala are considered. Evolution of egg hatching in rotifers (i.e., loss of the embryonic egg shell) is evaluated in relation to the phylogenetic similarity of rotifers to the Neodermata. Based on this analysis, I proposed uniting Rotifera and Neodermata into superphylum Squamodermata.

68. **MARKEVICH, G.I. 1993.** SEM observations on *Seison* and phylogenetic relationships of the Seisonidae (Rotifera). *Hydrobiologia* **255**, 513-520. <Address above.> The trophi and external features of the marine rotifer, Seison, are described using SEM. Organization of the trophi of the Seisonidea is discussed and possible evolutionary origins of the sclerite system of the fulcrate mastax are presented. Additional information on the taxonomy and general ecology of Seison are offered.

69. **MAROZAW, A.M. 1992.** Patterns of the populational growth of predatory rotifer *Asplanchna brightwelli* Gosse under the conditions of different food supply. *Vyestsi Akad. Navuk Byelarusi Syer Biyal Navuk* 0 (3-4), 96-98. <Inst. Zool., Acad. Sci. B., Minsk, Belorussia.> [Belorussian] (Not seen).

70. **MATUBARA, T. 1992.** Esophageal and gizzard contents of Northern Shoveler (*Anas clypeata*) in Lake Teganuma. *Jpn J. Limnol.* **53**, 373-377. <Divn Aquat. Ecol., Cent. Ecol. Res., Kyoto Univ., Shimosakamoto, Otsu-Shi 520-01, Japan.> The major contents of the gizzard were cyclopoid copepodids and an attached green alga *Cladophora glanurata*, plus an insignificant number of rotifers *Brachionus calyciflorus*, *B. leydigii*, *B. angularis* *Trichocera birostris* and *Polyarthra* spp., as well as nematodes *Nematoda* spp. and attached diatoms *Navicula* spp. and *Synedra* spp.

71. **MAY, L., A.E. BAILEY-WATTS & A. KIRIKA, 1993.** The ecology of *Synchaeta kitina* Rousselet in Loch Leven, Scotland. *Hydrobiologia* **255**, 305-315. <Inst. Terr. Ecol., Inst. Freshw. Ecol., Bush Estate, Penicuik EH26 0QB, Midlothian, Scotland.> *S. kitina* reached population densities to 5000 ind.l^{-1} (Jan. 1977 - Dec. 1982). There was a marked inverse relationship between populations of *S. kitina* and *Daphnia hyalina* var. *lacustris* in the loch. It seems unlikely that this was due to interference competition from *Daphnia*. *S. kitina* can be cultured on *Rhodomonas minuta* var. *lacustris* and there is some evidence that this rotifer also feeds on small flagellates in its natural environment.

72. **MAZUELOS, N., J. TOJA & C. GUISANDE, 1993.** Rotifers in ephemeral ponds of Donana National Park. *Hydrobiologia* **255**, 429-434. <Fac. Biol., Univ. Seville, Dept Biol. Vegetal & Ecol., APDO 1095, E-41080 Seville, Spain.> 32 ephemeral dune ponds were studied at the end of January 1990. 34 rotifer species were identified. The distribution of only a few species was related to salinity, suspended matter, chlorophyll-a and total water protein concentrations. However, most of the species seem to be better related to the colonization possibilities than to the environmental characteristics of the ponds.

73. **MIMOUNI, P., A. LUCIANI & P. CLEMENT, 1993.** How females of the rotifer *Asplanchna brightwelli* swim in darkness and light - an automated tracking study. *Hydrobiologia* **255**, 101-108. <Univ. Lyon 1, LTCC, F-69622 Villeurbanne, France.> An automated tracking system was used to describe the swimming path of females - twenty five x and y coordinates of the center of gravity of the animal per second, in a discrete space of 512 x 512 pixels. Females swam slower and turned more in darkness than in light. These results show that beside a positive phototactic response, there is a photokinesis which increases the dispersion of animals in the light.

74. **MIRACLE, M.R. & M.T. ALFONSO, 1993.** Rotifer vertical distributions in a meromictic basin of Lake Banyoles (Spain). *Hydrobiologia* **255**, 371-380. <Univ. Valencia, Dept Ecol., E-46100 Burjassot, Spain.> The presence of large populations of rotifers at the oxic-anoxic interface is constant through the years, but highly variable regarding the total abundance and relative proportions of the species, depending on the importance of the vertical mixing in winter and the posterior segregation of water layers as a function of production and decomposition processes. Population distributions of individual rotifer species are detailed. Populations at the oxycline are probably different ecotypes adapted to low oxygen conditions, but having the advantage of high food availability.

75. **MISRA, S.K. & R.P. PHELPS, 1992.** A zooplankton harvester designed to collect rotifers. *Prog. Fish-Cult.* **54**, 267-269. <Dept Biol., Coll. Fisheries, Orissa Univ. Agric. Technol., Rangailunda, Berhampur 76007, Orissa, India.> Rotifers were concentrated from fertilized ponds by pumping water into three baskets of differing mesh set within the other. Mesh openings were 241 μm for the inner basket, 80 μm for the center basket, and 63 μm for the outer basket. An average of 5.6 X 10^5 organisms, of which 99.7% were rotifers, were collected in the 63 μm-mesh basket after 30 min of pumping.

76. **MODENUTTI, B.E. 1993.** Summer population of *Hexarthra bulgarica* in a high elevation lake of South Andes. *Hydrobiologia* **259**, 33-37. <Centro Reg. Univ. Bariloche, C.C. 1336, 8400 Bariloche, Argentina.> The zooplankton is composed of this species and the calanoid copepod *Pseudoboeckella gibbosa*. The lake lacks vertebrate predators. Analysis of calanoid guts showed that its omnivorous diet included *Hexarthra*. A biogeographical comparison is made between this and other American high-elevation lakes. It is concluded that the *Hexarthra* population is controlled by predation and by extreme abiotic conditions.

77. **NOGRADY, T. & T.L.A. ROWE, 1993.** Comparative laboratory studies of narcosis in *Brachionus plicatilis*. *Hydrobiologia* **255**, 51-56. <Queens Univ., Dept Biol., Kingston K7L 3N6, Ontario, Canada.> The effect of twelve drugs and chemical compounds on the narcosis of *B. plicatilis* was studied using standardized laboratory conditions. Drug efficacy was compared by calculating EC50 (effective concentration causing narcosis in 50% of animals), time necessary to reach narcosis in 50% of animals, concentration range of activity, and degree of extension after preservation. The local anesthetic Bupivacaine was found to be most effective by all criteria. Our previous data and preliminary field experiments indicated that drug sensitivity varies widely, even between congeneric taxa. The anesthetic effect of carbonated water was also investigated.

78. **OOMS-WILMS, A.L., G. POSTEMA & R.D GULATI, 1993.** Clearance rates of bacteria by the rotifer *Filinia longiseta* (Ehrb.) measured using 3 tracers. *Hydrobiologia* **255**, 255-260. <Vijverhof Lab., Inst. Limnol., Rijksstr. 6, 3631 AC Nieuwersluis, Netherlands.> Clearance rates (CRs) were measured by (1) 0.51 μm fluorescent microspheres, (2) fluorescently labelled bacteria (FLB) and (3) natural [methyl-H-3]-thymidine-labelled bacteria (< 1.2 μm). Using a 5 min feeding time, the rate of uptake of microspheres was higher than that of

the FLB, though the variation in the uptake in both cases was high: microspheres, 5115 bact.ind^{-1} h^{-1} and 0.368 μl ind^{-1} h^{-1}; FLB, 2252 bact.ind^{-1} h^{-1} and 0.162 μl ind^{-1} h^{-1}. The mean CR using the thymidine-labelled natural bacteria and a 10 min feeding time was 0.179 μl ind^{-1} h^{-1}. Thus, the CR based on the microsphere method was twice as high as for the other two methods.

79. **OSTRENSKY, A. 1993.** Acute toxicity of nitrite to rotifer *Brachionus plicatilis*. *Arq. Biol. Tecnol.* (Curitiba) **36**, 125-132. <Lab. Carcinocultura, Cent. Estudos do Mar, Univ. Fed. Parana, Praca Santos Andrade S/N, Centro, Curitiba, Portugal, CEP 83020-300.> [Portuguese] The concentrations, in mg/l NO2-N, which inhibits in 50% the populational growth (EC50) ranged from 609.3 mg/l in 24-hours to 40.5 mg/l NO2-N in 96-hours, while the median lethal concentrations (LC50) ranged from 732.9 to 168.5 mg/l, in the same period. The maximum concentration that causes no significant mortality, after 96-hours of continuous exposure, was 55.2 mg/l NO2-N. These results put Brachionus plicatilis amongst the most resistant to nitrite aquatic organism ever recorded.

80. **OSTRENSKY, A. & W. WASIELESKY JR. 1992.** The effects of ammonia on populational growth and survival of the rotifer *Brachionus plicatilis* Müller. *Rev. Bras. Biol.* **52**, 355-360. <Lab. De Carcinocultura, Centro De Biol. Mar., Av. Beira Mar S/N, 83225-000 Pontal Do Sul, Portugal.> [Portuguese]. The toxicity of ammoniacal forms on the rotifer *B. plicatilis*, which is largely used in the production of fishes and shrimps, was studied in static semistatic bioassays. The long-term tests (20 days) showed that concentrations of up to 1.2 mg/l NH_3-N did not have any adverse effect on population growth. Acute toxicity tests showed that values of LC50 ranged from 20.6 mg/l NH_3-N, in 24-hours, to 8.6 mg/l NH_3-N, in 96-hours. The chronic levels which affect the median populational growth (EC50) ranged from 10.0 to 2.9 mg/l NH_3-N in the same period.

81. **PAGANI, M., C. RICCI & C.A. REDI, 1993.** Oogenesis in *Macrotrachela quadricornifera* (Rotifera, Bdelloidea). 1. Germarium eutely, karyotype and DNA content. *Hydrobiologia* **255**, 225-230. <Dipt Biol., Via Celoria 26, Milan, Italy.> Bdelloids reproduce via obligate apomictic parthenogenesis. Oogenesis occurs through two subsequent equational divisions, with the extrusion of two polar bodies. We studied oogenesis in *M. quadricornifera* by assessing (1) the constancy of oocyte number, (2) chromosome number and size, and (3) the DNA content of oocytes and blastomeres. Oocyte number at birth is constant and determines maximal fertility. We found a chromosome number of 5, in which two homologous pairs can be recognized. The genome size of the species is 0.75 picograms.

82. **PAVEL'EVA, E.B. & I.V. TELESH, 1992.** Nutrition of planktonic crustaceans and rotifers in some small lakes of Karelia. *Gidrobiol. Zh.* **28**, 11-16. <Zool. Inst., Acad. Sci. Russ., St Petersburg, Russia.> [Russian] The bacterial biomass in lake Kostomojarvi was quite sufficient for maintaining the Rotifers daily rations. The specific utilization of bacteria by zooplankters was inversely proportional to the animals' body weight. The consumption of *Chlorella* and detritus by crustaceans was 60-300% of the animals' body weight, assimilation efficiency 28-88%. The zooplankton community of the lake forms a powerful self-purification system, which can provide the sedimentation of twice as much fine organic matter.

83. **PECHMANEE, T., J. PONGMANEERAT & M. IIZAWA, 1985.** Relation between rotifer density and amount of rotifer consumed by seabass larvae, *Lates calcarifer*. *Tech. Paper* **1**, 1-18. <Nat. Inst. Coastal Aquaculture, Songkhla, Thailand.> (Not seen).

84. **PEJLER, B. & B. BERZINS, 1993.** On the ecology of Dicranophoridae (Rotifera). *Hydrobiologia* **259**, 129-131. <Inst. Limnol., POB 557, S-75122 Uppsala, Sweden.> Information on the distribution of 59 dicranophorid rotifers from diverse habitats in south and central Sweden was analyzed to reveal their relationships to their substrate. They mainly frequent macrophytic vegetation. Some species which have previously been regarded as 'psammobionts' were mostly or only found on periphytic substrates. Like other raptorial predators, dicranophorids have a very broad ecological range.

85. **PEJLER, B. & B. BERZINS, 1993.** On the ecology of *Cephalodella*. *Hydrobiologia* **259**, 121-124 <Address above.> Data on 66 species of Cephalodella (Rotifera), from diverse waters in south and central Sweden, were analyzed to reveal their possible relationships to substrate and habitat. Most species preferred periphytic environments. Most species have a broad ecological range, only a few being bog specialists. An artificial substrate, white cotton, was colonized by several species, even some without eyes.

86. **PEJLER, B. & B. BERZINS, 1993.** On relation to substrate in sessile rotifers. *Hydrobiologia* **259**, 121-124. <Address above.> Information on the distribution of 45 sessile rotifers from diverse freshwaters in south and central Sweden was analyzed to reveal possible

relationships to their substrates. Almost all of them showed an exclusively periphytic occurrence. The highest number of species was found on *Utricularia*, but otherwise it was not possible to correlate rotifer presence to any special macrophyte or category of plants (e.g., fine-leaved or floating-leaved species).

87. PEJLER, B. & B. BERZINS B, 1993. On choice of substrate and habitat in bdelloid rotifers. *Hydrobiologia* **255**, 333-338. <Address above.> Only two species were reported from plankton, both in low frequency. An artificial substrate, white cotton, was utilized only by few bdelloids, mainly by species with eyes. Only one species occurred at higher frequency on the saprobic substrate *Sphaerotilus*. Most bdelloids prefer environments rich in oxygen, but some species may be found in soft-bottom sediments. Several species dwell preferentially in diverse habitats of bogs. Some bdelloids have an exceptionally broad ecological range, but even for these is it possible to distinguish a pattern of preference and avoidance.

88. PEJLER, B. & B. BERZINS, 1993. On the ecology of Trichocercidae (Rotifera). *Hydrobiologia* **263**, 55-59. <Address above.> Most species of 46 trichocercid rotifers from diverse waters in south and central Sweden were found in a wide variety of periphytic environments, but a few seemed to be specialized for bogs or psammon, respectively. Several trichocercids are generally regarded as plankters, but some of them obviously invade the open water only on certain occasions. Hypertrophic environments are generally avoided. *T. similis* prefers polyhumic environments, *T. uncinata* oligotrophic and running-water conditions. The occurrence is often best explained by studying the food choice.

89. PEJLER, B. & B. BERZINS, 1993. On the ecology of Colurellidae (Rotifera). *Hydrobiologia* **263**, 61-64. <Address above.> Periphytic substrates were generally preferred by the 45 colurellid rotifers known from south and central Sweden. Most species are obviously mobile and more or less euryecious, but a few show a predilection for bog environments. Some colurellids are euryhaline, but when inhabiting fresh water they prefer rivers and other environments with a high oxygen concentration, probably because of problems with osmoregulation.

90. PETERS, U., W. KOSTE & W. WESTHEIDE, 1993. A quantitative method to extract moss-dwelling rotifers. *Hydrobiologia* **255**, 339-341. <Univ. Osnabrück, Fachb. Biol. Chem., Spezielle Zool., Barbarastr. 11, W-4500 Osnabrück, Germany.> One of the difficulties in working with bdelloid rotifers is to extract them from the substratum. In the present paper a method is suggested to separate moss-dwelling bdelloids and other animals quantitatively from their habitat. By this procedure it is possible to identify the entire spectrum of species and to calculate exactly their individual densities per unit area or dry weight of moss.

91. PILLARD, D.A., & R.V. ANDERSON, 1993. Longitudinal variation in zooplankton populations in Pool 19, Upper Mississippi River. *J. Freshw. Ecol.* **8**, 127-132. <ENSR Consult. Eng., 1716 Heath Pkwy., Ft Collins, CO 80524, USA.> Rotifers dominated the system with *Brachionus calyciflorus* the most abundant organism. Zooplankton densities were significantly higher at both the upper and lower ends of the pool. The lower end of the pool was lacustrine in nature, supporting higher zooplankton densities. High densities are transferred to the upper part of the succeeding pool. Such a sequence of populations may be typical of pool systems that result from navigation structures such as those on the upper Mississippi River.

92. PONTIN, R.M. & J.M. LANGLEY, 1993. The use of rotifer communities to provide a preliminary national classification of small water bodies in England. *Hydrobiologia* **255**, 411-419. <26 Hermitage Woods Cres., Woking GU21 IUE, England.> The rotifer species present in samples from 180 small water bodies, or ponds, in England were identified and listed for each pond. These communities were used to provide a system of classification of ponds applicable on a national basis, using the program 'TWINSPAN'. Sites were also ordinated using 'DECORANA' to identify major trends within the data set. The environmental factors most highly correlated with rotifer community were (a) conductivity ($P < 0.001$), (b) pH ($P < 0.00$ 1) and (c) permanence of water body ($P < 0.00$ 1). Out of 167 species, 32 were acting as indicators. It is suggested that a pond classification could be based on these species alone.

93. POZUELO, M. & L.M. LUBIAN, 1993. Asexual and sexual reproduction in the rotifer *Brachionus plicatilis* cultured at different salinities. *Hydrobiologia* **255**, 139-143. <Univ. Sevilla, Psicobiol. Lab., Dept Fisiol. & Biol. Anim., Av. S Francisco Javier S-N, E-41005 Seville, Spain.> Results of culture experiments showed that mixis can occur over a wide ranges of female population density, and support the hypothesis that sexual reproduction is a strain dependent component of the general reproductive response.

94. RAO, T.R. 1993. Population growth rate of the parasitic rotifer *Proales gigantea* and susceptibility to parasitization in the snail *Lymnaea aduminata* at different stages of embryonic development. *Hydrobiologia* **254**, 1-6. <Dept Zool., Univ. Delhi, Delhi 110007, India.> The population growth rate of *P. gigantea* was 0.46 ± 0.07 $ind.^{-1}$ day^{-1} at the ambient temperature of 18-22 °C. Snail eggs were most susceptible to rotifer attack during the initial stages of development, becoming progressively more resistant after the 'hippo' stage. Yet, regardless of the stage of development, the host embryo was doomed to die without hatching even if one individual rotifer gained entry inside the egg capsule. The presence of *P. gigantea* within the parasitized egg capsules or in the mucilage had no effect on the developmental rates and hatching success of non-parasitized eggs within the same egg mass.

95. REALE, D., P. CLEMENT & A. ESPARCIA-COLLADO, 1993. Influence of the concentration of oxygen on the swimming path of *Brachionus plicatilis* (Rotifera). *Hydrobiologia* **255**, 87-93. <Univ. Lyon 1, Trajets Comportements & Connaissances Lab., F-69365 Lyon 2, France.> The relative swimming speed significantly decreased when the concentration of oxygen was very low. There was a negative correlation between the linear speed and the angular speed. The spatial sinuosity ('S' of Bovet & Benhamou, 1988) was calculated. The trajectories were significantly more sinuous when the concentration of oxygen was very low. These results could explain the accumulation of some rotifers in the oxycline; rotifers may spend more time in very low concentrations of oxygen by slowing and by turning more.

96. RICCI, C., G. MELONE & C. SOTGIA, 1993. Old and new data on Seisonidae (Rotifera). *Hydrobiologia* **255**, 495-511. <Univ. Turin, Dept Anim. Biol., Via Accademia Albertina 17, I-10123 TURIN, Italy.> The literature concerning biogeographical distribution, relationships with their host, and morphology is reviewed, and new information from SEM and optical microscopy of both living animals and serial sections is given. Some features are peculiar to Seison: obligatory amphimixis, endolecythal eggs, encysted spermatozoa, unique mastax, and absence of copulatory organ in males and of vitellaria in females. Reduction of the corona and absence of resistant stages in Seisonidea may be related to their habitat and to their life style. We propose a closer relationship of Seisonidea to Monogononta than previously asserted.

97. RICO-MARTINEZ, R. & M. SILVA-BRIANO, 1993. Contribution to the knowledge of the Rotifera of Mexico. *Hydrobiologia* **255**, 467-474. <Georgia Inst. Technol, Sch. Biol., Atlanta, GA 30332, USA.> This faunistic survey of Mexican Rotifera, covering 32 localities, mostly in Central Mexico, has yielded 96 taxa of which 41 are new to Mexican fauna. The zoogeographic status of the rotifer fauna of Mexico is re-evaluated on the basis of the present data.

98. ROCHE, K.F. 1993. Temporal variation in the morphology of the rotifer *Keratella quadrata* (Müller, 1786). *Annls Limnol.* **29**, 119-127. <Zool. Dept, Univ. Coll. Cork, Lee Maltings, Prospect Row, Cork, Ireland.> Body and caudal spine lengths increased from Nov.-Feb., then decreased until June. There were no significant correlations with water temp., pH, hardness, food levels or copepod numbers.

99. ROCHE, K.F., E.V. SAMPAIO, D. TEIXEIRA, T. MATSUMURA-TÜNDISI, J.G. TUNDISI & H.J DUMONT, 1993. Impact of *Holoshesthes heterodon* Eigenmann (Pisces: Characidae) on the plankton community of a subtropical reservoir: the importance of predation by *Chaoborus* larvae. *Hydrobiologia* **254**, 7-20. <Address above.> In a month-long enclosure experiment, two enclosures were stocked with fish and two remained fishless. In both fishless enclosures, *Chaoborus* larvae became abundant. Rotifers were low in abundance in the absence of fish, probably as a consequence of *Chaoborus* predation. Phytoplankton density increased in all four enclosures, due probably to the lack of water flow. Only in the fishless enclosure with high densities of crustaceans did phytoplankton abundance decrease markedly at the end of the experiment, perhaps becauseof grazing losses.

100. RONNEBERGER, D., P. KASPRZAK & L. KRIENITZ, 1993. Long-term changes in the rotifer fauna after biomanipulation in Haussee (Feldberg, Germany, Mecklenburg-Vorpommern) and its relationship to the crustacean and phytoplankton communities. *Hydrobiologia* **255**, 297-304. <Inst. Gewässerökol & Binnenfischerei, Limnol. Abt., Geschicheter Seen, W-1431 Neuglobsow, Germany.> In Feldberg Haussee, an anthropogenic eutrophicated lake, biomanipulation was executed for restoration. To increase the biomass of crustaceans, fish grazing on zooplankton was reduced by catching small fishes and introducing pike-perch. After biomanipulation rotifer biomass from a wide range of species decreased to a small spring maximum with three dominant species. The development of food in spring and food competition between crustaceans probably controlled the rotifer development.

101. RUTTNER-KOLISKO, A. 1993. Taxonomic problems with the species *Keratella hiemalis*. *Hydrobiologia* **255**, 441-443. <Biol. Stn Lunz, A-3293 Lunz am See, Austria.> *K. hiemalis* was distinguished from *K. quadrata* by its low morphological variability and its occurrence at only low temperatures. Morphological characteristics are straight lateral borders of carapace and spines, caudal spines of medium length, and triangular, first median facet. The species has been found by many authors in the hypolimnion of oligotrophic lakes. Some workers have applied the name *hiemalis* to a similarly-sized species, *K. testudo*. This species occurs in high mountain and arctic pools and displays substantial morphological variability.

102. SAMPATHKUMAR, R. 1992. On the taxonomy and ecology of rotifers in fish ponds. *J. Bombay Nat. Hist. Soc.* **89**, 204-209. <Dept Zool., Natl Univ. Singapore, Lower Kent Ridge Rd, Singapore 0511.> Rotifers present in four fish ponds in Tuticorin during a fish culture season (November 1986 to March 1987) are listed. *Hexarthra intermedia* is a new record from India.

103. SANDERS, B.M. 1993. Stress proteins in aquatic organisms: an environmental perspective. *Crit. Rev. Toxicol.* **23**, 49-75. <Mol. Ecol. Inst., Calif. State Univ., Long Beach, CA 90840, USA.> (Not seen).

104. SANOAMUANG, L.-O. 1993. Comparative studies on scanning electron microscopy of trophi of the genus *Filinia* Bory de St Vincent (Rotifera). *Hydrobiologia* **264**, 115-128. <Fac. Sci., Khon Kaen Univ., Khon Kaen 40002 Thailand. Trophi of *Filinia* species from 19 lakes in New Zealand were examined and compared with specimens from Australia, Austria, Belgium, and Turkey. Five species of *Filinia* (*brachiata, longiseta*, cf. *pejleri, novaezealandiae*, and *terminalis*) were positively identified from the New Zealand samples. Numbers of unci teeth are considered to be the most reliable features for identification within the genus. Numbers obtained from SEM of other species of *Filinia* (*australiensis, grandis*, and *hofmanni*) are also listed for the first time.

105. SANOAMUANG, L.-O. & J.C. MCKENZIE, 1993. A simplified method for preparing rotifer trophi for scanning electron microscopy. *Hydrobiologia* **250**, 91-95. <Address above.> A simple, quick technique for the preparation of rotifer trophi for scanning electron microscopy is described. The method permits visual monitoring of the extraction process and does not require critical point drying of the specimens. Micrographs showing fine, structural detail of the hard parts of the mastax of representatives of the following genera are presented: Asplanchna, Conochilus, Filinia, Hexarthra, Keratella, Proalides, Synchaeta, and Trichocerca.

106. SANOAMUANG, L. & V.M. STOUT, 1993. New records of rotifers from the South Island lakes, New Zealand. *Hydrobiologia* **255**, 481-490. <Address above.> Thirty-five lakes in the South Island of New Zealand were surveyed for rotifers during 1988-91. Of 85 taxa identified, 31 are first records for New Zealand, bringing the rotifers recorded from the country to 331. Four species (*Keratella australis, K. slacki, Lecane herzigi* and *L. tasmaniensis*), previously recorded as endemic forms only in Australia, are now added to the New Zealand checklist. Several of the new records are photographed, and scanning electron micrographs of the trophi are shown. Comments are made on the Australasian endemics and rotifer biogeography in New Zealand.

107. SCHMID-ARAYA, J.M. 1992. The biochemical composition and calorific content of a rotifer and its algal food: comparison of a two-stage chemostat and batch culture. *Oecologia* (Heidelb.) **92**, 327-338. <Biol. Stn Lunz, Inst. Limnol., Öst. Akad. Wiss., Seehof 4, A-3293 Lunz am See, Austria.> In the chemostat the biochemical composition of *Encentrum linnhei* varied with dilution rates, algal input and food availability but significant differences were found in the biochemical composition of the animals growing in the reaction vessel and those collected from the sump. In contrast, the biochemical content of batch-grown *E. linnhei* varied with time, depending on food availability and the biochemical state of the algal food. At the end of the exponential growth phase, when maximum densities had been achieved, batch-grown rotifers were more biochemically nutritious than chemostat-grown animals in their steady-state phase.

108. SCHMID-ARAYA, J.M. 1993. Rotifer communities from some Araucanian lakes of southern Chile. *Hydrobiologia* **255**, 397-409. <Address above.> A total of 19 species was found in these oligotrophic lakes. Species richness varied from 6 to 12; similarly, one or two dominant species usually accounted for more than 80% of the total annual abundance. Species diversity was significantly related to species richness in all lakes. Rotifer abundances in these lakes were significantly influenced by a number of abiotic variables,

including those related to water ionic composition. These relationships may imply that the small differences in chemical characteristics of these lakes influence the structure of the rotifer community.

109. SCHNEIDER, S., & W. KLEINOW, 1992. Cytoskeletal structures from the rotifer integument - main protein components of the lorica of Brachionus plicatilis (Rotifera). *Verh. Dtsch Zool. Ges.* **86**, 115. <Univ. Köln, Inst. Zool., Lehrstuhl Tierphysiol., Weyertal 119, W-5000 Köln 41, Germany.> Used polyacrylamide gel electrophoresis to examine the structural proteins, e.g. actin.

110. SCHWARZ, A.-M.J., J.D. GREEN, T.G.A. GREEN & R.D. SEPPELT, 1993. Invertebrates associated with moss communities at Canada Glacier, Southern Victoria Land, Antarctica. *Polar Biol.* **13**, 157-162. <NIWA Freshwater, P.O. BOX 8602, Riccarton, Christchurch, New Zealand.> The invertebrate fauna was numerically dominated by protozoa, rotifers, nematodes and tardigrades, with densities recorded comparable to those in other Antarctic regions. These groups were found at a mean depth ranging from 5 to 10.83 mm in the moss. A greater percentage of all groups were in the upper 5 mm of moss cores in post-melt samples than in pre-melt samples.

111. SEGERS H. 1993. Rotifera of some lakes in the floodplain of the River Niger, Imo State, Nigeria I. New species and other taxonomic considerations. *Hydrobiologia* **250**, 39-61. <Inst. Anim. Ecol., Univ. Ghent, K.L. Ledeganckstr.35, B-9000 Ghent, Belgium.> The Rotifera of thirteen freshwater habitats in the upper floodplain of the River Niger were studied. Thirteen new species are described. The synonymy of *Hemimonostyla* Bartos and *Monostyla* Ehrenberg with *Lecane* Nitzsch is commented upon. A number of new names and synonymies are proposed for species of *Lepadella* and *Lecane*.

112. SEGERS, H, & H.J. DUMONT, 1993. Rotifera from Arabia, with description of two new species. *Fauna Saudi Arab.* **13**, 3-26. <Address above.> 118 taxa of rotifers are the first recorded from Arabia, including two new species (see p. 30). Notes are given on rare or little known species. A rare war-correspondent's view of the microbiota.

113. SEGERS, H., G. MURUGAN & H.J. DUMONT, 1993. On the taxonomy of the Brachionidae: description of *Plationus* n. gen. (Rotifera, Monogononta). *Hydrobiologia* **268**, 1-8. <Address above.> SEM studies of *Brachionus* and *Platyias* are used to relocate the unsettled *B. patulus* into a new genus, *Plationus*.

114. SEGERS, H., C.S. NWADIARO, & H.J. DUMONT, 1993. Rotifera of some lakes in the floodplain of the River Niger, Imo State, Nigeria. II. Faunal composition and diversity. *Hydrobiologia* **250**, 63-71. <Address above.> 207 species of monogonont rotifers are recorded. The most diverse genus is *Lecane* with 59 species. Ten species appear to be endemic to the lower Niger delta, another 3 are restricted to Central and/or West Africa. Two lakes (Iyi-Efi and Oguta), with 136 and 124 species on record, rank among the richest rotifer environments ever studied. It is hypothesized that (sub)tropical floodplains are the world's richest habitats for rotifers.

115. SERRA, M. & M.J. CARMONA, 1993. Mixis strategies and resting egg production of rotifers living in temporally-varying habitats. *Hydrobiologia* **255**, 117-126. <Univ. Valencia, Area Ecol., E46100 Burjassot, Spain.> A dynamic model based on six differential equations has been developed to explore the control of mixis of rotifers living in temporally-varying habitats. Results from our simulations suggest that the optimal mixis strategy could be dependent on ecological features of the habitat. In temporal habitats high mictic rates should be expected when the mixis is induced, and the optimal moment of mixis induction would be few days before the mortality rate overcompensates the birth rate of amictic females.

116. SHARMA, B.K. & V.K. DUDANI, 1992. Rotifers from some tropical ponds in Bihar: species composition, similarities and trophic indicators. *J. Indian Inst. Sci.* **72**, 121-130. <Dept Zool., North-Eastern Hill Univ., Shillong 793 014, India.> 57 sp. and ssp. belonging to 22 genera and 16 families reflect a broadly tropical character, with four new records from India. Comments are made on species composition and similarities of the rotifer faunas of different ponds, their trophic status and on the distribution of various taxa. Some specimens of *Brachionus falcatus* infected by a microsporid, *Bertramia asperospora*, are also examined and these comprise the first report of parasitism of the rotifers from this country.

117. SHIEL, R.J. & W. KOSTE, 1993. Rotifera from Australian inland waters. IX. Gastropodidae, Synchaetidae, Asplanchnidae (Monogononta). *Trans. R. Soc. S. Aust.* **117**, . <Murray-Darling Freshwater Res. Ctr, POB 921, Albury NSW 2640, Australia.> 33 species from these three rotifer families have been identified from Australian waters. In contrast to other families, which have a high proportion of indigenes, only two of the 33 are native, including a new *Synchaeta* described here. Keys to species include trophi figures for most taxa, and photographs of some.

118. **SHIEL, R.J. & L. SANOAMUANG, 1993.** Trans-Tasman variation in Australasian *Filinia* populations. *Hydrobiologia* **255**, 455-462. <Address above.> Morphological comparisons of populations of *Filinia* from New Zealand and Australia established the presence of an undescribed species in Lake Okaro, N.Z. SEM micrographs of trophi were used to distinguish closely allied *Filinia* species. It is suggested that *Filinia* species may be more restricted than global records indicate; these records reflect the distribution of authoritative taxonomic references, not necessarily the animals they depict.

119. **SINHA, R.K. 1992.** Rotifer population of Ganga near Patna, Bihar, India. *Proc. Natl Acad. Sci. India Sect. B (Biol. Sci.)* **62**, 313-322. <Envt. Biol. Lab., Dept Zool., Patna Univ., Patna 800 005, India.> 16 species are recorded. The rotifers constitute more than 50% of the total zooplankton populations. Higher number of rotifers were recorded during January whereas during flood season (July to September), they were unrepresented. The rotifer populations were correlated with different abiotic factors of the river water and it was concluded that a number of abiotic factors jointly affect the rotifer population. It wasalso observed that the number of rotifers is high near the outfall points.

120. **SMET, W.H. DE, E.A. VANROMPU & L. BEYENS, 1993.** Contribution to the rotifer fauna of subarctic Greenland (Kangerlussuaq and Ammassalik area). *Hydrobiologia* **255**, 463-466. <Univ. Antwerp, Plant Dierk. Algem. Biol. Lab., RUCA Campus, Groenenborgerlaan 171, B-2020 Antwerp, Belgium.> Sixty-nine taxa (2 Bdelloidea, 67 Monogononta) are reported, forty-six of which represent new records for Greenland. *Proales pejleri* n. sp. is described.

121. **SNELL, T.W. & P.D. MORRIS, 1993.** Sexual communication in copepods and rotifers. *Hydrobiologia* **255**, 109-116. <Georgia Inst. Technol., Sch. Biol. Atlanta, GA 30332, USA.> In this review, the methods used by copepods and rotifers for mate seeking and recognition *inter alia*, are described. The significance of these studies lies in their contribution to our understanding of zooplankton reproductive biology, the chemical ecology of male-female communication, the molecular basis of chemoreception in the aquatic environment, and the evolution of pre-mating reproductive isolating mechanisms in zooplankton.

122. **STARKWEATHER, P.L. 1993.** Hierarchal gene trees and molecular phylogeny of the Rotifera - use of the Polymerase Chain Reaction (PCR) to dissect ecological and evolutionary patterns. *Hydrobiologia* **255**, 551-555. <Univ. Nevada, Dept Biol. Sci., Las Vegas, NV 89154, USA.> The study of rotifer phylogenies and analysis of population-level processes historically have been disjunct. New molecular methods which can be applied to a wide range of genetic systems and systematic grades will shortly eliminate the methodological (and perhaps conceptual) distinction between these fields. The development of PCR, a technique of synthetic DNA amplification, produces concentrated preparations of selected genes from complex mixtures of nuclear and mitochondrial genomes. Analysis of PCR products can provide hierarchal genetic comparisons from the level of local rotifer populations through broad evolutionary (at least molecular) phylogenies.

123. **STOREY, A.W., S.A. HALSE & R.J. SHIEL, 1993.** Aquatic invertebrate fauna of the Two Peoples Bay area, southwestern Australia. *J. Roy. Soc. W.A.* **76**, 25-32. <Western Australian Wildlife Research Centre, > The aquatic invertebrate of lakes and streams in the bay area comprised a total of 247 taxa, with 110 in flowing waters, 170 in standing waters, and 33 common to both habitats. There was a diverse microinvertebrate fauna of 47 taxa of Protozoa and Rotifera. Few species occurred in all three lakes at Two Peoples Bay, suggesting that the species respond to interhabitat differences and that different species occurred under slightly different conditions.

124. **STOTTRUP, J.G & Y. ATTRAMADAL, 1992.** The influence of different rotifer and *Artemia* enrichment diets on growth, surival and pigmentation in turbot (*Scophthalmus maximus* L.) larvae. *J. World Aquacult. Soc.* **23**, 307-316. <Danish Inst. Fish. Mar. Res., North Sea Centre, DK-9850 Hirtshals, Denmark.> An experiment was carried out on turbot larvae fed three different rotifer enrichment diets: Dry Selco, Protein Selco and ICES low-HUFA (an enrichment emulsion containing low amounts of highly unsaturated fatty acids-HUFA). The rotifer enrichments had no significant effect on larval growth and survival. The nutritional value of the *Artemia* stage (day 13 to 26) was more important for the overall larval survival.

125. **TAMARU, C.S., R. MURASHIGE, C.-S. LEE, H. AKO & V. SATO, 1993.** Rotifers fed various diets of baker's yeast and/or *Nannochloropsis oculata* and their effect on the growth and survival of striped mullet (*Mugil cephalus*) and milkfish (*Chanos chanos*) larvae. *Aquaculture* **110**, 361-372. <Oceanic Inst., Makapu'u Point, Waimanalo, HI, USA.> There were no significant differences in the daily rotifer production and amino acid profiles of the resulting rotifers. Rotifers fed only yeast were nutritionally deficient in fatty acids. The fatty acids requirements of mullet, however, appeared to be satisfied with rotifers cultured on a combination of yeast and *N. oculata*. In contrast, no significant differences in larval milkfish survival and growth at Day 10 posthatching were detected when using rotifers fed the various diets in the larval rearing protocol.

126. **TAN, L.W. & R.J. SHIEL, 1993.** Responses of billabong rotifer communities to inundation. *Hydrobiologia* **255**, 361-369. <MDFRC, POB 921, Albury, NSW 2640, Australia.> Daily plankton collections pre- and post inundation of a River Murray billabong demonstrated rapid community responses. Significant negative or positive responses to inundation were detected for most common taxa of 63 rotifer species recorded. A four-fold dilution from intrusion of river water masked rapid population increases. Opportunistic responses to inundation appear to be a survival strategy in the highly unpredictable billabong environment.

127. **TELESH, I.V. 1993.** The effect of fish on planktonic rotifers. *Hydrobiologia* **255**, 289-296 <Russian Acad. Sci., Inst. Zool, St Petersburg 199034, Russia.> The dynamics, community structure, and productivity of planktonic rotifers were studied during 3 years in two lakes near St. Petersburg. One lake was repeatedly stocked with larvae of the fish *Coregonus peled*; the other contained no fish. Fish addition led to a shift in plankton community structure. Population densities of some rotifer species increased as a result of the elimination of large crustaceans by fishes during summer and autumn. An inverse relationship was found between the biomass of rotifers and *Daphnia*.

128. **TURNER, P.N. 1993.** Distribution of rotifers in a Floridian saltwater beach, with a note on rotifer dispersal. *Hydrobiologia* **255**, 435-439. <Wichita State Univ., Dept Biol. Sci., Wichita KS 67260, USA.> Eighteen different rotifers were found at varying densities, depths and locations in the interstitial sand of a small, brackish-water Floridian beach. Most of the rotifers encountered were found in greatest numbers two meters from the waters edge, corresponding to the high-tide mark of the sampled beach. A single, dead *Notholca (Pseudonotholca) japonnica kisselevi* Kutikova (1970), previously known only from its original description locality in the south Kuril Islands, Sea of Okhotsk, was found in the 6 cm depth core at mid-tide level.

129. **TURNER, P.N. & C.D. SILVA, 1993.** Littoral rotifers from the state of Mato Grosso, Brazil. *Stud. Neotrop. Fauna Environ.* **27**, 227-241 (1992). <Address above.> Rotifer composition of eight small bodies of water along the Transpantaneira highway (Pantanal of Pocone) are incorporated with species composition of six stations from Baia Acurizal (Pantanal of Barao de Melgaco), to give a listing of 172 rotifers from the State of Mato Grosso. One hundred and four different rotifers were identified from the Transpantaneira highway, and 97 species were recorded from Baia Acurizal. New regional records are cited along with comments on biogeography and ecology for particular rotifers.

130. **VIRRO, T. & J. HABERMAN, 1993.** The rotifers of Lake Peipus. *Hydrobiologia* **255**, 389-396 <Inst. Zool. & Bot., 21 Vanemuine St., Tartu 202400, Estonia.> In the northern part of Lake Peipus, 140 taxa of rotifers were identified, with species of *Anuraeopsis*, *Conochilus*, *Keratella*, *Polyarthra* and *Synchaeta* dominating. Two main periods of sexual reproduction occur, in the spring and autumn. Different life cycle patterns are represented. Rotifer number and biomass have two maxima between spring and early autumn. The contribution of rotifers to total zooplankton production varies from 13.6% (Oct.) to 89.8% (May). The average production of grazing rotifers is 485.1 kJ m-2, while that of predatory rotifers (*Asplanchna*) is 10.0 kJ m2.

131. **WAGGONER, B.M. & G.O. POINAR, 1993.** Fossil habrotrochid rotifers in Dominican amber. *Experientia* **49**, 354-357. <Univ. Calif. Berkeley, Museum Paleontol., Dept Integr. Biol., Berkeley, CA 94720 USA.> Flask-shaped microfossils are reported from bracts of a moss in Eocene-Oligocene amber from the northern Dominican Republic. They are identical with the thecae of living moss-dwelling *Habrotrocha* (Bdelloidea), which have previously been reported as fossils only from Holocene peat. What may be an egg and a rotifer body fossil are associated with these thecae and further support the identification of these fossils with *Habrotrocha*; the fossils are almost identical to extant *H. angusticollis*. The parthenogenetic bdelloid rotifers have a longer evolutionary history than was previously thought; habrotrochid rotifers seem to have persisted for 35 million years with very little change in morphology or ecological role.

132. WALFORD, J. & T.J. LAM, 1992. High density production of rotifers (*Brachionus plicatilis*) using baker's yeast (*Saccharomyces cerevisiae*) and their N-3 highly unsaturated fatty acid content. *J. Aquacult. Trop.* **7**, 287-300. <Dept Zool., Natl. Univ. Singapore, Kent Ridge, Singapore.> Rotifers were produced continuously through 15 cultures over a period of nine months using baker's yeast. The average duration of a culture was 28 days, and the mean daily rotifer density for the 15 cultures reached more than 400 individuals/ml on day 11 and remained in the range 400-600 individuals/ml for 19 days. The baker's yeast contained no highly unsaturated fatty acids of the n-3 series (n-3 HUFA). In the total lipids from samples of rotifers taken from several different cultures, the mean n-3 HUFA concentration was 2.8%. The need for nutritional supplementation of yeast-cultured rotifers to increase their n-3 HUFA content and improve their nutritional value for marine fish larvae is discussed.

133. WALLACE, R.L. 1993. Phylogeny of the phylum Rotifera - a workshop. *Hydrobiologia* **255**, 491-493. <Ripon Coll., Dept Biol. Ripon, WI 54971, USA.> Summarised workshop which detailed studies presented in the symposium volume (*Hydrobiologia* **255/256**.)

134. WALLACE, R.L. 1993. Presence of anisotropic (birefringent) crystalline structures in embryonic and juvenile monogonont rotifers. *Hydrobiologia* **255**, 71-76. <Address above.> A systematic survey for the presence of birefringent (anisotropic) structures in rotifers was undertaken. Several common features of rotifers exhibit anisotropism (e.g. trophi & muscles). However, unusual anisotropic crystalline structures (ACS) were found in late stage embryos (i.e. possessing eyespots and trophi, and showing movement). ACS were found in 18 of 26 species of monogonont rotifers (comprising 11 genera of 5 families). In *Sinantherina socialis*, ACS were present in the lower gut as compact, spherical masses of minute crystals that slowly broke apart and disappeared within 20 hours of hatching. Although several authors have described the existence of refractive bodies in rotifers, to my knowledge this is the first report of their birefringent properties.

135. WALSH, E.J. 1993. Rotifer genetics - integration of classic and modern techniques. *Hydrobiologia* **255**, 193-204. <Dept of Zoology, 574 Widtsoe, Brigham Young Univ. Provo, UT 84602-5255, USA.> Rotifer genetics has a long but sporadic history. There have been 4 major periods of research activity (1) determining the environmental control of sexuality with inferences regarding genetics - early 1900's; (2) exploring the relationship between chromosome numbers and the rotifer life cycle - 1920's; (3) physiological and developmental genetics - 1960's; and (4) theoretical and experimental population genetics late 1970's. With newly developed molecular techniques, in conjunction with more traditional approaches, integration of these fields is beginning. Most recently the polymerase chain reaction (PCR) has been used to amplify ribosomal genes, and is a first step in using DNA sequences to define evolutionary relationships among the Rotifera.

136. WALSH, E.J. & P.L. STARKWEATHER, 1993. Analysis of rotifer ribosomal gene structure using the polymerase chain reaction (PCR). *Hydrobiologia* **255**, 219-224. <Address above.> We used the polymerase chain reaction (PCR) to selectively amplify 18S ribosomal genes in rotifer taxa from major planktonic clades. In each case, we obtained an amplified product of between 1.8 and 2.0 kilobase pairs. We analyzed the PCR products using 6- and 4-base cutting restriction enzymes, comparing fragment mobilities. For example, Brachionus plicatilis (BSL strain) 18S genes have no restriction sites for Hind III or Bam HI and only a single site for Eco RI (all 6-base cutters). The 4-base cutter Msp I, on the other hand, has at least 4 enzymatic sites, producing fragments between approximately 110 and 460 base pairs in length. Results of this type can be used to differentiate among species and species groups within the Rotifera and can be used as the basis for construction of a broad molecular phylogeny of the group.

137. WETHMAR, C. 1992. Endopeptidase-Aktivitäten aus Gesamthomogenaten des Rädertiers *Brachionus plicatilis* (Rotatoria). PhD Dissertation, Köln. <Univ. Köln, Inst. Zool., Lehrstuhl Tierphysiol., Weyertal 119, W-5000 Köln 41, Germany.> Biochemical study, determination of proteins, MW, extensive use of electrophoresis, proteolytic activity, etc.

138. WETHMAR, C. & W. KLEINOW, 1992. Characterization of a serine endopeptidase from Brachionus plicatilis (Rotifera). *Verh. Dtsch Zool. Ges.* **85**, 175. <Address above.> Determination of proteases by gel electrophoresis, gel chromatography.

139. WICKHAM, S.A., J.J. GILBERT & U.-G. BERNINGER, 1993. Effects of rotifers and ciliates on the growth and survival of *Daphnia*. *J. Plankt. Res.* **15**, 317-334. <Max-Planck-Inst. Limnol., Postfach 165, D-2320 Plön, Germany.> *Daphnia* can suppress ciliates and rotifers through predation and interference competition, but it is not known whether this produces any direct benefit to *Daphnia*. Survivorship and cohort lifetable experiments demonstrated that the amount of enhancement of *Daphnia* growth rates by rotifers and ciliates is roughly proportional to the death rates imposed by *Daphnia*. The death rate imposed by *Daphnia* on rotifers is a function of both algal density and *Daphnia* size. Per unit biomass, neither ciliates nor *Keratella* appear to be as nutritious for *Daphnia* as is *Cryptomonas*.

140. WILLIAMSON, C.E. 1993. Linking predation risk models with behavioural mechanisms identifying population bottlenecks *Ecology* **74**, 320-331. <Dept Earth Environ. Sci., Lehigh Univ., Bethlehem, PA. 18015, USA.> A model is developed to combine the density risk and prey vulnerability components of predation. The model is used to estimate the contribution of predator and prey population overlap to predation risk, and to quantify both density risk and prey vulnerability components of predation risk for two planktonic invertebrate predators and five rotifer prey. The results reveal the presence of severe bottleneck periods where predation risk exceeds the rmax of four of the five prey species, thus supporting the *a priori* prediction of negative population growth or extremely low prey populations during these periods.

141. YANG, L., X. ZHANG et al., 1993. Influence of wastewater from oil refinery on species and biomass of microzoon in rootzone of water hyacinth. *Chin. J. Environ. Sci.* (Beijing) **14**, 67-70. <Nanjing Comb. Environ. Eng. Co., Nanjing 210029, China.> [Chinese] Describes microbiota (including 13 protozoa, 3 rotifers and 4 others) of the root zone of water hyacinth, which can purify wastewater from an oil refinery. The longer retention time of wastewater in the oxidation pond, the more species and the bigger population of microzoon in rootzone. Population densities reach 1.91×10^7 ind./m^2. Increased retention time of wastewater is beneficial to biomass of microzoon and has no effect on the content of aerobic and facultative aerobic microbes in oxidation pond.

142. YUFERA, M., E. PASCUAL & J. GUINEA, 1993. Factors influencing the biomass of the rotifer *Brachionus plicatilis* in culture. *Hydrobiologia* **255**, 159-164. <CSIC, Inst. Cienc. Marinas Andaluc., Aptdo Oficial E-11510 Puerto Real, Spain.> The contribution of the egg weight and the population size structure to the body mass have been studied in two strains of Brachionus plicatilis of different size. A mathematical model was developed in order to obtain a reliable estimate of the dry mass from two single easily determined parameters; the egg/female ratio and the mean lorica length.

NEW TAXA REPORTED

New taxa of Rotifera described in papers listed in this issue are given below. Country and reference from above list are given in parentheses. New synonyms and proposed classification changes above the level of genus are not reported here, but can be found in the relevant papers.

New genus

Plationus n. gen. (relocates '*Brachionus*' *patulus* global, 113)

New species

Aspelta ecuadoriensis (Ecuador, 54)
Cephalodella edax (U.K., 42)
Cephalodella tincaeformis (Ecuador, 54)
Dipleuchlanis ornata (Nigeria, 111)
Euchlanis semicarinata (Nigeria, 111)
Filinia novaezealandiae (New Zealand, 118)
Itura deridderi (Nigeria, 111)
Lecane dumonti (Nigeria, 111)
Lecane eupsammophila (Ecuador, 54)
Lecane inconspicua (Arabia, 112)
Lecane nigeriensis (Nigeria, 111)
Lecane nwadiaroi (Nigeria, 111)
Lecane simonneae (Nigeria, 111)
Lecane stichoclysta (Nigeria, 111)
Lecane sylviae (Nigeria, 111)
Lepadella arabica (Arabia, 112)
Lepadella discoidea (Nigeria, 111)
Lepadella elongata (Ecuador, 54)
Lepadella latusinus striata (Ecuador, 54)
Proales pejleri (Greenland, 120)
Squatinella lunata (Nigeria, 111)
Synchaeta jollyi (Australia, 117)
Trichocerca kostei (Nigeria, 111)

INTRODUCTION

Since the 1st International Rotifer Symposium held successfully in Lunz, Austria, in September 1976, five other symposiums of this kind have taken place. These conferences every three years provide a forum for the interchange of ideas and recent development in rotifer research and are open to everybody working on rotifers. The VII International Rotifer Symposium will take place at a field station of the Institute of Ecology PAS in Mikolajki (Poland), a small town being a well-known holiday and sailing center on the Masurian Lakeland. The station itself is located 4 km from the town, on a shore of Mikolajskie Lake, at the edge of the Piska Forest and close to numerous reserves and protected areas.

MAIN TOPICS

Oral and poster sessions will feature the flowing main topic:

1. History of rotifer research
2. Biogeography
3. Systematics and evolution
4. Genetics
5. Anatomy and morphology
6. Metabolic processes
7. Biochemistry
8. Behaviour
9. Ecophysiology
10. Ecotoxicology
11. Ecology
12. Biotechnology

TENTATIVE PROGRAMME

SUNDAY, 5. Arrival; registration ; informal get-together

MONDAY, 6. (chairpersons: A.Hillbricht-Ilkowska and H.Dumont) Opening ceremony; oral sessions (1 and 2); beer-party

TUESDAY, 7. (chairpersons: C.Ricci and S.Radwan) Oral (3,4 and 5) and poster sessions; camp fire

WEDNESDAY, 8.(chairpersons: M.Miracle and L.Kufel) Oral sessions (6 and 7); mid-symposium boat-trip; round-table discussions

THURSDAY, 9. (chairpersons: L.May and R.Żurek) Oral (8,9,10) and poster sessions; beer-party

FRIDAY, 10. (chairpersons: J.Ejsmont-Karabin and B. Pejler) Oral sessions (11 and 12); farewell party

SATURDAY, 11. Post-conference excursion

ORAL SESSIONS

Lectures are limited to 15 min followed by 5 min discussion. A list of special topics is provided in this announcement. Please note on the Abstract form the number of the topic where you wish to allocate your paper. If you are interested in another topic, please make a note in the Abstract. Reviews are limited to 30 min followed by 10 min discussion. Slide and overhead projectors will be available. Requests for video or other kinds of projection should be adressed to J. Ejsmont -Karabin.

POSTER SESSIONS

The available space for each poster will be 100 cm x 100 cm. All posters will be exhibited throughout the conference.

ABSTRACTS

Both lecture and poster abstracts will be printed and supplied to the participants who submit their abstracts before 15 January 1994. Abstracts can be typed in any way on one side of A4 paper (up to 30 lines). Author name(s), address and title should precede the text.

REGISTRATION FEE

Registration Fee for conference participants is 100 US$ (the Fee covers the volume of abstracts, shuttle transport at Mikolajki, all social events, mid - conference excursion, coffee, tea and refreshments) Accompanying person Fee is 50 US$ (the Fee covers all the costs listed above, except for the volume of abstracts).

PAYMENT

Registration Fees should be paid in US$ by bank transfer to the conference bank account:

Polska Akademia Nauk, Instytut Ekologii, Dziekanów Leśny, 05-092 Łomianki WBK S.A. O/Warszawa 350004-2017 "VII International Rotifer Symposium".

ACCOMODATION

Hotel accomodation available is given on a separate form. Please read carefully, select three from the hotel list and write their numbers in order of preference on the enclosed registration form.

MEALS

Breakfasts will be served at all hotels for 3 US$, lunches and suppers will be served in the Station canteen for 6 US$ each. Thus the expected cost of all three meals is about 15 US$/ person/day.

DEADLINES

Submission of abstracts and Registration form	15 Jan. 1994
Payment of registration fee	15 Jan. 1994
3rd Announcement to be mailed	1 March,1994
Submission of manuscripts	8 June, 1994

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