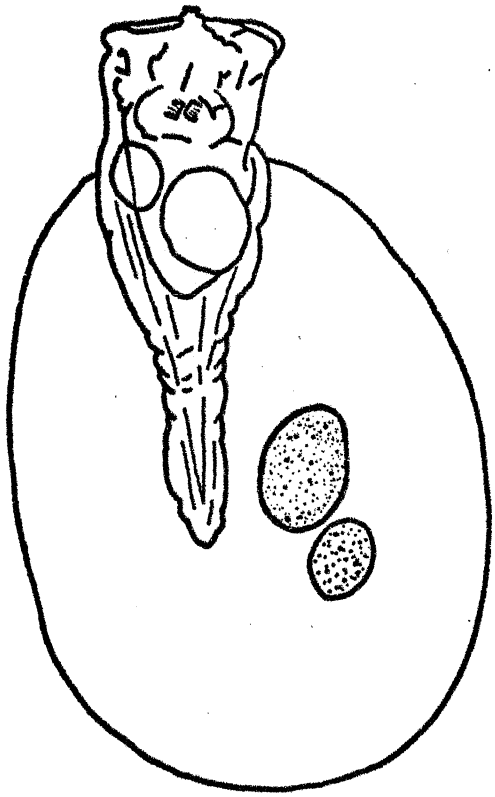
NUMBER 2 January 1975

ROTIFER NEWS

A Newsletter for Rotiferologists throughout the World



Conochiloides exiguus

(Wallace, orig.)

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Plankton changes following the restoration of Lake Trummen, Sweden.

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Ecology of rotifers occuring in Sphagnum hillocks of a poor fen.

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Systematics and variation.

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Anabiosis in bdelloid rotifers.

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Rotifer ultrastructure and the influences of photoperiod and population density on sexual reproduction.

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Designing a suitable artificial diet for Brachionus. The ecological significance of obligate phagotrophy in Brachionus.

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Nutrition and energetics of Brachionus in continuous monoxenic culture under steady-state conditions.

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Rotifer resting eggs, especially as indicators in lake sediments.

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Distribution and secondary production of planktonic rotifers in Alberta and Yukon.

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Competitive and predator-prey relationships among zooplankton species.

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Vertical distribution of rotifers and its relation to chlorophyll a distribution in South Fishtail Bay Douglas Lake.

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Ecology of rotifers in the biological purification of sewage by the activated sludge methods, bacterial bed methods and sewage treatment ponds.

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Seasonal distribution and ecology of freshwater and estuarine planktonic rotifers with particular emphasis on stream and river communities.

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Rotifer production in the Ivory coast.

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Niche structure of rotifer populations in separate basins of a single lake. Sexual periods of rotifers.

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Studies on the biology of freshwater rotifers of Kerala with special references to planktonic groups.

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Taxonomic and ecology studies on the freshwater rotifers of Kerala; rotifer population biology, cyclomorphosis.

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Modesto Pozuelo
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Rotifer biology and mass culture of Brachionus plicatilis.

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Designing a suitable artificial diet for Brachionus. The ecological significance of obligate phagotrophy in Brachionus.

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Seasonal dynamics of rotifer population of fish ponds.

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Anabiosis in bdelloid rotifers.

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Germ-free culture of Brachionus plicatilis and Encentrum sp.
Behavior, nutrition, and energetics of Brachionus in continuous culture.

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Zoogeography, systematics, and ecology of rotifers, especially of the Great Lakes region.

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Investigations on the dry weight of rotifers.

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Tihany
HUNGARY
Planktonic rotifers of Lake Balaton.

Christian Zimmerman
Landesstelle f. Gewässerkunde
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II. Changes in Previous Listings.

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III. Requests.

1. DAEMS, G. and H. DUMONT during a recent investigation of the rotifer fauna of Nepal discovered two species of Scaridium, including one new species, co-occurring in a pond near Kathmandu. They suggest that in the genus Scaridium there may be more than two distinct species. They would appreciate material from different places to compare to their material from W. Europe, Turkey, Morocco, and Nepal. (Zoological Institute, University of Gent, Ledeganckstraat, 35, 9000 Gent, BELGIUM).

2. DUMONT, H., S. DUMONT, AND I. VAN DE VELDE are engaged in a study on the dry weights of rotifers and would appreciate receiving material of any of the following genera: Anuraeopsis, Ascomorpha, tropical Brachionus and Keratella, Cephalodella, Chromogaster, Conochilus, Conochiloides, Dicranophorus, Euchlanis (other than dilatata), Lophocharis, Macrochaetus, Notholca, Platyias, Ploesoma, Proales, Squatinella, Testidunella (other than patina), Trichotria, and Tetramastix. In most of the cases 50-100 specimens are sufficient, more if you can spare them. Theoretically, small species in the size range of Lecane, Lepadella, and Colurella may also be treated, but the number of animals needed will be higher, 250-500. Contractile species, such as those of Bdelloids and Notommatids, can also be used but only if they were identified prior to fixation. Specimens need not be separated--raw samples can be sent. Only animals preserved in formalin can be dealt with, as weight losses in other preservatives are important. (Zoological Institute, University of Gent, Ledeganckstraat, 35, 9000 Gent, BELGIUM).

3. GRACE, D. R. has preserved and live material from Antarctica (Bdelloids and Loricates) he desires to have identified. (Antarctica Division, Department of Science, 568 St. Kilda Rd., Melbourne, AUSTRALIA).

III. Requests continued.

4. JENNINGS, PETER G. requests the assistance of any interested worker who feels he could tackle specific determination of moss rotifers collected from selected sites in the maritime Antarctic. The British Antarctic survey would welcome publication of faunal lists, or the description of any new species found therein. Material could be supplied in any form the investigator wished,--dried, moss fragments, etc. (British Antarctic Survey, Monks Experimental Research Station, Abbots Ripton, Huntington, ENGLAND).

5. KOSTE, WALTER is undertaking a revision of Max Voigt (1959): Rotatoria - Die Rädertiere Mittleleurops. Text u. Tafelband. If anyone has suggestions he would enjoy receiving them. He would also like to receive preserved material of the following free-floating aquatic plants: Eichhornia, Salvinia, Azolla, Utricularia, Pistia, and others from tropical waters. Limnological data necessary. (Realschul-Konrektor, Ludwig-Brill-Strasse 5, D457 Quakenbruck, GERMANY).

6. REED, J. VAUGHN is interested in hearing from anyone who has collected Cephalodella pentaplax or Cephalodella derbyi (Dixon-Nuttall). He wishes to obtain live material of C. pentaplax and information on the distribution of C. derbyi including information on areas where it is absent. The original description of C. derbyi is in Dixon-Nuttall & Freeman 1903. J. Roy. Micros. Soc. p. 1.

7. Rotifer News - If you have not returned your Questionnaire re Rotifer Symposium please do so. If you have additional suggestions or have not received this questionnaire please write the Editor. See also IV. Notices.

Be sure to send new information to the Editor for the next issue of Rotifer News. Requested is information on: 1) new subscribers, 2) changes in previous listings, 3) requests for materials, etc., 4) notices (new species in culture, planned research, planned expeditions, etc., 5) notes on recent research, which may or may not be published, 6) teaching or research opportunities, 7) bibliographies of your published work, and 8) a reprint of each of your recent publications. Lists of hard-to-find rotifer papers which you can make available to Rotifer News readers on an exchange basis will also be published.

8. STEMBERGER, RICHARD would appreciate receiving any preserved specimens of the genus Synchaeta, including date, location of collection site, and etc. Mixed aliquots from concentrated samples will suffice. (Univ. of Mich., Biological Station, Douglas Lake, Pellston, Mich., 49767, U.S.A.).

IV. Notices

1. Proposed Rotifer Symposium to be held in Lunz Austria in 1975!

In the fall of 1974 a questionnaire was sent to all whose name appeared on the Rotifer News mailing list. The following is a synopsis

IV. Notices continued.

of the responses to that questionnaire.

Twenty six people indicated that they will attend the symposium: H. Buchner, G. Daems, J. Donner, H. Dumont, W. T. Edmondson, D. Gallup, J. J. Gilbert, J. Green, U. Halbach, W. Hofmann, J. P. K. Horkan, R. Keen, W. Koste, C. Levinthal, M. R. Miracle, B. Pejler, R. Pourriot, K. Preissler, O. Ravera, A. Ruttner-Kolisko, G. Salt, J. M. Scott, A. G. Serra, R. Stemberger, V. Storch, V. Stout, M. Sudzuki.

The following 25 investigators have indicated that they might attend the symposium: R. S. Anderson, G. Badino, L. Bateman, R. Chengalath, M. De Ridder, F. A. Domenech, A. Gillard, S. Godeanu, U. T. Hammer, C. E. King, M. Kosmerchock, R. Le Brasseur, G. Likens, J. Litton, J. Makorwicz, E. Maley, R. Pontin, St. Radwan, J. V. Reed, C. Robotti, P. Schaher, B. Torke, J. Vancie, R. Wallace, R. Zurek, M. Kabay.

Of 61 people responding, 57 wished to see invited lectures. Of 58 responding, 53 wished to see contributed papers.

The most popular suggestions for topics to be covered by the symposium included: 1) sampling techniques and problems, 2) vertical migration, 3) feeding rates and behavior, 4) secondary production-population dynamics, 5) predator-prey interactions, 6) biomass estimation, 7) polymorphism, 8) laboratory culturing and techniques, 9) sexuality, 10) general ecology, 11) taxonomy and classification. Suggestions for other activities to be held during the symposium included: 1) discussion groups or workshops on specific topics such as Bdelloids; review of past, present, and future work on rotifers; preservation, staining, mounting, etc.; species determination and taxonomy of difficult genera, 2) demonstrations of difficult methods, 3) field trips, 4) slides of interesting specimens or phenomena from the participants' countries, 5) souvenir pictures for participants.

Thirty-five of 54 people responding said that they would be willing to prepare an invited lecture or contributed paper. They include: R. S. Anderson, G. Badino, H. Buchner, G. Daems, J. Donner, H. Dumont, J. J. Gilbert, A. Gillard, J. Green, U. Halbach, W. Hofmann, J. P. K. Horkan, M. Kabay, R. Keen, C. King, R. Le Brasseur, C. Levinthal, G. Likens, J. Litton, J. Makarewicz, E. Maly, M. R. Miracle, B. Pejler, St. Radwan, A. Ruttner-Kolisko, G. Salt, J. M. Scott, A. Guiset Serra, R. Stemberger, V. Storch, V. Stout, M. Sudzuki, R. Wallace.

Sixty-three of 65 people responding said that they would like to see the lectures and papers published in a special symposium volume.

Many suggested that the sessions of our symposium be quite flexable and not limited to formal presentations of papers. As an alternative to this traditional method of meeting, we might emphasize discussion sessions, field trips (especially to demonstrate new sampling equipment), and colloquia on various problems and techniques. Several requested that a distribution center be

IV. Notices continued.

established where published rotifer papers can be made available to the participants.

2. DROOP, M. R. and M. J. SCOTT report two species in bacteria-free culture: Philodina roseola and Brachionus plicatilis.

3. POURRIOT, ROGER reports the following species in culture: Brachionus calyciflorus (several strains), B. bidentatus, B. dimidiatus, B. plicatilis, Epiphanes brachionus, Asplanchna brightwelli, Notommata copeus, Trichocerca rattus, Polyarthra dolichoptera, Synchaeta pectinata, Adineta oculata, Abrochta intermedia.

4. REED, J. V. reports the following species of the genera Cephalodella and Trichocerca in culture for over two years: Cephalodella catelina, C. gracilis, C. gibba, C. forficata, C. forficula, C. sterea, C. pachydactyla, C. forceps, C. cyclops, C. limosa, C. delicata, C. exigua, C. tenvior, Trichocerca weberi, T. brachyura, T. tenvior, T. longisetta, T. stylata. They have been fed on either of the two non-motile algae, Chlorella or Schemedesmus sp. All animals examined so far from the C. tenvior culture, which was started from a single isolate, appear to lack the crystal body in the brain. Species which have been cultured for shorter periods of time include: Rhinoglena frontalis, Filinia sp., Brachionus quadridentatus, Scaridium longicaudum, Trichotria pocillum, Mytilina sp.

5. RUTTNER-KOLISKO, A. has indicated that the Austrian Academy of Sciences has a scientific exchange program with Britain, Poland, Russia, and possibly with some other countries. These programs could be used for joint research with Austrian scientists.

The English version of Plankton Rotifers (A. Ruttner-Kolisko) is now available: Suppl. to Binnengewässer, Vol. XXVI/1; Verl. Schweizerbart, Stuttgart, 1974.

She also reports that Brachionus plicatilis and Hexarthra fennica are in culture.

RUTTNER-KOLISKO, A. has the following reprints available for exchange. People interested in these papers are requested to send their own exchange list.

Buchner 1941. Untersuchungen über den Gen. Wechsel der Rädertiere.

Buchner, Mulzer, and Rauh 1957. Untersuchungen über die variabilität der Rädertiere.

Kiechle u. Buchner 1966. Dimorphismus u. Bisexualität bei Asplanchna.

Donner 1965. Bdelloidea, Best. Bücher z. Bodenfauna Europas.

Hauer 1935. Rotatorien aus dem Schluchsee Moor.

IV. Notices continued.

Hauer 1937. Rotatorienfauna des Eichener Sees.

Pawlowski 1968. Rotifèrs de la riviére Grabia.

Pejler 1957. Variation and evolution in planktonic rotifers.

The following reference was requested by A. Ruttner-Kolisko; Nestor I. Germino and Gabriel Gerard 1967. Fresh-water invertebrates studied in toto with techniques of cellular enzymes. Comp. Biochem. Physiol. 20(3):653-655. (Departamento de Anatomiá Microscópica y Citologia, Facultad de Humanidades y Ciencias, Montevideo, URUGUAY).

6. VASISHT, H. S. and his coworkers are presently investigating rotifer anatomy with particular reference to the general histochemical nature and physiology of the digestive system.

V. Notes,

1. ANDERSON, G. et al. 1973 (see section VII) report the maximum population densities for Anuraeopsis fissa at 1.2 x 10^4 inds. l^{-1}, Filinia longiseta at 9 x 10^4 inds.l^{-1}, and Trichocera pusilla at 5.5 x 10^3 inds. l^{-1} during 1969 in Lake Trummen, Sweden. During a restoration period (1970-71), when lake sediments were removed by use of a sucking dredge, a marked change in zooplankton densities was observed. Expressed as a percentage of the mean population densities of 1969 (June-Sept.) the abundance in 1972 was 41% for rotifers, 1.6% for cladocerans, and 64% for copepods (excluding juvenile stages). Higher oxygen levels during the winter of 1972 allowed Keratella and Polyarthra, nearly absent in 1969, to occur in relative high numbers. The eutrophic indicator species--Brachionus angularis, Trichocera, and Keratella quadrata--declined dramatically. Anuraeopsis fissa, abundant in 1969, was not observed in 1972.

2. BERNATOWICZ and coworkers reported the following from their 1974 limnological survey of Lake Niegocin, Poland (see section VII). Research on Lake Niegocin (a eutrophic, holomictic lake with a surface area of 2600 ha, maximum depth of 39.7 m and mean depth of 10.0 m) showed the density of planktonic rotifers to be high in August (approximately 10^3 inds. l^{-1}) and low in October (10 inds. l^{-1}). The lowest rotifer densities occurred at the station closest to a sewage discharge. Dominant species at all stations were: Keratella cochlearis, Pompholyx sulcata, and Syncheata sp. Numerous species at all stations included; Kellicottia longispina, and K. quadrata. In the summer the average egg-female ratio for egg-carrying species was rather high (e.g. for K. cochlearis values were 0.3 to 0.5).

3. BNINSKA, M. and coworkers reported on their paper entitled "Influence of mineral fertilization on lake ecosystem functioning, preliminary results" (see section VII).

Four lakes initially of different trophic status were fertilized

V. Notes continued.

with mineral fertilizers (N,P,K,Ca) to simulate the advanced eutrophication processes. The most profound changes in planktonic rotifers (increases in abundance and composition) were observed in dystrophic Lake Smolak. In highly eutrophic Lake Czarna Kuta changes in species dominance and seasonal dynamics were observed. Changes in species abundance and composition in two deeper lakes (one dystrophic and one eutrophic) were not as profound as in the shallow ones. A shift in rotifer population maxima from summer to spring in the first year after fertilization and the abundant occurrence of rotifers under spring ice in the second year was observed. These four lakes, initially of different trophic status, became more similar in their planktonic composition after mineral fertilization.

4. DOMENECH, F. A. reporting for FURUKAWA, I. and K. HIDAKA, indicates that these two workers have cultured rotifers to densities of over 10^3 inds ml^{-1}, (12° - 15°C, pH 7 - 7.5).

5. EJSMONT-KARABIN, J. reports the following in recent work entitled: "Research on the feeding of the planktonic polyphagous rotifer Asplanchna priodonta Gosse" (see section VII).

Observations on living A. priodonta and examination of the gut contents of fixed individuals showed that this species is ominivorous but that it has a marked preference for certain prey, especially the smaller rotifers Keratella, Pompholyx Trichocerca, and others. The floral diet of this species is comprised of large flagellates, diatoms, and green algae. Calculations of feeding rate, using Ceratium hirundinella, showed the rate to be proportional to food density. Passage of food through the gut was accomplished in 14 minutes; the time between successive swallowings was 8 minutes.

6. KARABIN, A. reported that the predatory copepod Mesocyclops sp. prefers large, non-loricate rotifer species. Predation pressure on rotifera fauna in lakes was estimated (see section VII).

7. MIRACLE, MARIA R. has published a paper in Ecology (55:1306) titled: "Niche structure in freshwater zooplankton: a principal components approach." The following is the abstract from that paper.

The niche structure of zooplankton is demonstrated by using factor and principal components analyses. Such analyses were performed on 895 samples taken at different depths during a one year cycle in Banyoles Lake, Spain. Data on 17 species have been used. Five factors are enough to explain all the variance due to common factors and three of them account for 85% of this variance. The three factors are equivalent to the first three principal components, which account for 58% of the total variance. These first three principal components are associated respectively to: 1) upwelling and diversity, 2) temperature, 3) trophic factors (phytoplankton species composition) and nitrate concentration.

The zooplankton separate in the principal components space; they occupy different niches in the ecological space. The trophic basis of niche differentiation is practically not considered, since only factors of niche separation which influence the distribution

V. Notes continued.

of species in space and time are detected. Congeneric species are far apart in this ecological space, while predator and prey are closely associated. At any one time and depth the coexistence is limited to one small particle feeder, one or two predators with different selected prey and a few intermediate forms ranging from filtering to raptorial habits. The use of the factor scores to trace the causes and trends of zooplankton succession is discussed.

8. RADWAN, STANISLAW submitted the following note entitled: "Rotifers as indicators of lake trophy."

The trophy of lake waters refers to the supply of organic substances in lakes. It is often used to define whether a lake is oligo-, eu-, or dystrophic. In evaluating the trophic status of waters different factors are taken into consideration: the intensity of production, conductivity, and visibility, as well as the presence of certain indicator species. Many Scandinavian investigators believe that some rotifers may be important indicators of the trophic status of lakes.

Järnefelt (1952) thought that many species of planktonic rotifers are restricted to eutrophic waters in varying degrees. However, not all of them may be good indicators of eutrophy, because some show a great deal of ecological tolerance. Common eurytopic species, in particular, cannot be used to indicate the degree of water fertility.

According to Berzins (1949) the following species prefer eutrophic waters: Anuraeopsis fissa, Brachionus angularis bidens, Brachionus quadridentatus, Brachionus urceus, Filinia longiseta, F. terminalis, Keratella quadrata, Pompholyx sulcata, P. complanata, Trichocerca capucina, and T. pusilla. Thunmark (1945) listed five species more or less typical of the eutrophic environment: Brachionus angularis, Polyarthra euryptera, Pompholyx sulcata, Trichocera cylindrica, and T. pusilla. Lillieroth (1950), however, treated the following species as typical of eutrophy: Brachionus angularis bidens, Brachionus angularis chelonis, B. calyciflorus, B. calyciflorus amphiceros, Polyarthra euryptera, Pompholyx sulcata, and Trichocerca cylindrica. Järnefelt (1952) and Pejler (1965), on the other hand, considered the following species as indicators of eutrophy of Swedish and Finnish lakes: Anuraeopsis fissa, Filinia longiseta, Keratella cochlearis tecta, K. cochlearis hispida, K. quadrata, Trichocerca birostris, T. capucina, T. cylindrica, T. porcellus, T. pusilla, Polyarthra euryptera, and Pompholyx sp. These species and forms live "sesu lato" in eutrophic waters of Scandinavia.

In Leczna and Wlodawa lakes, situated in the eastern part of Poland, the following species seem to be sensitive indicators of water fertility: Anuraeopsis fissa, Brachionus angularis, B. diversicornis, Filinia longiseta, Keratella cochlearis tecta, Pompholyx sulcata, Trichocera cylindrica, and T. pusilla. Mentioned by Scandinavian investigators in the group of typical "eutrophobionts", K. quadrata and P. euryptera are found as common rotifers in Leczna and Wlodawa lakes. Polyarthra euryptera is

V. Notes continued.

commonly found in lakes of both low and high eutrophy. However, it must be stressed that the more fertile the waters the higher the density of their populations. Keratella quadrata, however, is a typical eurytopic species in the waters of this region. The most frequently noted indicators of eutrophy in the investigated lakes were: B. angularis, Filinia longiseta, Keratella cochlearis tecta, Trichocerca cylindrica, and Pompholyx sulcata. They could be found in great numbers in all fertile lakes. The two latter species were sometimes found in great numbers in some nearly oligotrophic lakes. However, T. cylindrica was also found in great numbers in dystrophic lakes, where conductivities were 144-276 µmhos cm^{-1} and calcium concentrations were 5.6 to 14 mg l^{-1}. The occurrences of this species in Scandinavia show that it has neither oligotrophic nor dystrophic characteristics.

A few species of rotifers show a preference to oligotrophic waters--being more abundant and frequent in oligotrophic waters than in eutrophic ones. One should not suppose, however, that among planktonic rotifers there are species living only in oligotrophic waters. In southern and central Sweden the species preferring oligotrophic waters were regarded to be: Ascomorpha ovalis (= Chromogaster ovalis), Asplanchna herricki, Synchaeta grandis, and Ploesoma hudsoni. In Finnish lakes only Polyarthra dolichopter is thought to be a species typical of waters of low trophy. However, its ecological characteristics (a cold stenotherm during the autumn-winter period and appearing quite often in eutrophic lakes) does not permit us to classify it as a good indicator of oligotrophic conditions. In Leczna and Wlodawa lakes three species are closely restricted to low trophic waters (weakly oligotrophic and dystrophic): Chromogaster ovalis, C. testudo, and Keratella hiemalis. These species are found, as a rule, in waters having conductivities lower than 600 µmhos cm^{-1}, levels of oxidizable materials below 40 mg l^{-1} O_2, and a pH lower than 8.0. Such waters are found in lakes which are relatively deep (15 to 39m) and in shallow lakes containing large amounts of humic acids.

Although some of the lakes in the Leczna and Wlodawa are defined as dystrophic, no species were limited to that water type alone. Trichocera similis, mentioned by Pejler (1957) in the group of dystrophic indicators, appears commonly in waters of different status. It constitutes a common element of the rotifer fauna of this region, being noted in 80% of the investigated lakes. It also tolerates some of the harsh abiotic factors of the environment, (pH, oxidability, and NH_3). Three other species preferring dystrophic waters, Keratella paludosa, K. valga, and K. ticinensis, were found sporadically--in 2 to 7% of the lakes. An important stable element completing a group of rotifers living in dystrophic waters is: Kellicottia longispina, Conochilus unicornis and Gastropus stylifer. In these waters they were found often in relatively dense populations.

The percentage of rotifers in each trophic lake type was differentiated. Occurrence of eutrophic indicators in the investigated lakes varied widely--2.7 to 4.0%. The highest percentages, over 30%, were noted in only 8 of 60 lakes. Rotifers were rarely

V. Notes continued.

found in both oligotrophic and humic waters (4.1 to 16.7%). In only three lakes were oligotrophic indicators found exclusively. These were lakes with little oxidizable material--below 15 mg l^{-1} O_2--and very low conductivities--ranging from 146 to 198 µmhos cm^{-1}. On the basis of the data one may hypothesize that species showing preference for oligotrophic and humic waters live mainly in waters of low biological production. They were never found in fertile lakes containing more than 21% of "eutrophobionts".

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9. RUTTNER-KOLISKO, A. has papers in preparation on the following topics: 1) Reproductive rates at fluctuating temperatures, 2) Distribution of rotifers in an oxygen-depleted lake, 3) Taxonomic problems in Cyrtonia and Microcodon, and 4) Amphigonic reproduction in Asplanchna priodonta.

10. STEMBERGER, RICHARD has completed his MS thesis on Lake Michigan rotifers. The following is an abstract from his work entitled: "Temporal and spatial distributions of rotifers in Milwaukee Harbor and adjacent Lake Michigan."

Twenty-nine species of limnetic rotifers occurred frequently in the open waters off Milwaukee, July 1972 to June 1973. Nine additional species were of rare or solitary occurrence. Ten limnetic species were recorded for the first time for Lake Michigan. The main genera are Polyarthra, Keratella, Synchaeta and Notholca. Significant inshore-offshore differences in abundance and species composition existed. The rotifer community of Milwaukee Harbor was composed largely of benthic and littoral species as well as limnetic species characteristic of eutrophic waters. During thermal stratification pronounced vertical differences in distribution of species existed. The maximum abundance for most species usually occurred near the metalimnion. The seasonal pattern of abundance appears trimodal or at least bimodal with major peaks occurring in July and September and a summer minimum in August.

MR. STEMBERGER has prepared a revised species list of Lake

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Michigan rotifers.

11. WALLACE, R. L. has completed research on the sessile rotifers of a bog pond. The following are abstracts from his work.

1) On the substrate distribution of the sessile rotifers of Mud Pond. Seventeen species of sessile rotifers were identified from collections of plant periphyton of Mud Pond, an acid bog-like pond in west central N. H. during the summer of 1971. Thirteen species were found frequently enough to make quantitative statements concerning their substrate distribution. Three major catalogies of substrate were observed for these sessile rotifers; macrophytes, periphytic algae, and the tube of another sessile rotifer. Four species (C. vorax, S. fimbriatus, L. melicerta, and P. beauchampi) were completely limited to macrophytes and one species (S. millsii) almost completely limited. One species, P. melicerta mucicola, was completely limited to the epiphytic blue-green algae, Gloeotrichia. Three other species, C. campanulata, P. barbata, and P. longicornis bispicata were mainly limited to epiphytic green algae. F. conifera demonstrated a great propensity for attaching to its own tube, thus forming intraspecific colonies. B. crucigera, P. crystallina, and P. pilula were found to form interspecific colonies with F. conifera. These three species (B. crucigera, P. crystallina, and P. pilula) had generalized distributions, attaching to all three substrates. Data concerning the seasonal occurrence of six species are presented. Mictic females were seen for only three species. They never represented more than 3% of the population. Species separate into seven groups according to similarities in their substrate distributions. Speculation on the causes of restricted and generalized substrate distribution patterns are discussed. The adaptive significance of some of the substrate distribution patterns is discussed.

2) Substrate selectivity of the sessile rotifer Ptygura beauchampi (Edmondson). (Reported at the 37th Annual Meetings of ASLO, 24-28 June, 1974). The substrate of P. beauchampi in a small bog pond was found to be limited to the trap door area of only one of three distinct prey trap types of the carnivorous macrophyte, Utricularia vulgaris. Nine other hydrophtes including three congenerics were present. The door areas of all four Utricularia species are covered with glandular trichomes, but larvae undergo characteristic movements, resulting in settling, only when they contact those glands of the particular trap type of U. vulgaris. The attractive factor is associated with the hairs since, experiments show trap doors without hairs are significantly less colonized than those with hairs. Experiments showed hairs to be unattractive until they attained a stage of development in which the bulbous tip cell is covered by mucilage. This mucilage becomes colonized by bacteria, but evidence indicates that they are not necessary for settling. Attempts to extract active factors were unsuccessful. Settling activity was significantly reduced after boiling active doors for 10 and 30 but not 1 or 5 minutes. The active factor appears to be a unique heat-stable plant compound held within the mucilage.

V. Notes continued.

3) Larval behavior of the sessile rotifer Ptygura beauchampi (Edmondson). (Verh. Internat. Verein. Limnol. 19, 1974 in Press). Laboratory observations were made on larvae of known ages. New born larvae (up to 120 mins. old) are relatively refractory to settling, particularly during the first 45 minutes of life. During this time they swim with quick bursts, rarely pausing when encountering surfaces, including pieces of their preferred substrate Larvae 120 to 180 minutes old swim with a tight spiral motion and react to surfaces in a characteristic exploratory manner. Further, they show unique positive responses to, and will settle on U. vulgaris vestibules. Larvae between 180 and 270 minutes of age swim more slowly in a wide, open spiral fashion. Contact with vestibules at this age results in the highest probability of settling. Larvae greater than 270 minutes will settle, but thereafter the probability of settling is decreased. In the absence of U. vulgaris vestibules, larvae 10 to 20 hours old continue to swim slowly in wide spirals. In that case they may metamorphose either while swimming or attached to the bottom of depression slides, but usually they die.

12. ZANKAI, NORA reports finding seven dominant planktonic rotifers in Lake Balaton (Hungary). A diverse composition of the rotifer fauna was found in different portions of the lake.

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