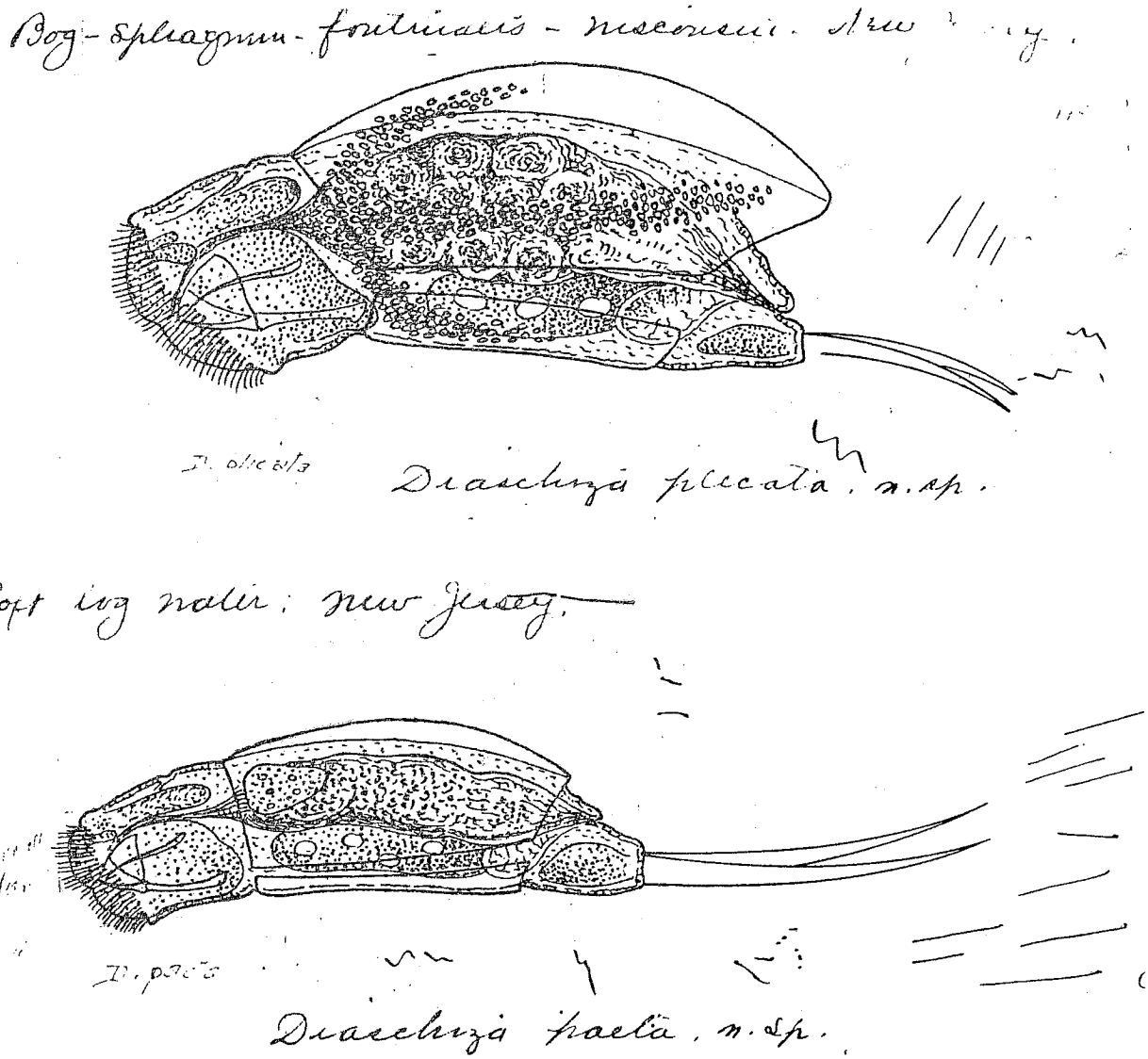
Number 14 Late Spring 1987

Rotifer News

A Newsletter for Rotiferologists throughout the World



Original drawings by Frank J. Myers: From the collection of Paul N. Turner.

Editors: Robert L. Wallace, Paul N. Turner, and James R. Litton, Jr.

Correspondance: R.L. Wallace, Biology Department, Ripon College, 300 Seward Street, Ripon, WI USA, 54971-0248.

This issue of Rotifer News has been reformatted to fit a standard 8.5" x 11" paper size (i.e., portrait layout). It was originally printed with two full pages reduced to fit sideways on US letter paper (i.e., landscape layout).

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ROTIFER NEWS is not part of the normal scientific literature (e.g., journals such as ECOLOGY, HYDROBIOLOGIA, LIMNOLOGY AND OCEANOGRAPHY, and VERH INTERNAT VEREIN LIMNOL); therefore, it should not be cited as such. ROTIFER NEWS is a newsletter that prints citations of recent published literature, abstracts of papers published elsewhere, news, and notes about work in progress or such items being submitted for publication in regular scientific journals as a service to professional or amateur investigators of the phylum Rotifera. ROTIFER NEWS is printed twice a year (each June and December) at Ripon College. Please send reprints and/or references, news, notes, requests to: Robert L. Wallace, Biology Department, Ripon College, 300 Seward Street, Ripon, WI USA 54971-0248.

PLEASE BE SURE TO INFORM THE EDITORS CONCERNING OTHER INVESTIGATORS WHO MIGHT WISH TO RECEIVE ROTIFER NEWS.

PRODUCTION OF ROTIFER NEWS

A letter quality copy of ROTIFER NEWS is produced at Ripon College from text files using a DEC PDP 11/70 as a text editor and the system progtams EDT (editor) and RNO (runoff). Although we have made considerable progress in the addition of accents and scientific notation, there are still some editing problems with the computer that we have not been able to correct. The editors encourage authors to send us reprints so that papers may be properly cited, abstracted, and annotated for the index. Some of the material printed below has been copied directly from the author's abstract and/or textual material. Other material has been edited from information provided by Zoological Record, BIOSIS, or specific information provided by the author. Some items were abstracted by the editors of ROTIFER NEWS.

NEWS AND REQUESTS

Most items received by either editor on or before 5 June 1987 have been included in this issue of ROTIFERS NEWS (No. 14), other items will be published in issue No. 15.

The editors are sorry to inform our readers that we must require support in the production of ROTIFER NEWS. As you are well aware, international and even domestic mailing costs are quite high. Production costs are also quite expensive. We are requiring that the readers of ROTIFER NEWS support us in this valuable endeavor by paying the annual dues ($ 5.00 US dollars per year). IF YOU NEED TO SEND ADDITION FUNDS TO COVER YOUR DUES YOU WILL FIND A QUESTIONNAIRE/ORDER FORM ENCLOSED WITH THIS ISSUE OF ROTIFER NEWS!! Readers of ROTIFERS NEWS who wish to may contributions beyond the dues are encouraged to do so !!!! Make all checks payable to RIPON COLLEGE ACCOUNT #352.01. Rotiferologists who cannot pay the dues because of legal or other financial restrictions may request an exemption from the dues.

1. Back issues of ROTIFER NEWS are still available! If you need a back issue (1-13) of ROTIFER NEWS copies are available from Bob Wallace at a cost of $3.00 per issue to cover mailing and reproduction. Your comments on any aspect of ROTIFER NEWS is requested by the editors!

2. Paul Turner (Research Associate at the National Museum of Natural History, Smithsonian Institute, Washington, D.C. 20560, USA) is a new editor of ROTIFER NEWS. If you have any ARTWORK or abstracts suitable for a new section of ROTIFER NEWS called WORK IN PROGRESS (see below) you should send that information to Paul. If you send it to Bob Wallace, he will forward it to Paul for editing.

3. WORK IN PROGRESS: A new section of ROTIFER NEWS has been established beginning with this issue. WORK IN PROGRESS will abstract unpublished research that, in the opinion of the editors, is of interest to our readers. For the present, each entry in WORK IN PROGRESS will be limited to a space 12 x 18 cm, including all text and figures. References should not be included unless absolutely necessary. About four entries per issue will be printed.

4. Readers of ROTIFER NEWS should be aware of another important news letter: ARTEMIA NEWSLETTER. Address: ARTEMIA REFERENCE CENTER Faculty of Agriculture, State University Ghent, Rozier 44, B-9000 Ghent, BELGIUM, Tel. 32-91-25-257571 - TELEX 12754.

5. Kleinow, W., C. Wetmar, and M. Karisch. Proteinases from Brachionus plicatilis (Rotatoria): characterization by means of gel electrophoresis. (submitted for publication).

6. Stoecker, D.K. and D.A. Egloff. Predation by Acartia tonsa Dana on planktonic ciliates and rotifers. J Exp mar Biol Ecol (in press).

7. Egloff, D.A. Food and growth relations of the marine microzooplankter, Synchaeta cecilia (Rotifer). Hydrobiologia (in press).

8. Soto, D. The relevance of reproductive characteristics of zooplankters to experimental studies in outdoor enclosures. (in revision).

9. Soto, D. Short-term interactions among calanoid, cyclopoid, and phytoplankton. (in manuscript).

10. Ruttner-Kolisko, A. and Malicky, G. (in press). Succession and abundance of rotifers in Lunzer Untersee as determined by biological interactions and abiotic events. XXIII SIL Congress, Hamilton (1987).

11. IMPORTANT REQUEST: Walter Koste and Russ Shiel request that anyone wishing to receive reprints of the Australian rotifer revision appearing in Invertebrate Taxonomy (a series of papers by family, with dichotomous keys to the Australian species) please advise either author by card or letter. The journals are now charging for reprints and only a limited number will be ordered. [Remember that postage costs are quite high too!- RLW, ed.]

12. Recently I (RLW) have heard several workers complain about their samples drying out while in long-term storage. Sometimes the caps of screw-top vials loosen and the fluid evaporates. Dipping the tops in melted wax does improve the shelf-life of samples. An alternative method of long-term storage is to place samples in ampules or Cryules (Wheaton). These two glass vials are essentially the same thing. Ampules are often used to store C-14 as a solution. Cryules are used to store cryogenetic samples. Both look like short cylinders with tapering necks, and are closed by heating the glass neck until it nearly glows orange; this softens the glass enough to stretch it. (Becareful not to heat the sample.) When the very top of the vial is pulled using forceps the neck stretches and the top part separates from the rest of the vial thus closing it. A small piece of high quality paper with a code number may be placed in the vial to identify the sample. Some marking pens work well on the glass too. One problem with this method is that the total volume of sample that may be stored is rather small. The vials that I have seen range in size from 1-20mL so some sample processing may need to be done. Also once the vial is opened it cannot be reclosed; the remaining sample must be placed in another vial for storage. Readers who know of other methods of long-term storage are invited to describe their procedures for the next issue of ROTIFER NEWS.

IVth INTERNATIONAL ROTIFER SYMPOSIUM VOLUME

The papers given at the IVth International rotifer symposium have been published (1987) in Hydrobiologia 147:1-381 and as a separate volume Developments in Hydrobiology 42. Rotifer Symposium IV by Dr. W. Junk, Publishers; ISBN 90-6193-645-4. Distributors are as follows:

for the USA and CANADA: Kluwer Academic Publishers, PO Box 358, Accord Station, Hingham. MA 02018-0358, USA.

for the UK and IRELAND: Kluwer Academic Publishers, MTP Press Limited, Falcon House, Queen Square, Lancaster, LA1 1RN, UK.

for all other countries: Kluwer Academic Publishers Group, Distribution Center, PO Box 322, 3300 AH Dordrecht, THE NETHERLANDS.

The volume is divided into a preface and 7 parts, covering the topics of 1. Taxonomy and Biogeography (15 papers); 2. Bdelloids (3 papers); 3. Colonial Rotifers (2 papers); 4. Population Dynamics and Spacial Distribution (11 papers); 5. Aquaculture, Feeding and Nutrition (9 papers); 6. Reproduction (5 papers); 7. Ultrastructure, Biochemistry and General Morphology (5 papers). Several of the papers are extensive reviews of the literature. In a future issue of ROTIFER NEWS all the papers of this symposium will be listed.

WORK IN PROGRESS

I. Bennett, W.N. and Boraas, M.E. A turbidostat culture system for studying rotifer population dynamics. <Abstract of a paper given at the 1987 Annual Meeting of the American Society of Limnology and Oceanography.>

Using a computer-controlled continuous-culture turbidostat system, where rate of addition of fresh algal suspension and rotifer mortality were regulated by the concentration of algae in the culture, rotifers (Brachionus calyciflorus) were successfully maintained in steady-state near their maximum specific growth rate.

Artificial selection for "fast-growing" rotifers was promoted under these conditions and resulted in a population with a maximum specific growth rate (doubling time=10.2h), 20% faster than previously published values (DT=12.8h). Adult females were observed to have a lower length to width ratio than females maintained at slower growth rates in chemostat culture. Production of males eventually ceased and could not be stimulated in batch culture. The system is unique for it provides a means to explore population growth dynamics of a metazoan growing near its maximum.

II. Kirk, K.L. The effect of suspended sediments on rotifers and cladocerans. <Abstract of a paper given at the 1987 Annual Meeting of the American Society of Limnology and Oceanography.>

The effect of suspended sediments on several planktonic rotifer and cladoceran species was investigated in the laboratory. Life table experiments, conducted after one generation of acclimation, showed that moderate concentrations of suspended clay (50mg/L, 2μm illite) caused large reductions in the population growth rates of 3 cladoceran species. These reductions were associated with a large increase in juvenile mortality, as well as an increase in the age of first reproduction, and decreased fecundity. The inhibitory effects of moderate concentrations of suspended clay were greater at low food levels. Low clay concentrations (10mg/L), when combined with low food levels, caused a slightly increase in population growth rates. Most rotifer species tested showed no inhibition at moderate suspended clay concentrations, even at very low food levels. These results are discussed in terms of their implications for competitive interactions between rotifers and cladocerans.

III. Stemberger, Richard S. The effect of food concentration on population growth of basic and predator-induced phenotypes of the rotifer Keratella testudo.<Abstract of a paper given at the 1987 Annual Meeting of the American Society of Limnology and Oceanography.>

The intrinsic rate of population growth (r[m]) was determined for spined and unspined phenotypes of a clone of Keratella testudo using cohort life-table methods. At high food concentrations the unspined morph had population growth rates nearly twice that of the spined one. However, at threshold food concentrations (where r[m]=0) the growth rates were not statistically different between morphs. Sinking rates and the orientation of the body during sinking vary with food concentration reflecting changes in the rotifer's specific garvity and center of mass due to food and storage products in the body. At high food concentrations both phenotypes sink posterior-end first and at a high rate-- the spined form sinking at a faster rate. However, at low food concentrations both phenotypes sink in a nearly horizontal plane and at approximately the same rate. In this position the posterior spines provide drag and reduce sinking rates. Sinking rates are inversely related to horizontal swimmming speeds. The increased swimming speeds of the spined morph at low food concentrations should increase encounter rates with food particles. This should directly reduce threshold food requirements and may provide the mechanism explanining the similarity of the phenotypes' population growth responses at low food concentrations.

IV. Wallace, R.L. and D.J. Bevington, Biology Department, Ripon College, Ripon, WI, USA. Prey capture by the sessile rotifer Cupelopagis vorax, an ambush predator. <Abstract of a paper given at the 1987 Annual Meeting of the American Society of Limnology and Oceanography.>

Predation by planktonic rotifers is widely studied, but little information is available on prey capture by sessile rotifers. We

studied predation by adult Cupelopagis using a stereomicroscope equipped with video camera and VCR to record events for detailed analysis.

Unlike planktonic, predatory rotifers (e.g., Asplanchna), Cupelopagis (about 200-1000μm) is an ambush predator that uses 2 pairs of antennae located on its funnel-shaped corona to detect vibrations produced by potential prey. Cupelopagis displays a 360° reactive field (RF) that is biased strongly towards a about 180° arc directly in front of the animal. Size of the horizontal RF is a function of prey size, ranging from <50μm for a small, unidentified ciliate to >250μm for Paramecium sp. (The vertical RF is small, but was not analyzed in this study.) Analysis of >200 attacks indicates that Cupelopagis has a handling time ranging from 7-53s depending on prey-type and degree of satiation, and that it detects prey equally as well on either side.

DESCRIPTIONS OF NEW SPECIES

6- Bienert, R.W., Jr. 1986. A new species of Lecane, Rotifera: Lecanidae, from subtropical Florida. Hydrobiologia 141(3): 175-178. <Address: Department of Environmental Eng. Science, University of Florida, Gainesville, FL, USA> <Biosis number: 83-98054> <SUMMARY: A new species of Lecane (Lecane ordwayi) was discovered during a recent investigation of the rotifers of softwater lakes in North-Central Florida. Descriptions of the new species and type locality are given.> <KEYWORDS: Lecane ordwayi new species, taxonomy, water chemistry>

42- Koste, W. and Shiel, R.J. 1986. New Rotifera, Aschelminthes, from Tasmania. Trans R Soc S Aust 110(34): 93-110. <Address: Ludwig-Brill-Str. 5, Quakenbrueck, D-4570, FEDERAL REPUBLIC GERMANY> <Biosis number: 83-98058> <SUMMARY: 100 aquatic habitats were surveyed in Tasmania for rotifers in Spring 1985. Of 130 species identified, 63 were first records for Tasmania, 17 new to Australia and 4 (Brachionus lyratus tasmaniensis new subspecies, Lepadella tana new species, Cephalodella lindamaya new species, and Testudinella mucronata tasmaniensis new subspecies) new to science, bringing to approximately 200 the rotifers known from the island. New taxa are described and figured; several of the first records for Australia also are figured, and ecological and zoogeographical peculiarities of the Tasmanian Rotifera are discussed.> <KEYWORDS: Brachionus lyratus tasmaniensis new subspecies, Cephalodella lindamaya new species, Lepadella tana new species, Testudinella mucronata tasmaniensis new record, new records, taxonomy, biogeography>

43- Koste, W. and Tobias, W. 1987. Zur Rädertierfauna des Sankarani-Stausees im Einzugsgebiet des Niger, Republik Mali, Westafrika (Aschelminthes: Rotatoria). Arch Hydrobiol 108(4):499-515. <Address: see reference listed above.> <SUMMARY: Rotifers were identified in several plankton samples from the Sélingué man-made lake (river Sankarani, tributary to the Niger River), taken in the years 1982 and 1985. Only 12 taxa out of 54 are of tropical and subtropical origin, the remaining ones are considered to be cosmopolitan. Four rotifer taxa Collotheca ornata natans (Tschugunoff 1921), Ptygura libera Meyers 1934, Testudinella brevicaudata Yamamoto 1951 and the newly described Keratella maliensis (new species) are new records for the African fauna. <KEYWORDS: african rotifers, community structure, sessile rotifer, species diversity, Collotheca ornata natans, Keratella maliensis new species, Ptygura libera, Testudinella brevicaudata>

68- Saksena, D.N. and Kulkarni, N. 1986. Polymorphosis in a brachionid rotifer, Brachionus quadridentatus, from Morar channel, Gwalior, India. Proc Indian Acad Sci Anim Sci 95(3): 365-369. <Address: Sch. of Studies in Zoology, Jiwaji University, Gwalior 474011, INDIA> <Biosis number: 83-14859> <Summary: Five polymorphic forms of the brachionid rotifer Brachiomus quadridentatus are described from the Morar channel in Gwalior. The forms are as follows: form quadridentatus, form cluniorbicularis, form rhenanus, form brevispina, and form monospina, new form. Variation in these forms is due to the emergence, development, and elongation of posterolateral and posteromedian spines, and changes in the size of lorica. This paper is the first report of polymorphism in B. quadridentatus from India.> <KEYWORDS: development, spines, Brachionus quadridentatus f. quadridentatus, Brachionus quadridentatus, f. cluniorbicularis, Brachionus quadridentatus f. rhenanus, Brachionus quadridentatus f. brevispina, Brachionus quadridentatus f. monospina new form, taxonomy, India, polymorphism>

75- Sudzuki, M. 1986. Some notes on rotifers from a mixo-haline lake, Harutori, Hokkaido. Zool Sci (Tokyo) 3(6): 1109. <From: Fifty-seventh Annual Meeting of the Zoological Society of Japan, Fukuoka, Japan, October 10-12, 1986> <Address: Biology Laboratory, Nihon Daigaku University, Omiya, JAPAN> <Biosis number: 32-70770> <KEYWORDS: Notholca marina extensa, Notholca squamula salina, mixo-haline lake, salinity>

RECENT LITERATURE

The literature cited below has been gleaned from several sources as noted above. We apologize for any incorrect citations that may follow! An attempt is always made to cite works completely and properly. We would like to be informed of any important errors in these citations; corrections will be published in a subsequent issue. The editors encourage authors to send us reprints so that they can be properly cited and abstracted. Only if reprints are received can we properly annotate the citations. These references have been indexed at the end of RECENT LITERATURE section by using such keywords as the specific species names, predation, salinity, biogeography, etc. Suggestions concerning the index are welcome.

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A

1- Arcifa, M.S., Northcote, T.G., and Froehlich, O. 1986. Fish-zooplankton interactions and their effects on water quality of a tropical Brazilian reservoir. <Address: Department Biology, F.F.C.L., University Sao Paulo, 14100 Ribeirao Preto, BRASIL> Hydrobiologia 139(1): 49-58. <Biosis number: 83-12223> <SUMMARY: Influence of zooplanktivorous fishes on the plankton community and water quality of Americana Reservoir (Brazil) was studied using floating enclosures. Rotifers were the prominent zooplankters in the fish enclosures and Cladocera in the fish-free ones.> <KEYWORDS: enclosures, water quality, tropics, reservoirs>

2- Bailey, K.M. and Stehr, C.L. 1986. Laboratory studies on the early life history of the walleye pollock, Theragra chalcogramma. J Exp Mar Biol Ecol 99(3): 233-246. <Address: Northwest and Alaska Fish. Cent., 7600 Sand Point Way NE, Seattle, Wash. 98115, USA> <Biosis number: 82-101115> <SUMMARY: Walleye pollock, Theragra chalcogramma (Pallas), were grown from eggs through metamorphosis in the laboratory in 1984 and 1985. Growth and survival of larvae were better at higher ration levels, up to the highest levels tested, 50 rotifers·ml^{-1}.> <KEYWORDS: rotifers as food for fish>

3- Barron, G.L. 1986. A new Harposporium parasitic in bdelloid rotifers. Can J Bot 64(10): 2379-2382. <Address: Department Environ. Biology, University Guelph, Guelph, Ontario, N1G 2W1, CANADA> <Biosis number: 83-21063> <SUMMARY: Harposporium spirosporum is described as a new hyphomycete attacking bdelloid rotifers in soil.> <KEYWORDS: parasite>

4- Berner-Fankhauser, H. 1986. Populationsdynamik der Plankton - Rotatorien im Bielersee 1981/82. Inauguraldissertation der philosophisch-naturwissenschaftlichen Fakultät der Universität Bern zur Erlangung der Doktorwürde. <Address: <SUMMARY: From April 1981 - April 1982 several physical, chemical, and biological parameters were determined for thw Bielersee. Samples were taken frequently, every third day in the summer and weekly in the winter. More than 50 species were recorded from the pelagic zone Population dynamics of the 20 most important species or species-groups is described based on the changes in abundance, vertical distribution, fertility and occurrence of mictic phases, temporal variations and parasites. The genera Synchaeta, Polyarthra, and Keratelladominated the rotifer plankton; several times >50% of the total rotifer numbers consisted of Synchaeta. In May and June Conochilus and Asplanchna were important, while Trichocerca was important in August, and in the winter Kellicottia, Trichocerca, and Notholca. The details of the dynamics of population levels is discussed. The frequency of taking sampling (sampling interval) is discussed in light of the 3-day sampling protocol adopted for the summer in this study. <KEYWORDS: season, population dynamics, parasite, vertical migration, sampling, Switzerland, sexual reproduction, temperature>

5- Bielanska-Grajner, I. and Krezel, K. 1986. The rotifers in the ponds of Voivodship Park of Rest and Culture in Chorzow. Pr Nauk Uniw Slask Katowicach 0(802): 91-107. <Address: Katedra Ekologii, Uniwersytet Slaski, ul. Bankowa 9, 40-007 Katowice, POLAND> <Biosis number: 83-73931> <SUMMARY: Rotifers of 2 ponds, situated in the area of Voivodship Park of Rest and Culture in Chorzow, were studied; 71 taxa were recorded, including many species characteristic eutrophic waters. On the basis of the structure of rotifer associations a distinct eutrophication was stated in the pond II and the succeeding eutrophication in the pond I. <KEYWORDS: species diversity, eutrophic, pond, species list>

6- Bienert, R.W., Jr. 1986. A new species of Lecane, Rotifera: Lecanidae, from subtropical Florida. Hydrobiologia 141(3): 175-178. <Address: Department of Environmental Eng. Science, University of Florida, Gainesville, FL, USA> <Biosis number: 83-98054> <SUMMARY: A new species of Lecane (Lecane ordwayi) was

discovered during a recent investigation of the rotifers of softwater lakes in North-Central Florida. Descriptions of the new species and type locality are given.> <KEYWORDS: Lecane ordwayi new species, taxonomy, water chemistry>

7- Bilgrami, A.L., Ahmad, I., and Jairajpuri, M.S. 1986. A study of the intestinal contents of some mononchs. Rev Nematol 9(2): 191-194. <Address: Section Nematology, Department Zoology, Aligarh Muslim University, Aligarh-202001, INDIA> <Biosis number: 82-103027> <SUMMARY: The study showed that mononchs feed upon several different organisms including rotifers. Cuticular remains of all types including trophi of rotifers and other unidentifiable objects of prey frequently occurred in the gut.> <KEYWORDS: predator-prey>

C

8- Coves, D., Audineau, P.,, and Nicolas, J-L. 198?. Les rotifères - Technologie d'élevage. Chapter 6 in G. Barnabé (ed.) Aquaculture volume 1. Technique et Documentation - Lavoisier 11, rue Lavoisier 75384 Paris Cedex 08 FRANCE> <KEYWORDS: culture, mass culture, equipment, Brachionus plicatilis>

9- Criales, M.M. and Anger, K. 1986. Experimental studies on the larval development of the shrimps Crangon crangon and Crangon allmani. Helgol Meeresunters 40(3): 241-266. <Address: Biology Anstalt Helgoland (Meeresstn.), D-2192 Helgoland, FRG> <Biosis number: 83-63531> <SUMMARY: Larvae of the shrimps Crangon crangon L. and C. allmani Kinahan were reared in the laboratory from hatching through metamorphosis. The best results were obtained when larvae were reared individually, with a mixture of Artemia sp. and the rotifer Brachionus plicatilis as food.> <KEYWORDS: Brachionus plicatilis, rotifers as food for shrimp larvae>

10- Cryer, M., Peirson, G., and Towsend, C.R. 1986. Reciprocal interactions between roach, Rutilus rutilus, and zooplankton in a small lake: prey dynamics and fish growth and recruitment. Limnol Oceanogr 31(5): 1022-1038. <Address: Tangariro Hatchery, Private Bag, Turangi, NEW ZEALAND> <Biosis number: 83-42171> <SUMMARY: Recruitment success of roach varied between 1979 and 1982 in Alderfen Broad, a small lake in eastern England (UK). When fry were abundant (in 1979 and 1981, but not in 1980 or 1982) the summer zooplankton became sparse and was dominated by copepods and rotifers. In years of good recruitment, as each of the preferred cladoceran prey species entered the diet of underyearling roach, its density dropped dramatically.> <KEYWORDS: population dynamics, rotifers as food for fish, predator-prey>

D

11- Dackman, C., Olsson, S., Jansson, H-B., Lundgren, B., and Nordbring-Hertz, B. 1987. Quantification of predatory and endoparasitic nematophagous fungi in soil. Microb Ecol 13(1): 89-93. <Address: Department Microbiology and Ecology, Ecology Build., University of Lund, S-223 62 Lund, SWEDEN> <Biosis number: 83-70560> <SUMMARY: Methods were developed to quantify predatory and endoparasitic fungi in soil. [The editors have not been able to review this work, but it appears to be a report on soil fungi that feed on nematodes and rotifers.] <KEYWORDS: soil rotifers, predator-prey, parasite>

12- Datta, N.C., Mandal, N., and Bandyopadhyay, B.K. 1987. Seasonal abundance of rotifers in a perennial freshwater pond in Calcutta. J Environ Biol 8(1): 63-72. <Address: Fishery and Ecology Research Unit, Department of Zoology, University of Calcutta, Calcutta 700 019, INDIA> <Biosis number: 83-95288> <SUMMARY: The relative abundance of rotifer taxa at the genus level shows that Brachionus is numerically abundant; Brachionus angularis was the dominant species. Rotifer population development showed bimodal peaks; the maximum number of rotifer species were encountered in the post-monsoon. Total alkalinity was significantly correlated with total rotifer population (r=0.644); other abiotic parameters did not show such relationship> <KEYWORDS: Brachionus angularis, population dynamics, alkalinity, water chemistry>

13- Dickerson, J.E., Jr. and Robinson, J.V. 1986. The controlled assembly of microcosmic communities: The selective extinction hypothesis. Oecologia (Berl) 71(1): 12-17. <Address: Alcon Laboratory 6201 S. Freeway, Fort Worth, TX, 76134, USA> <Biosis number: 83-73976> <SUMMARY: 40 communities were assembled through controlled inoculation of algae, protozoans, and a rotifer according to either of 2 distinct introduction schedules. Species richness and extinction rate in the microcosms were determined> <KEYWORDS: species diversity, species richness, MacArthur-Wilson equilibrium model, microcosms, selective extinction.>

E

14- Ejsmont-Karabin, K. and Weglenska, T. 1985. Variation in the structure of the summer zooplankton of four lakes during inorganic fertilization and after its cessation. Ekol Pol 33(4): 645-676. <Address: Department of Hydrobiology, Institute of Ecology, Polish Academy of Sciences, Dziekanów Lesny, (near Warsaw), 05-092 Lomianki, POLAND> <Biosis number: 83-52655> <SUMMARY: Zooplankton of 4 lakes was studied for 11 years. In the years 1971-1974 the lakes were treated with inorganic fertilizers (NPK). Changes in the zooplankton community structure are discussed.> <KEYWORDS: community structure, pH, eutrophic, pollution>

15- El-Kheir, W.S.A., Mekkey, L.E., and Al-Qadaib, S.A. 1987. A rotifer epiphytic on a green filamentous alga. Phytologia 61(7): 425-428. <Address: Botany Department, Girls College, Ain Shams University, EGYPT> <Biosis number: 32-61969> <SUMMARY: The genus of rotifer in question was thought to be Filinia or Pedetes (pg 426). A Photomicrograph is presented showing 3 individuals.> <KEYWORDS: epiphytic rotifer, Filinia sp., Pedetes sp.>

16- Evans, M.S. 1986. Lake Huron rotifer and crustacean zooplankton, April-July, 1980. J Great Lakes Res 12(4): 281-292. <Address: Great Lakes Research Division, The University Michigan, Ann Arbor, 48109, MI USA> <Biosis number: 83-73870> <SUMMARY: Between April and July 1980, zooplankton were sampled from Lake Huron. Rotifers occurred in greater abundances in southern Lake Huron in 1974 than over the whole lake in 1980. Differences in abundance across time may reflect changes in the trophic status of the lake or differences in sampling methods and locations. Evans suggests that rotifers, may be the best zooplankton indicators of trophic condition.> <KEYWORDS: species diversity, community structure, populations dynamics, trophic status, oligotrophic, Lake Huron, Great Lakes-(CANADA/USA)>

F

17- Ferrara, O. 1984. Structure and dynamic of the zooplanktonic community in a zone of Bracciano Lake, Latium, (Italy). Riv Idrobiol 23(23): 145-158. <Address: Dipartimento di Biologia Animale e dell'Uomo, University La Sapienza, di Roma, ITALY> <Biosis number: 83-32166> <SUMMARY: Zooplankton of Bracciano Lake (Latium) in the Acquarella area was investigated: 12 rotifer species were observed. <KEYWORDS: community structure, season, Italy, temperature, species diversity>

18- Flösuer, D., Kasprzak, P., Mothes, G., Ronneberger, D., and Schonborn, W. 1985. The invertebrate communities. Pages 213-259 in J. Casper and S. Jost (eds.) Lake Stechlin. A temperate oligotrophic Lake. Dr. W. Junk Publ. Dordrecht. <KEYWORDS: annual, distribution, horizontal distribution, long-term variations, season, vertical distribution, Ascomorpha ecaudis, Ascomorpha saltans, Conochilus unicornis, Keratella cochlearis, Kellicottia longispina, Filinia terminalis, Polyarthra dolichoptera, Pompholyx sulcata, Polyarthra vulgaris, Synchaeta pectinata, Synchaeta oblinga, Synchaeta tremula>

19- Francez, A-J. 1986. Sphagnum microfauna in two peat-bogs of the French Massif Central. Suo 37(1):1-6. <Address: Station Biologique de Besse-en-Chandesse. B.P. 45, F-63170 Aubiére, FRANCE> <SUMMARY: The composition and sesonal fluctuations of the Sphagnum microfauna in two peat-bogs of the Puy-de-Dôme (France) are described. <KEYWORDS: bog>

20- Fujita, S., Kitajima, C., and Hayashida, G. 1986. Induction of ovarian maturation and development of eggs, larvae and juveniles of the tonguefish, Cynoglossus abbreviatus, reared in the laboratory. Jpn J Ichthyol 33(3): 304-315. <Address: Laboratory Ichthyol., Tokyo University Fisheries, Konan 4, Minato-ku, Tokyo 108, JAPAN> <Biosis number: 83-63501> <SUMMARY: Larvae of Cynoglossus abbreviatus were reared on rotifers and microcrustaceans.> <KEYWORDS: rotifers as food for fish>

G

21- Gilbert, J.J. and Confer, J.L. 1986. Gigantism and the potential for interference competition in the rotifer genus Asplanchna. Oecologia (Berl) 70(4): 549-554. <Address: Department Biology Science, Dartmouth College, Hanover, N.H. 03755, USA> <Biosis number: 83-42063> <SUMMARY: Laboratory experiments showed that Asplanchna brightwelli could outreproduce, or coexist with, Asplanchna silvestrii only when the absence of dietary tocopherol prevented the latter from transforming to the giant cruciform and campanulate morphs. When tocopherol permitted polymorphic transformations as often occurs in nature, the giant morphs of A. silvestrii ingested and rapidly excluded the much smaller only slight polymorphic A. brightwelli. Such interference (or encounter) competition from trimorphic Asplanchna species is unknown to occur in nature and must limit the distribution and abundance of monomorphic or only slightly polymorphic species. The ability to eat congeneric competitors may have provided some selective pressure for the evolution of gigantism in the genus. <KEYWORDS: predator-prey, Asplanchna brightwelli, Asplanchna silvestrii, food, competition, interference competition, diet, polymorphism, cruciform, campanulate, alpha-tocopherol, selection pressure, evolution>

22- Grozdov, A.O. 1986. Phototaxis as a test function in biotesting. Gidrobiol Zh 22(3): 68-71. <Address: All-Union Research Institute Fish. Oceanogr., Moscow, USSR> <Biosis number: 83-60336> <SUMMARY: Several toxic agents (pollutants, i.e., salts of heavy metals, organophosphoric compounds, dissolved oil products, and fish-processing plant effluents) were studied for their effect on the phototaxic behaviors of Brachionus plicatilis. <KEYWORDS: Brachionus plicatilis, toxic agent, environmental toxicology, pollution, indicator organisms, heavy metals>

H

23- Haney, J.F., Brauer, M., and Nuernberg, G. 1986. Feeding and egestion rates of individual zooplankton using Cerenkov counting. Hydrobiologia 141(3): 165-174. <Address: Department Zoology, University of New Hampshire, Durham, NH, 03824, USA> <Biosis number: 83-95318> <SUMMARY: Cerenkov radiation was used to measure ingestion and release by Brachionus calyciflorus and Daphnia pulex that were fed ^{32}P-labeled Rhodotorula glutinus. A method is described that uses automatic pipet tips as cages, permitting measurement of ingestion rates and isotope loss by individual animals. Estimated gut renewal times were 16 min for B. calyciflorus. Filtering and ingestion rates for both animals agree closely with previous estimates. B. calyciflorus release ^{32}P at high rate in several pulse of short duration. ^{32}P release by B. calyciflorus was not dependent on the presence of food.> <KEYWORDS: Brachionus calyciflorus, ^{32}P, clearance rates, radioisotopes, feeding rates, ingestion>

24- Hofmann, W. 1985. Dynamics of vertical zooplankton community structure in the Plußee: cluster analysis. Verh Internat Verein Limnol 22: 2983-2986. <Address: Max-Planck-Inst. für Limnologie, Postfach 165, D-2320, Ploen, FRG> <SUMMARY: This study determined (1) if ordination according to percentage similarity reflects the original order of the vertical profile; (2) if there were gradual changes or breaks in the community structure; (3) if grouping of the samples will lead to a separation of different assemblages; (4) if relationships between environmental and community gradients become discernible.> <KEYWORDS: species list, cluster analysis, community structure, distribution, vertical distribution>

25- Hofmann, W. 1985. Nahrungswahl einer überwiegend phytophagen Population des Planktonrotators Asplanchna priodonta Gosse (Großer Pöntizer See, Ostholstein). Faun-ökol Mitt 5:365-373. <Address: see above> <SUMMARY: In Großer Pönitzer See Asplanchna priodonta was the predominating planktonic rotifer from July 1982 to January 1983. The analysis of the stomach contents indicated that the population was almost exclusively feeding on algae. The composition of food generally reflected phytoplankton succession in the lake. Food conditions were most favourable during a bloom of Ceratium furcoides. The predominance of Asplanchna over an extended period was obviously due to the fact that this population was in the position of a primary consumer.> {This paper was reported in ROTIFER NEWS issue number 13 without an abstract.-- eds. note} <KEYWORDS: feeding, food, population dynamics, Aplanchna priodonta>

26- Hollowday, E.D. 1986. Some hints and tips on the collection and handling of monogononti d Rotifera, Part 3. Microscopy (Lond) 35(5): 369-375. <Address: 45 Manor Rd., Aylesbury, Bucks, HP20 1JB, UNITED KINGDOM> <Biosis number: 32-33145> <KEYWORDS: slide preparation, mounting, collection, relaxant, trophi preparation>

I

J

27- Jindal, R. and Vasisht, H.S. 1985. Ecology of a freshwater pond at Nabha, Punjab, India. Zool Orient 2(12): 74-83. <Address: Department Zoology, Panjab University, Chandigarh-160 014, INDIA> <Biosis number: 83-22366> <SUMMARY: Physical (temperature, light, rainfall), chemical (pH, O2, CO2, HCO3- $CO3^{-2}$, Cl^{-1}, Ca^{+2}, total hardness, $NO3^{-1}$, $PO4^{-3}$, and silicates), and biological (abundance and periodicity of plankton) characteristics of a freshwater pond at Nabha in Patiala district (Punjab, India) was determined for a period of two years (July 1978 to June 1980). Rotifera (54.56%) and Copepoda (28.17%) constituted the dominant groups of zooplankton. Rotifer species diversity is discussed.> <KEYWORDS: temperature, light, nutrients, pH, species diversity, community structure>

K

28- Kaitaranta, J.K., Linko, R.R., and Vuorela, R. 1986. Lipids and fatty acids in plankton from the Finnish coastal waters of the Baltic Sea. Comp Biochem Physiol B Comp Biochem 85(2): 427-434. <Address: Food Research Laboratory, Tech. Research Center of Finland, SF-02150 Espoo, FINLAND.> <Biosis number: 83-12149> <SUMMARY: In Finnish coastal waters rotifers were abundant in June. Lipid content is considered. <KEYWORDS: lipid>

29- Kamler, E., Lewkowicz, M., Lewkowicz, S., Uchmanski, J., and Urban-Jezierska, E. 1986. Gravimetric techniques for measuring consumption of live foods and artificial diets by fish larvae. Aquaculture 54(12): 109-122. <Address: Institute Ecology, Pol. Academy Science, Dziekanow Lesny, 05-092 Lomianki, POLAND> <Biosis number: 31-105123> <KEYWORDS: rotifers as food for fish, aquaculture>

30- Karabin, A. 1985. Pelagic zooplankton (Rotatoria + Crustacea) variation in the process of lake eutrophication I. Structural and quantitative features. Ekol Pol 33(4): 567-616. <Address: Department of Hydrobiology, Institute of Ecology, Polish Academy of Sciences, Dziekanów Lesny (near Warsaw), 05-092, Lomianki, POLAND> <Biosis number: 83-59243> <SUMMARY: Rotifers indicative of certain eutrophic lakes are discussed.> <KEYWORDS: species diversity, pollution, indicator organisms, biomass>

31- Karabin, A. 1985. Pelagic zooplankton (Rotatoria + Crustacea) variation in the process of lake eutrophication II. Modifying effect of biotic agents. Ekol Pol 33(4): 617-644. <Address: see reference above> <Biosis number: 83-52822> <SUMMARY: Zooplankton numbers and biomass were analyzed in eutrophic lakes.> <KEYWORDS: biomass, predator-prey, species diversity, eutrophic>

32- Kasprzak, P. and Ronneberger, D. 1982. Vergleichende Untersuchungen zur Struktur und Dynamik des Zooplanktons im Stechlinsee, Nehunitzsee und Haussee 1978/79. Limnologica (Berlin) 14:263-295. <KEYWORDS: population dynamics, season, vertical distribution>

33- Kasprzak, P. and Ronneberger, D. 1985. The secondary production. pages 323-345 in J. Casper and S. Jost (eds.) Lake Stechlin. A temperate oligotrophic Lake. Dr. W. Junk Publ. Dordrecht. <KEYWORDS: assimilation, community grazing, food, grazing, temperature, Keratella cochlearis, Kellicottia longispina>

34- Kentouri, M. and Divanach, P. 1986. Food range of sparid larvae in controlled conditions specific selectivity of Sparus aurata. Oceanol Acta 9(3): 343-348. <Address: Stn. de Biology Marine et Lagunaire, 1, Quai de la Daurade, 34200 Sete.) <Biosis number: 83-52715> <SUMMARY: Food preferences larval Sparus aurata were studied using the rotifers Synchaeta triophthalma, Synchaeta littoralis, Hexarthra fennica, Brachionus plicatilis and other small invertebrates.> <KEYWORDS: Synchaeta triophthalma, Synchaeta littoralis, Hexarthra fennica, Brachionus plicatilis, rotifers as food for fish>

35- Kerfoot, W.C. 1987. Translocation experiments: Bosmina responses to copepod predation. Ecology 68(3):596-610. <Address: Great Lakes Research Division, University of Michagan, Ann Arbor, MI, 48109, USA> <SUMMARY: Although this work deals with the cladoceran Bosmina it will be of interest to researchers working on morphological plasticity (spine induction) and differential mortality of species, subspecies, or clones in rotifers.> <KEYWORDS: Cladocera, spines, morphology>

36- Keshmirian, J. and Nogrady, T. 1987. Rotifer neuropharmacology --III. Adrenergic drug effects on Brachionus plicatilis. Comp Biochem Physiol 86C(2): 329-332. <Address: Department of Biology, Queen's University, Kingston, K7L 3N6, CANADA> <Summary: Norepinephrine (NE) induces 3 pharmacological effects in Brachionus plicatilis. As a result of excitation the rate of ciliary motion and swinning increases, and the animals flip their foot constantly at a rapid rate. This foot flipping was used as a specific model to measure adrenergic effects in B. plicatilis. Phenylephrine, isoproterenol, and salbutamol show similar effects, the later 2 at 0.5 and 0.1 NE efficacy, respectively. Propranolol (beta blocker) and tolazoline (alpha blocker) both antagonize foot flipping induced by NE. Propranolol causes foot paralysis by itself. Timolol (beta blocker, but without the membrane effect of propranolol) does not antagonize the alpha receptor mediated NE effect, nor does it cause foot paralysis. Propranolol, timolol, and tolazoline also show agonist activity, inducing foot flipping. NE does not antagonize the foot paralysis induced by propranolol, only its anesthetic effect by delaying its onset. These results indicate that the foot flipping induced by NE is a receptor-mediated alpha adrenergic effect, while the foot paralysis is caused by membrane phenomena.> <KEYWORDS: anesthesia, behavior, ciliary movement, drug effects, foot flipping, neuropharmacology, paralysis, pharmacology, swimming speed, Brachionus plicatilis>

37- Khadka, R.B and Rao, T.R. 1986. Prey size selection by common carp, Cyprinus carpio var. communis, larvae in relation to age and prey density. Aquaculture 54(12): 89-96. <Address: Department Zoology, Kirtipur Campus, Tribhuvan University, Kathmandu, NEPAL> <Biosis number: 31-105121> <KEYWORDS: rotifers as food for fish, aquaculture>

38- Kivi, K. 1986. Annual succession of pelagic protozoans and rotifers in the Tvarminne Storfjarden, southwestern coast of Finland. Ophelia 0(Suppl. 4): 101-110. <From: 9th Symposium of the Baltic Marine Biologists on Ecology of Coastal Waters: Interactions Between and Within Species, Turku, Finland, June 11-15, 1985> <Address: Tvarminne Zoology St., SF-10900 Hanko, FINLAND> <Biosis number: 32-48748> <KEYWORDS: community structure, species diversity, seasonal, Protozoa>

39- Kleinow, W. 1986. Effects of acrylamide on Brachionus plicatilis (Rotifera). Comp. Biochem. Physiol. 84C(2): 243-246. <Address: Zoologisches Institut der Universität zu Köln, Lehrstuhl Tierphysiologie, Weyertal 119, D-5000, Köln 41, FEDERAL REPUBLIC GERMANY> <Biosis number: 82-103028> <SUMMARY: Acrylamide has been shown to have toxic effects on the rotifer Brachionus plicatilis. Within a certain concentration range, acrylamide preferentially blocks neuromuscular activity while the activity of cilia continues uninhibited.> <KEYWORDS: behavior, ciliary activity, neuromuscular block, toxic agent, acrylamide, Brachionus plicatilis>

40- Kleinow, W. and Bender, W. 1986. Zur chemischen Zusammensetzung des Hautpanzers von Brachionus plicatilis (Rotatoria). [On the chemical composition of the lorica of Brachionus plicatilis (Rotatoria).] Verh Dtsch Zool Ges 79:389. <Address: see reference above> <KEYWORDS: Brachionus plicatilis, biochemistry>

41- Kleinow, W. and Kühle, K. 1984. Zum pH-Optimum hydrolytischer Enzyme und zum pH-Milieu im Verdauungstrakt bei Brachionus plicatilis (Rotatoria). Verh Dtsch Zool Ges 77: 299. <Address: see reference above> <KEYWORDS: pH, water chemistry, Brachionus plicatilis>

42- Koste, W. and Shiel, R.J. 1986. New Rotifera, Aschelminthes, from Tasmania. Trans R Soc S Aust 110(34): 93-110. <Address: Ludwig-Brill-Str. 5, Quakenbrueck, D-4570, FEDERAL REPUBLIC GERMANY> <Biosis number: 83-98058> <SUMMARY: 100 aquatic habitats were surveyed in Tasmania for rotifers in Spring 1985. Of 130 species identified, 63 were first records for Tasmania, 17 new to Australia and 4 (Brachionus lyratus tasmaniensis new subspecies, Lepadella tana new species, Cephalodella lindamaya new species, and Testudinella mucronata tasmaniensis new subspecies) new to science, bringing to approximately 200 the rotifers known from the island. New taxa are described and figured; several of the first records for Australia also are figured, and ecological and zoogeographical peculiarities of the Tasmanian Rotifera are discussed.> <KEYWORDS: Brachionus lyratus tasmaniensis new subspecies, Cephalodella lindamaya new species, Lepadella tana new species, Testudinella mucronata tasmaniensis new record, new records, taxonomy, biogeography>

43- Koste, W. and Tobias, W. 1987. Zur Rädertierfauna des Sankarani-Stausees im Einzugsgebiet des Niger, Republik Mali, Westafrika (Aschelminthes: Rotatoria). Arch Hydrobiol 108(4):499-515. <Address: see reference listed above.> <SUMMARY: Rotifers were identified in several plankton samples from the Sélingué man-made lake (river Sankarani, tributary to the Niger River), taken in the years 1982 and 1985. Only 12 of 54 taxa are of tropical and subtropical origin, those remaining are cosmopolitan; 4 rotifer taxa Collotheca ornata natans (Tschugunoff 1921), Ptygura libera Meyers 1934, Testudinella brevicaudata Yamamoto 1951 and the newly described Keratella maliensis (new species) are new records for the African fauna. <KEYWORDS: African rotifers, community structure, sessile rotifer, species diversity, Collotheca ornata natans, Keratella maliensis new species, Ptygura libera, Testudinella brevicaudata>

44- Kusuda, R., Yokoyama, J., and Kawai, K. 1986. Bacteriological study on the cause of mass mortalities in cultured black sea bream fry. Bull Jpn Soc Sci Fish 52(10): 1745-1752. <Address: Fish Disease Laboratory, Faculty Agric., Kochi University, Nankoku, Kochi 783, JAPAN> <Biosis number: 83-63470> <SUMMARY: Mass mortalities frequently had been occurring in the early stage of development of hatched black sea bream Acanthopagrus schlegeli at hatcheries in west Japan; 3 species of bacteria are suspected to be the etiological agents of the mortality. Consumption of the rotifer Brachionus plicatilis that had ingested these bacteria may be one method by which the bacteria gain access to fish.> <KEYWORDS: Brachionus plicatilis, rotifers as food for fish, culture>

45- Kutikova, L. and Haberman, J. 1986. Rotifers (Rotatoria) of Lake Võrtsjärv: 1. Taxonomic and ecologic survey. Eesti Nsv Tead Akad Toim Biol 35(2): 113-121 <Address: Academy of Sciences of the Estonian SSR, Institute of Zoology and Botany, Tallinn, USSR> <Biosis number: 32-71891> <SUMMARY: This paper presents the species composition of rotifers of the pelagic and littoral zones of Lake Võrtsjärv, and characterizes the seasonal changes in succession and life cycles of the predominating rotifer species. <KEYWORDS: habitat, population, life history, season>

L

46- La Baugh, J.W. 1986. Limnological characteristics of selected lakes in the Nebraska sandhills, USA and their relation to chemical characteristics of adjacent ground water. J Hydrol (Amst) 86(34): 279-298. <Address: U.S. Geol. Survey, P.O. Box 25046, Mial Stop 413, Denver Federal Cent., Lakewood, CO, 80225, USA.) <Biosis number: 83-52827> <SUMMARY: Limnological characteristics of Crane, Hackberry, Island, and Roundup Lakes, and chemical characteristics of shallow ground water, within the Crescent Lake National Wildlife Refuge, western Nebraska, were determined during a preliminary investigation of the interaction between lakes and ground water in this study area between 1980 and 1984. Physical, chemical, and biological aspects of these lakes are discussed. Although rotifers and copepod naupli commonly were the most abundant zooplankton in the lakes, cladocerans were dominant occasionally.> <KEYWORDS: water chemistry, season, ground water>

47- MacIsaac, H.J., Keller, W., Hutchinson, T.C., and Yan, N.D. 1986. Natural changes in the planktonic Rotifera of a small acid lake near Sudbury, Ontario following water quality improvements. Water Air Soil Pollut 31(34): 791-798. <From: International Symposium on Acidic Precipitation, Muskoka, Ontario, Canada, September 15-20, 1985> <Address: Department Botany, University Toronto, Toronto, Ontario, M5S 1A1, CANADA> <Biosis number: 32-70820> <KEYWORDS: Keratella taurocephala, Polyarthra sp., Chromogaster ovalis, Conochilus (=Conochiloides) natans, Trichocerca similis, acid percipitation, heavy metals, pollution, environmental toxicology, toxic agent>

48- Matveeva, L.K. 1986. Pelagic rotifers of Lake Glubokoe from 1978 to 1984. Hydrobiologia 141(12): 45-54. <Address: A. N. Severtsov Institute of Evolutionary Morphology and Ecology of Animals, USSR Academy of Science, Leninsky Prospect 33 Moscow 117071 USSR> <Biosis number: 83-73859> <SUMMARY: After alteration in the pattern of drainage of run-off from surrounding swamps and changes in the colour and transparency of the Lake Glubokoe water, the previously epilimnial Trichocerca similis, Conochilus unicornis, and Keratella cochlearis showed a shift of their maximum numbers to deeper layers. Pompholyx sp. and Trichocerca capucina, (indicative of eutrophic waters)have disappeared from the pelagic zone of the lake and Conochilus hippocrepis, Synchaeta pectinata, Gastropus stylifer, Asplanchna herricki, Ascomorpha ecaudis, Ascomorpha saltans, Euchlanis dilatata, and Trichocerca porcellus have appeared. Most of the new species are considered to be indicators of oligotrophic conditions. However the total density of pelagic rotifers remained at the same level. Apparently establishment of the new species of rotifers was possible due to some 'rarefaction' [dilution?] of the epilimnion, disappearance of predaceous Mesocyclops leuckarti and invasion of the pelagic zone by Peridinium cinctum. <KEYWORDS: Ascomorpha ecaudis, Ascomorpha saltans, Asplanchna herricki, community structure, Conochilus hippocrepis, Conochilus unicornis, Euchlanis dilatata, Gastropus stylifer, Keratella cochlearis, Pompholyx sp., population dynamics, species diversity, Synchaeta pectinata, Trichocerca capucina, Trichocerca porcellus, Trichocerca similis, water chemistry>

49- Matveeva, L.K. 1986. Long-term changes in the community of planktonic rotifers of Lake Glubokoe - abstract of a report on the Vth congress of Soviet Hydrobiological Society. Volzhskaya komunna, 1986, Kuybishev, pp 267-268. <KEYWORDS: community structure>

50- Matveeva, L.K. 1986. Long-term changes in the community of planktonic rotifers of a mesotrophic lake. Ph.D. dissertation. <KEYWORDS: community structure, trophic status>

51- Mitchell, S.A. and Joubert, J.H.B. 1986. The effect of elevated pH on the survival and reproduction of Brachionus calyciflorus. Aquaculture 55(3): 215-220. <Address: Department Botany, University Orange Free State, P.O. Box 339, Bloemfontein 9300, SOUTH AFRICA> <Biosis number: 82-110418> <SUMMARY: Effect of pH

level (7.5-10.5) in unbuffered media on mictic and amictic egg production and on population growth rates of B. calyciflorus were investigated. pH 9.5 gave the highest capacity for population increase and no mictic resting eggs were produced; pH 10.5 gave the lowest r and the highest production of mictic resting eggs. <KEYWORDS: Asplanchna sp., population growth, culture, predator-prey, pH, survivorship, reproduction, Brachionus calyciflorus>

52- Mogil'chenko, V.I. 1986. Some aspects of the diet of commercial fish larvae in Kanev Water Reservoir. Gidrobiol Zh 22(4): 36-41. <Address: Institute HydroBiology, Academy Science Ukr. SSR, Kiev, USSR> <Biosis number: 83-84576> <SUMMARY: The guts of the larval stages of several species of fish were examined to determine the composition of their diet in their early developmental stages. Larvae from 980 specimens were examined; the following rotifer prey were found: Brachionus calyciflorus Brachionus angularis, Euchlanis dilatata, Keratella quadrata, Conochilus sp., Asplanchna sp., and Synchaeta sp.> <KEYWORDS: Asplanchna sp., Brachionus angularis, Brachionus calyciflorus, Conochilus sp., Euchlanis dilatata, Keratella quadrata, rotifers as food for fish, Synchaeta sp.>

N

53- Nagarajaiah, C.S. and Gupta, T.R.C. 1985. Observations on the seasonal fluctuations of plankton in brackishwater ponds of Nethravati estuary, Mangalore: II. Zooplankton. Mysore J Agric Sci 29(1): 28-33. <Address: Coll. Fisheries, Mangalore-575 002, INDIA> <Biosis number: 83-73946> <SUMMARY: Seasonal fluctuations of dominant groups of zooplankton in brackish-water ponds along the Nethravati estuary were studied. The rotifer component of the zooplankton community was small.> <KEYWORDS: salinity, brackish-water>

O

54- Okino, T. and Satoh, Y. 1986. Morphology, physics, chemistry and biology of Lake Rara in west Nepal. Hydrobiologia 140(2): 125-134. <Address: Suwa Hydrobiology Station, Faculty of Science, Shinshu University, Suwa 392, JAPAN> <Biosis number: 83-32306> <SUMMARY: A survey of oligotrophic Lake Rara, the largest lake in Nepal, was undertaken from 1982 to 1984. (Physical, Chemical, and Biological data are discussed.) Five species of rotifers were observed. <KEYWORDS: physical limnology, pH, conductivity, production, oxygen, water chemistry>

P

55- Paranagua, M.N., Neumann-Leitao, S., Nascimento-Vieira, D.A.D., Koening, M.L., and Gusmao, L.M.D.O. 1986. Ecological study of Itamaraca region, Pernambuco, Brazil): XXVIII. Zooplankton of estuarine ponds. Arq Biol Tecnol (Curitiba) 29(2): 359-370. <Address: Department Oceanografia, University Federal de Pernambuco, Av. Bernardo Vieira de Melo 986, Piedade, Recife, 50.000, PE, BRAZIL> <Biosis number: 82-100993> SUMMARY: Surface zooplankton samples were collected from natural, fertilized, and

rationed ponds at Ltamaraca Fish Culture Base from Sept 1975 to July 1981. Water samples were collected to determine temperature, salinity, dO2, NO3-N, NO2-N, & PO4-P. Brachionus plicatilis, Lecane grandis, were present. In fertilized ponds rotiferas were frequent and abundant. <KEYWORDS: pond cultures, Brachionus plicatilis, Lecane grandis, temperature, water chemistry, salinity>

56- Pillard, D.A. and Anderson, R.V. 1986. A note on Plistophora, Protista: Sporozoa, a parasite of Rotifera in Pool 19, Mississippi River. Trans Ill State Acad Sci 79(34): 193-196. <Address: Institute Applied Science, Box 13078, North Texas State University, Denton, Texas, USA 76205> <Biosis number: 83-97793> <SUMMARY: A study of the zooplankton populations in Pool 19, Upper Mississippi River, revealed several specimens parasitized by the sporozoan Plistophora. Only one species of rotifer, Brachionus calyciflorus, was infected, in contrast to other reports which found the sporozoan infecting other rotifer taxa> <KEYWORDS: Brachionus calyciflorus, parasite>

57- Pourriot, R. 1986. Les rotifères - Biologie. Chapter 1 (pages 201-221) in G. Barnabé (ed.) Aquaculture volume 1. Technique et Documentation - Lavoisier 11, rue Lavoisier 75384 Paris Cedex 08 FRANCE> <KEYWORDS: culture, food, egg hatching, life cycle, light, mass culture, parthenogenesis, resting egg, temperature, Brachionus plicatilis>

58- Pourriot, R. and Francez, A-J. 1986. Introduction pratique a la systematique des organimsmes des eaux continentales Françaises. 8 Rotifères. Bull. Soc. Linn. Lyon 55(5):1-37. ISSN 0296-2225. <Address: Ecole Normale Supérieure, Laboratoire d'Ecologie, U.A. 258, 46 Rue d'Ulm, 75230, Paris Cedex, FRANCE> <SUMMARY: This paper presents keys for the families, the principal planktonic genera, and the planktonic species of the most common genera in french or european continental waters.> <KEYWORDS: taxomony, systematics, key, planktonic rotifers -key>

59- Pourriot, R., Rougier, C., et Benest, D. 1986. Influence de la température sur la reproduction et la réponse mictique a la photopériode chez le rotifère Notommata copeus Ehrb. <Biosis number: 82-71445> <SUMMARY: This paper was reported in ROTIFER NEWS issue number 13 under the access number of 135] in English translation. Here we report its correct title in French.> <KEYWORDS: Notommata copues, photoperiod, temperature, reproduction, mictic, culture, parthenogenesis, fecundity, light, dormancy, evolution>

60- Prinsloo, J.F. and Schoonbee, H.J. 1986. Comparison of the early larval growth rates of the Chinese grass carp Ctenopharyngodon idella and the Chinese silver carp Hypophthalmichthys molitrix using live and artificial feed. Water S A (Pretoria) 12(4): 229-234. <Address: Limnological Research Unit, University of the North, Private Bag X1106, Sovenga 0727, SOUTH AFRICA> <Biosis number: 83-32443> <SUMMARY: Live and artificial foods were tested for their relative growth potential for larvae of Chinese silver and grass carp. Live food was obtained from rotifer cultures developed in a combination of earthen and concrete ponds fertilized with poultry manure and inorganic fertilizer. <KEYWORDS: rotifers as food for fish, aquaculture, culture>

Q

R

61- Rao, T.R. and Sarma, S.S.S. 1986. Demographic parameters of Brachionus patulus, Rotifera, exposed to sublethal DDT concentrations at low and high food levels. Hydrobiologia 139(3): 193-200. <Address: Department of Zoology, University of Delhi, Delhi-110007, INDIA> <Biosis number: 83-29263> <SUMMARY: Combined effects of sublethal levels of DDT (0, 15, 30, 45, and 60 $\mu g \cdot l^{-1}$) and food (Chlorella at 1 and 3x10E6 cells$\cdot ml^{-1}$) on the demography of the rotifer Brachionus patulus were studied. Average lifespan, life expectancy, net reproductive rate (Ro), and intrinsic rate of natural increase (r) were significantly greater at the higher food level, but declined with increasing DDT concentrations. <KEYWORDS: food, survival, life span, reproduction, toxic agent, environmental toxicology, DDT, Brachionus patulus>

62- Robb, J. and Lee, B. 1986. Ultrastructure of mature and fired gun cells of Haptoglossa mirabilis. Can J Bot 64(9): 1935-1947. <Address: Department of Molecular Biology and Genetics, University of Guelph, Guelph, Ont., CANADA N1G 2W1> <Biosis number: 83-11637> <SUMMARY: Haptoglossa mirabilis is a parasitic oomycete infecting rotifers by means of a specialized vegetative cell, the gun cell.> <KEYWORDS: parasite>

63- Robinson, J.V. and Dickerson, Jr., J.E. 1987. Does invasion sequence affect community structure? Ecology 68(3):587-595. <Address: University of Texas at Arlington, Department of Biology, Arlington, TX, 76019, USA> <SUMMARY: Monostyla sp. was used in a study of community structure, succession, and invasion sequence in microcosms> <KEYWORDS: Monostyla sp., community structure, succession, microcosms>

64- Ronneberger, D. and Schönborn, W. 1985. Taxa observed in Lake Stechlin area. Rotatoria. Pages 505-508 in J. Casper and S. Jost (eds.) Lake Stechlin. A temperate oligotrophic Lake. Dr. W. Junk Publ., Dordrecht. <KEYWORDS: species list>

65- Ross, P.E. and Sloterdijk, H. 1986. Bioassay responses to pollutant concentrations in Lake St. Louis (Canada) sediments. Can Tech Rep Fish Aquat Sci 0(1462): 164-165. Twelfth Annual Aquatic Toxicity Workshop, Thunder Bay, Ontario, CANADA, Nov. 5-8, 1985. <Biosis number: 32-7805> <KEYWORDS: Brachionus calyciflorus, arsenic, mercury, heavy metals, pollution, environmental toxicology, toxic agent, Lake St. Louis>

66- Ruttner-Kólisko, A. 1986. Versuche über das Konkurrenzverhalten von Brachionus plicatilis und Brachionus calyciflorus under Laborbedingungen. Jber Biol Stn Lunz 9:243-247. <KEYWORDS: culture, Brachionus plicatilis, Brachionus calyciflorus>

67- Saksena, D.N. and Kulkarni, N. 1986. On the rotifer fauna of two sewage channels of Gwalior, India. Limnologica 17(1): 139-148. <Address: Sch. Studies Zoology, Jiwaji University, Gwalior-474011, INDIA> <Biosis number: 83-24918> <SUMMARY: The occurrence of 20 species of rotifers (listed below), including 5 families and 11 genera, in 2 sewage channels is discussed. Species List: Brachionus angularis, Brachionus bidentata, Brachionus calyciflorus, Brachionus falcatus, Brachionus patulus, Brachionus quadridentatus, Brachionus rubens, Filinia longiseta, Keratella tropica, Lecane curvicornis, Lecane ludwigi, Lecane luna, Monostyla bulla, Monostyla quadridentata, Mytilina ventralis, Platyias quadricornis, Polyarthra vulgaris, Testudinella patina, Trichocerca cylindrica, and Trichotria tetractis> <KEYWORDS: sewage ponds, eutrophic, species list>

68- Saksena, D.N. and Kulkarni, N. 1986. Polymorphosis in a brachionid rotifer, Brachionus quadridentatus, from Morar channel, Gwalior, India. Proc Indian Acad Sci Anim Sci 95(3): 365-369. <Address: Sch. of Studies in Zoology, Jiwaji University, Gwalior 474011, INDIA> <Biosis number: 83-14859> <Summary: Five polymorphic forms of the brachionid rotifer Brachiomus quadridentatus are described from the Morar channel in Gwalior. The forms are as follows: form quadridentatus, form cluniorbicularis, form rhenanus, form brevispina, and form monospina, new form. Variation in these forms is due to the emergence, development, and elongation of posterolateral and posteromedian spines, and changes in the size of lorica. This paper is the first report of polymorphism in B. quadridentatus from India.> <KEYWORDS: development, spines, Brachionus quadridentatus f. quadridentatus, Brachionus quadridentatus, f. cluniorbicularis, Brachionus quadridentatus f. rhenanus, Brachionus quadridentatus f. brevispina, Brachionus quadridentatus f. monospina new form, taxonomy, India, polymorphism>

69- Saikawa, M. and Hoshino, J. 1986. Electron microscopy on Sommerstorffia spinosa a watermold parasitic on rotifers. Mycologia 78(4): 554-561. <Address: Department Biology, Tokyo Gakugei University, Koganei, Tokyo 184, JAPAN> <Biosis number: 82-99664> Sommerstorffia spinosa Arnaudow (Saprolegniales, Oomycetes) infects loricate rotifers by both endoparasitic and predacious means, using sporelings and pegs, respectively.> <KEYWORDS: parasite>

70- Serrano, L., Miracle, M.R., and Serra, M. 1986. Differential response of Brachionus plicatilis, Rotifera, ecotypes to various insecticides. J Environ Biol 7(4): 259-276. <Address: Department Ecology, University of Valencia, Burjas, Valencia, SPAIN> <Biosis number: 83-92345> <SUMMARY: Effects of various biocides (5 organophosphates and 1 chlorinated hydrocarbon) on three clones of Brachionus plicatilis were studied under laboratory conditions.> <KEYWORDS: reproduction, Brachionus plicatilis, environmental toxicology, pollution, toxic agent, culture>

71- Snell, T.W. 1986. Effect of temperature, salinity and food level on sexual and asexual reproduction in Brachionus plicatilis, Rotifera. Mar Biol (Berl) 92(2): 157-162. <Address: Division Science, University Tampa, Tampa, Florida 33606, USA.) <Biosis number: 82-100875> <SUMMARY: Reproductive response of sexual and asexual female Brachionus plicatilis (Muller) was examined over temperatures ranging from 20-40°C, salinities from 5-40 parts per thousand, and food levels from 0.25-20μg Chlorella vulgaris dry-weight/mL. Reduced food levels, as well as temperature and salinity extremes, reduced reproduction of both sexual and asexual females, but did so differentially. Zones of exclusively asexual reproduction exist at environmental extremes where sexual reproduction is physiologically restricted. The appearance of sexual females in rotifer populations is the result of both inducible and repressible factors.> <KEYWORDS: temperature, salinity, diet, sexual reproduction, asexual reproduction, reproduction, Brachionus plicatilis, culture, marine>

72- Snell, T.W. 1987. Sex, population dynamics and resting egg production in rotifers. Hydrobiologia 144(2):105-112. <Address: Division Science, University of Tampa, Tampa, FL, 33606, USA> <Biosis number: 83-95356> <SUMMARY: Interaction between sexual reproduction and population growth in Brachionus plicatilis was examined using exponential and logistic growth models. A computer simulation was used to explore the effects of the frequency of sex and the proportion of a female's daughters reproducing sexually on population growth rate and resting egg production. A compilation of published data from laboratory populations of 4 Brachionus plicatilis strains reveals that the average proportion of sexual daughters in 21% and in close agreement with that predicted by simulation. Limitations of the simulation and its generalizability to other rotifers are discussed.> <KEYWORDS: Brachionus plicatilis, reproduction, population density, population growth model, sexuality, resting eggs, mating, computer model>

73- Soto, D., Vila, I., and Villalobos. 1984. Temporal and spatial distribution of rotifera in a Chilean reservoir: a possible effect of impoundment hydrodynamics. Hydrobiologia 114:67-74. <KEYWORDS: reservoir, distribution>

74- Stemberger, R.S. and Gilbert, J.J. 1987. Rotifer threshold food concentrations and the size-efficiency hypothesis. Ecology 68(1): 181-187. <Address: Department of Biological Science, Dartmouth College, Hanover, NH, 03755, USA> <Biosis number: 83-95257> <SUMMARY: Using published data, we develop a physiological explanation for the positive relationship between threshold food concentration (the food concentration at which the population growth rate is zero) and body mass in planktonic rotifers. The exponent describing maximum clearance rate as a function of body mass is similar to the exponent expressing energy intake rates at low food concentrations. The former exponent (0.42) is considerably lower than the exponent for respiration (0.66). Consequently, the difference between energy intake and metabolism should decrease with increasing body size at low food concentrations. Rotifer swimming speeds are rather uniform for a wide range of body sizes and species. Consequently,

length-specific swimming speeds (body lengths moved per unit time) and, particularly, mass-specific swimming speeds (distance moved per unit time per unit mass) decrease rapidly with increasing body size. We conclude that swimming speed, which is under the energy constraints of ciliary locomotion and which directly determines rate of food encounters, provides the mechanism for the positive relationship between body size and threshold food concentration.> <KEYWORDS: population dynamics, clearance rate, energetics, respiration, metabolism, swimming, locomotion, body size>

75- Sudzuki, M. 1986. Some notes on rotifers from a mixo-haline lake, Harutori, Hokkaido. Zool Sci (Tokyo) 3(6): 1109. <From: Fifty-seventh Annual Meeting of the Zoological Society of Japan, Fukuoka, Japan, October 10-12, 1986> <Address: Biology Laboratory, Nihon Daigaku University, Omiya, JAPAN> <Biosis number: 32-70770> <KEYWORDS: Notholca marina extensa, Notholca squamula salina, mixo-haline lake, salinity>

T

76- Telesh, I.V. 1986. Comparative merits of methods for the quantitative estimation of planktonic rotifers. Gidrobiol Zh 22(4): 99-102. <Address: Zoology Institute, Academy Science USSR, Leningrad, USSR> <Biosis number: 83-84291> <SUMMARY: Zooplankton samples from the Neva inlet of the Gulf of Finland show that an incomplete account of smaller forms of rotifers may result in an underestimation of total zooplankton biomass and a misrepresented view of the zooplankton community structure.> <KEYWORDS: marine, sampling>

77- Trotta, P. 1985. An indoor solution for mass production of the marine rotifer Brachionus plicatilis fed on the marine microalgae Tetraselmis suecica. Ergeb Limnol 0(20): 151-152. <From: Symposium on Production and Use of Microalgae held at the Second International Conference, Trujillo, Peru, Oct. 26-31, 1980> <Biosis number: 32-48921> <KEYWORDS: monoxenic culture, culture, production, mass production, Brachionus plicatilis>

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V

78- Vanni, M.J. 1986. Fish predation and zooplankton demography: indirect effects. Ecology 67(2):337-354. <Address: Freshwater Institute, 501 University Crescent, Winnipeg, Mantiboa R3T 2N6, CANADA> <SUMMARY: In Dynamite Lake, IL (USA) Bosmina, Ceriodaphnia, and Diaphanosoma coexist with planktivorous sunfish. An in situ enclosure experiment revealed that release of the cladocerans from fish predation resulted in an increased mean body size of Ceriodaphnia, and Diaphanosoma. Trichocerca multicrnis and Keratella cochlearis also were present in the lake. <KEYWORDS: predator-prey, fish predation, season, population dynamics, Keratella cochlearis, Trichocerca multicrnis>

79- Vanni, M.J. 1986. Competition in zooplankton communities: Suppression of small species by Daphnia pulex. Limnol Oceanogr 31(5): 1039-1056. <Address: see above> <Biosis number: 83-42172> <SUMMARY: The hypothesis that a large zooplankton herbivore, Daphnia pulex, can competitively reduce abundance of resident zooplankton when present in a community of small species was tested in two lakes; 3 Dynamite Lake zooplankters were reduced in density by D. pulex under both enriched and unenriched conditions: Bosmina longirostris, Trichocerca multicrinis, and copepod nauplii. Nutrient additions allowed these taxa to overcome some effects of competition with D. pulex. Daphnia pulex reduced the densities of copepods and rotifers common to both lakes more in eutrophic Larimore Pond than in unenriched Dynamite Lake enclosures. These results show that a large herbivore can reduce the density of some small zooplankton species and therefore contribute to the scarcity of small species in lakes dominated by large herbivores. Results suggest that competitive effects of a large herbivore on rotifers and copepods may be more pronounced in eutrophic systems because large species can attain a higher population density, and subsequently alter the resource base to a greater extent, in eutrophic systems.> <KEYWORDS: Trichocerca multicrinis, Keratella cochlearis, Polyarthra vulgaris, season, competition, size-efficiency hypothesis, eutrophic, population dynamics, enclosures, interference competition>

80- Vanni, M.J. 1986. Effects of nutrients and zooplankton size on the structure of a phytoplankton community. Ecology 68(3): 624-635. <Address: Department of Ecology, Ethology, and Evolution, Universtiy of Illinois, IL, 61820, USA> <SUMMARY: In situ enclosure experiments were conducted over two summers. Keratella cochlearis was abundant in the lake.> <KEYWORDS: Keratella cochlearis, enclosure experiment>

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81- Witek, Z. 1986. Seasonal changes in the composition and size structure of plankton in the near-shore zone of the Gulf of Gdansk (Poland). Ophelia 0(Suppl. 4): 287-298. <From: 9th Symposium of the Baltic Marine Biologists on Ecology of Coastal Waters: Interactions Between and Within Species, Turku, Finland, June 11-15, 1985> <Address: Sea Fisheries Institute, Al. Zjednoczenia 1, 81-345 Gdynia, POLAND> <Biosis number: 32-48766> <KEYWORDS: marine rotifers, Baltic Sea>

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82- Yousuf, A.R. and Qadri, M.Y. 1985. Seasonal fluctuations of zooplankton in lake Manasbal (India). Indian J Ecol 12(2): 354-359. <Address: Department Zoology, University Kashmir, Srinagar-190006, INDIA> <Biosis number: 82-100814> <SUMMARY: The seasonal fluctuation of zooplankton (Rotifera, Copepoda, and

Cladocera) of lake Manasbal, Kashmir is described. Copepoda and Rotifera showed a bimodal pattern of fluctuations, while Cladocera a single peak. More than half of the total population was represented by Copepoda; Rotifera contributed 20-40%; Cladocera was usually less than 20%. During stratification zooplankton showed a well marked preference for thermocline zone.> <KEYWORDS: season, population dynamics, India, community structure>

Yu, J-P. and Hirayama, K. 1986. The effect of un-ionized ammonia on the population growth of the rotifer in mass culture. Bull Jpn Soc Sci Fish 52(9): 1509-1514. <Address: Department of Fisheries, Faculty of Agriculture, University of Tokyo, Bunkyo, Tokyo 113, JAPAN> <Biosis number: 83-42394> <SUMMARY: In mass culture tanks used to culture Brachionus plicatilis, concentrations of inorganic nitrogen compounds, pH, water temperature and specific gravity were measured daily. The rotifer density decreased with an increased concentration of un-ionized ammonia nitrogen (NH3-N). The rotifer densities above 150 inds/mL were observed, only when pH ranged from 7.3-7.8. Acute toxicity test of NH3-N to rotifers showed that 24h LC50 value was 17.0 mg/L at 23°C. They were estimated as 2.1 and 2.4 mg/L, respectively. The results from mass culture and toxicity tests showed that higher concentration of NH3-N might be one of restrictive factors affecting population increase.> <KEYWORDS: Brachionus plicatilis, culture, mass culture, water chemistry, pH, toxic effects, reproduction>

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84- Zinevici, V. and Teodorescu, L. 1986. The zooplankton of the Iron Gate artificial lake in the area of the Cerna Gulf in the period between 1981-1984 (Romania). Rev Roum Biol Ser Biol Anim 31(1): 85-88. <Address: Institute fur Biologische Wissenschaften, Bukarest, Splaiul, Independentei 296, ROMANIA> <Biosis number: 32-11162> <KEYWORDS: artificial lake>

85- Zurek, R. 1986. Species composition of zooplankton in surface waters near the Upper Silesia (Poland) in the aspect of water quality. Acta Hydrobiol 27(3): 339-350. <Address: Polish Academy Science, Institute Freshwater Biology, ul. Slawkowska 17, 31-016 Krakow, POLAND> <Biosis number: 82-107553> <SUMMARY: The qualitative composition of zooplankton was investigated in 7 habitats: 4 rivers, 1 pond, 1 reservoir, and 1 flooded sand pit in the Upper Silesian Industrial Region. 26 rotifer taxa were found. Evendence of heavy metal pollution and oxygen depletion is discussed.> <KEYWORDS: environmental toxicology, heavy metal, toxic agent, eutrophication, oxygen depletion, Poland, water quality>

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Rotifer Symposium IV

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