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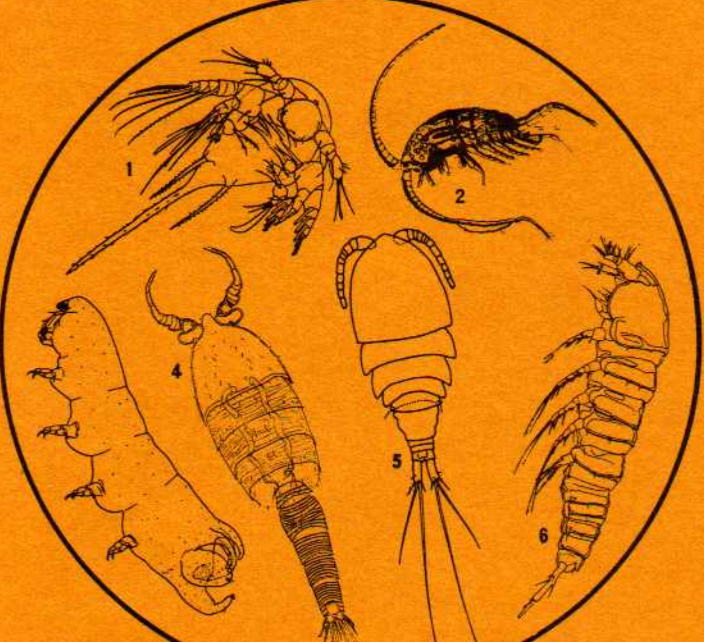
MONOCULUS

Copepod Newsletter



Nr. 29

APRIL 1995

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MONOCULUS

Copepod Newsletter

Number 29 April 1995

Edited by: Hans-U. Dahms and H. Kurt Schminke, Fachbereich 7 (Biologie), Universität Oldenburg, D-26111 Oldenburg, Germany. Gerd Schriever, BIOLAB Forschungsinstitut, Kieler Str. 51, D-24594 Hohenwestedt, Germany.

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This issue has been typed by: Angelika Sievers; cartoons by M. Pottek, Fachbereich 7 (Biologie), Universität Oldenburg.

Birthdays this year:

85: Helmut Kunz
70: Tagea K.S. Björnberg
70: Kazimierz Patalas
70: Tamara Vucetic

Deadline for the next issue of MONOCULUS: 1st October 1995

EDITORIAL

It seems as if there is not much new under the sun for copepodologists. We are missing the vibrant contributions on copepod biology, phylogeny, terminology, or methods as we discussed them in earlier issues of MONOCULUS. It seems as if all controversies are settled, or, is MONOCULUS not accepted as a platform for informal news exchange anymore? Has science become so serious that any new idea has to be hidden away for fear not to be taken up by any potential competitor? What are editors to do when WAC members don't raise issues, are not old enough to be included in the birthday league, or are not willing to produce a limerick or funny drawing? There are several ways in which you could contribute to MONOCULUS. You could provide points of view, book notices and reviews, reports on current research activities, offers or requests, interviews and portraits of copepodologists, poems, reports on meetings and symposia, or on current research activities. WAC members are further requested to leave a note on any change of address. Membership of WAC is still growing. We have gained 32 new candidate members. However, we had to cross a number of colleagues from the mailing list. This trend will be enhanced if dues are not paid (cf. Gerd's report on our financial situation). The addresses of candidate members are given in the DIRECTORY but we all want to know a little more about your research interests, running projects, thesis etc. Therefore, newcomers are asked for a short biographic note for the MONOCULUS newsletter. Furthermore, it is of substantial help to provide the MONOCULUS library with reprints of your publications. This is to ensure that there will be a substantial stock of copepod literature available for copepodologists, at one spot of the world at least.

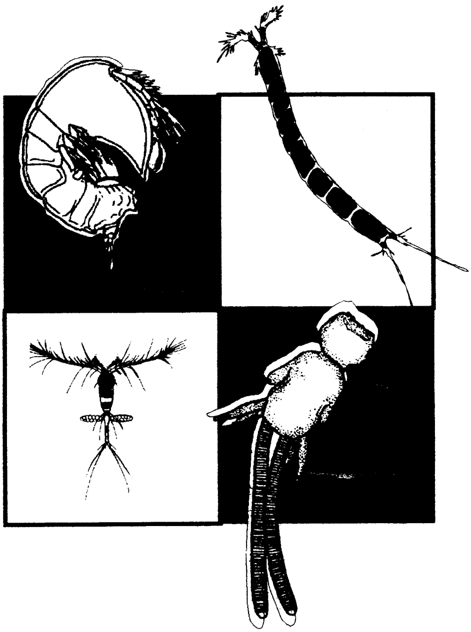
Preparations for the "Sixth International Conference on Copepoda" to be held in Oldenburg are on the anvil. Kurt Schminke will provide a more detailed programme of the conference in this issue. We are planning for an international cooking-contest to be held during the conference. One of the highlights will certainly be a "copepod soup" suggested by Herbert Fernando. But we are in need of more international recipies and ask you to send us promissing, colour- and tasteful suggestions. By the way, have you returned the registration form joint to last MONOCULUS No. 28? In case not, or that it became lost we include another form in this issue.

The annual lists of new copepod taxa (1985-1994) compiled by C.-t. Shih will be printed later this year for Chang-tai is on sabbatical leave in Taiwan till summer.

Repeating a type of quiz Kurt and Gerd initiated in MONOCULUS No. 10 (March 1985) we open another contest. Do you know the copepods on the front cover taken from secret literature sources? You want to win a bottle of liquor specialty from the Oldenburg region (called "Ammerländer Löffeltrunk") just to get a taste of what you may experience again during the "Sixth International Conference on Copepoda" next year in Oldenburg? Then you should let us know to which taxon (preferably but not necessarily species) the copepods on the front cover belong to.

We thank Werner Beckmann, Ruth Böttger-Schnack, Ed Busky, Frank Ferrari, H. Juhl for their contributions, Angelika Sievers for substantial work on the text, and Mark Pottek for garnishing it with caricatures.

Sixth International Conference on Copepoda



Oldenburg, Germany
July 29 – August 2, 1996

Hosts of the conference: Fachbereich 7 (Biologie) der Carl von Ossietzky Universität Oldenburg and Alfred-Wegener-Institut für Polar- und Meeresforschung, Bremerhaven

Organization committee

National:
Horst-Kurt Schminke (Oldenburg)
Sigrid Schiel (Bremerhaven)
Hans-Uwe Dahms (Oldenburg)
Hans-Jürgen Hirche (Bremerhaven)
Peter Jaros (Oldenburg)
Gerd Schriever (Hohenwestedt)

International:
Brian Bradley (Baltimore, U.S.A.)
Herbert Fernando (Waterloo, Canada)
Shuhei Nishida (Tokyo, Japan)
Gustav-Adolf Paffenhöfer (Savannah, U.S.A.)
Dov Por (Jerusalem, Israel)
Carlos da Rocha (Sao Paulo, Brazil)

Programme of symposia

Symposium „Parasitic copepods of fishes"
Convener: Prof. Dr. Ju-shey Ho (California State University, Long Beach)

Ju-shey Ho:
Cladistics of the Lernaeidae (Cyclopoida), a major family of freshwater fish parasites

Geoffrey Boxshall (The Natural History Museum, London):
Host specificity in copepod parasites of deep-sea fishes

J. Brian Jones (Western Australian Fisheries Department, Perth):
Parasitic copepods - distant water sailors

André Raibaut (Université des Sciences et Techniques du Languedoc, Montpellier):
Analysis of species richness of parasitic copepods on Mediterranean coastal fishes

Symposium „The role of copepods in freshwater ecosystems"
Convener: Prof. Dr. Geoffrey Fryer (University of Lancaster)

Zdenek Brandl (University of South Bohemia, Budejovice):
Title to be announced later

G.F. Mazepova (Limnological Institute of the Siberian Branch of the Russian Academy of Sciences, Irkutsk):
Role of copepods in the Baikal ecosystem

Jouko Sarvala (University of Turku):
Title to be announced later

Vernon E. Thatcher (Instituto Nacional de Pesquisas da Amazonia, Manaus):
Direct and indirect effects of copepods on Amazonian fish populations

Symposium „Reproductive biology of copepods"
Convener: Dr. Frank Ferrari (Smithsonian Institution, Washington)

Julie Ambler (Millersville University):
Mating behaviour of copepods

Nelson Hairston, Jr. (Cornell University):
Reproductive strategies of copepods

Barbara Hosfeld (Universität Oldenburg):
Study of the reproductive system: History and perspectives

Darcy Lonsdale (SUNY Stony Brook):
Role of chemical cues in copepod reproduction

Symposium „Life cycles of copepods"
Convener: Dr. Shin-ichi Uye (Hiroshima University)

Angus Atkinson (British Antarctic Survey):
Life cycles of Southern Ocean copepods, adaptation to a seasonally variable food supply

William Peterson (NOAA, Silver Spring):
Life cycles of copepods in coastal upwelling zones: Are copepods adapted or pre-adapted to upwelling conditions?

Barbara Santer (Max-Planck-Institut für Limnologie, Plön):
Life cycle strategies of cyclopoid copepods in fresh waters

Fourth speaker to be announced later.

In case you are interested in participating, please use the preliminary questionnaire added again to this issue. We could save a lot of money if the second announcement containing the registration forms would only have to be sent to those who have announced their interest. We cannot send the second announcement to all the rest as well. So make up your mind now, whether there is a chance that you will participate. If so, use the questionnaire added to this issue and let us know. You will then receive the second announcement, otherwise we won't bother you anymore with the conference. You will miss a great event if you stay away.

PLAIRE ET INSTRUIRE II

Copepodologists join forces for their family meeting

In a family, members help each other to make their activities a success. From time to time they all join forces for a big event. They present themselves as a group not as individual members. Copepodologists have grown together in the last decade and are now a big family with members worldwide.

Every third year they come together to have a big feast and to strengthen the contacts. New members have been born in the meantime and are shown around. A lot of gossip (and serious talk) has to be exchanged and sometimes relations turn up that for various reasons have not yet had a possibility to participate in these regular family meetings. The next such meeting will be in Oldenburg and Bremerhaven next year and, of course, all of you are invited to take part. Our first announcement has provoked a great number of reactions already (not enough, though) and among them are a lot of those who had to stay away so far. This is an additional reason to make our reunion a big feast. For a real feast all members have to join forces and therefore we invite you to cooperate.

How can you contribute to our feast apart from your individual presentation of a talk or a poster? We would be happy if you joined us in the following activities:

1. Copepodologists play music for copepodologists

If you play a musical instrument reasonably well or you have a family member who does and is willing and courageous enough not to hide his/her talents, please let us know. We want to organize an evening concert. Music of all kinds is welcome: classical music, jazz, national folk music, whatever. Please bring your instruments along but leave your piano at home (we have one), and let us have a great time. German „house music“ is known for not being a professional enterprise, it is a social event where cooperation counts, not perfection. So send us a letter announcing your willingness to make a contribution and start practising. There is a lot of time yet.

2. Copepodologists cook for copepodologists

German food is not every one’s favourite. People have different tastes, thank goodness. What we need is a variety of dishes. We expect a lot of people. So we plan to make our conference dinner a common enterprise. If you or your spouse or whoever accompanies you is an experienced cook feeding the family not only on chips from around the corner you should consider signalling us your intention to volunteer as a cook. The dinner will be on Friday night. Your dish should be tasty but not too complicated to prepare. The recipes of what will finally strike your palate will be published in MONOCULUS and help to enrich your list of publications with an exotic entry. National dishes of all kinds will be welcome! Isn’t diversity the hall-mark of biology?

3. Copepodologists demonstrate their specimens

I must confess that I have never seen a mormonilloid or a platycopioid or many of those extravagant parasites of fishes. I would be eager to see specimens of such copepods and I bet many of you would be, too. We plan to organize an evening demonstration with video to bring to mind the tremendous diversity of copepod forms. So please bring your specimens (as slides or in a preserving liquid) with you and tell us something about them. To coordinate the demonstration we would need to know in advance who offers to demonstrate what. Our motto is controlled improvisation.

Let us make our conference a combination of individual presentations and familial undertakings, a combination of scientific and social highlights according to the motto of MONOCULUS: „Plaire et instruire“ vulgarized as „to learn and to have fun“ together. Own initiative has a positive side-effect. What we do ourselves, we don't have to pay. This may give us more scope to help in situations where own initiative is in vain.

Those who are willing to participate in one or more of the proposed activities should contact Kurt Schminke and let him know what the contribution could be. His address is: Dr. H.K. Schminke, Fachbereich 7 (Biologie), Universität Oldenburg, Postfach 2503, D-26111 Oldenburg, Germany. Don't let him wait, check your possibilities and react promptly. Thank you.

H.K.S. on behalf of the organizing committee.

Should copepodologists and Biological Oceanographers try to discover more about the biology of *Pleuromamma indica* ?

In his famous monograph about the calanoid copepod genus *Pleuromamma*, Adolph Steuer reported that a plankton sample from the Gulf of Aden contained less than 1 % adult specimens of *P. indica* with a dark organ on the right side of the body (1932, Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition „Valdivia“ 24:1-119; p. 85). Why is this important for copepodologists and biological oceanographers?

Species of *Pleuromamma* usually express asymmetry in body somites, appendages and internal reproductive organs like the oviduct of females and the *vas deferens* of males (1984 Ferrari, Crustaceana, supplement 7:166-181). For *Pleuromamma* this asymmetry is most apparent on the second thoracic somite (which bears the first swimming leg) where a dark organ of presumed secretory function is found on either the left or right side. The ultrastructure of this organ, including its pigment knob, is described by Blades (1988, Journal of Morphology 197:315-326). Among most species of *Pleuromamma*, the dark organ is found on the right side of the somite in both males and females although rare left individuals can be found at frequencies of about 1 per 1000 individuals, possibly reflecting a rate of recurrent recombination of rare alleles. In three species, however, selection acts on both kinds of animals so that both left and right copepods may be found at frequencies of tens of percent. Left and right animals usually have been noted by copepodologists and biological oceanographers working with these species (e.g. 1986 Saraswathy & Krishna Iyer, Indian Journal of Marine Science 15:219-222). For two species, *P. abdominalis* and *P. xiphias*, selection is sex-limited so that usually only left males are found; right females make up the majority of females, about 65 % and left females the remaining 35 % for the better studied *P. xiphias* (1985 Ferrari, Smithsonian Contributions to Zoology 420:1-55 and 1990 Ferrari & Hayek, Journal of Crustacean Biology 10:114-127). For *P. indica* selection is not sex-limited; left and right males and females are common, and Steuer found that outside of the Gulf of Aden about 50 % right animals could be expected.

We recently examined our unpublished data about the distribution of asymmetry for *P. indica* from the Gulf of Aden and adjacent areas. One of us (WB) counted 297 adults in a sample from the Gulf of Aden and found about 2 % right animals, so the phenomenon Steuer noted is not transient but appears stable for the Gulf. In four samples from the Arabian Sea north of the Gulf of Aden (at 22.51°N 65.59°E; 22.52°N 63.57°E; 21.06°N 64.13°E; 20.28°N 63.17°E), one of us (EB) found 4 % of 203 adults, 5 % of 79 adults, 4 % of 29 adults, but 21 % of 14 adults were right, so selection seems reasonably stable to the northeast. However, to the northwest, in the

Red Sea, we (WB) found among 4,250 animals from five locations about 48 % right (with little difference between sexes, locations and months) suggesting a significant change in selection against right animals between the Red Sea and the Gulf of Aden.

At this time we have no definite ideas about the structure of this selection boundary, i.e. its geographical position (Bab al Mandab seems a logical place to look more carefully) or how sharp it is (e.g. are changes of 10 % effected over 1 km, 10 km or 100 km?). Nor do we know if a similar change in selection occurs among juvenile copepodids, although we suspect it may. Sex can be determined for copepodids IV and V of *Pleuromamma* species and the dark organ can be seen on animals as young as copepodid II, so immature copepodids can be analysed easily. We also do not know if changes in selection are effected vertically in particular areas, especially near the boundary where selection changes. However, Horst Weikert of Hamburg University is now analysing a series of plankton samples taken between the Gulf of Aden and the southern Red Sea, and his results may allow better inferences about the structure of the selection boundary.

The western boundary of *P. indica* appears to be the Benguela Current off the west coast of Africa. It has not been reported from the Mediterranean Sea since the completion of the Suez canal, but its eventual establishment there cannot yet be ruled out. We have no information about the percentage of right animals from the Benguela Current or Agulhas Current, or east of the Arabian Sea, e.g. through the Indian Ocean and across the tropical Pacific. Excepting the Gulf of Aden, Steuer states that in all his other samples, including those from the Benguela Current, right animals comprised about 50 % of *P. indica* adults.

Beyond mapping, can we discover factors which might effect the distribution of asymmetry in populations of *P. indica*? We know little about the biology of the copepod. Species of *Pleuromamma*, including *P. indica*, are eaten by lanternfishes (1980 Clarke, Fishery Bulletin 78:619-640 and 1993 Kinzer, Böttger-Schnack & Schulz, Deep-Sea Research II 40:783-800) along whose guts whole or partially digested specimens, or only the pigment knob of the dark organ can be found. It may be possible to identify the species and stage from which even a pigment knob has originated, because its size changes during copepodid development, and its shape appears to be specific, at least for larger species like *P. quadrungulata*, *P. robusta*, *P. abdominalis*, and *P. xiphias*. Similar information about *P. indica* and gut analyses of co-occurring lanternfishes may begin to tell us, whether lanternfishes prefer right *P. indica* in the Gulf of Aden but not in the Red Sea.

What opposite kind of selection might serve to maintain the balance of individuals within a population of *P. indica*? Asymmetry in *Pleuromamma* species usually effects primary and secondary sex characters. Is mate selection important in maintaining a balanced population? Do left or right males prefer females of the same kind or opposite? Do females make this kind of decision? More need to be learned about mating behavior of *P. indica* before we can decide about the importance of mate selection in maintaining the balance of asymmetry.

What is clear is that between the Red Sea and the Gulf of Aden there is a sharp change in selection within a population of copepods, perhaps one of the sharpest changes in marine waters. Does that boundary represent something more than selection on a particular population? The poecilostomatoid copepod genus *Oncaea* undergoes significant changes in species composition and community structure between the Red Sea and Gulf of Aden (1995 Böttger-Schnack, Marine Ecology Progress Series 118:81-102). We believe that understanding population changes of *P. indica* may provide a sensitive way of testing a larger hypothesis about the structure and composition of the zooplankton communities among Red Sea, Gulf of Aden, and Arabian Sea. Which is why discovering more about the biology of *P. indica* is important to copepodologists and biological oceanographers.

Werner Beckmann, Hamburg

Ruth Böttger-Schnack, Kiel
Ed Buskey, Port Aransas
Frank Ferrari, Washington

Birthdays

Dr. Tagea K.S. Björnberg (São Paulo, Brasil) will celebrate her 70th birthday in September. She is interested mainly in the development and distribution of marine planktonic copepods.

Dr. Kazimierz Patalas (Winnipeg, Canada) will be 70 in July. He works on the ecology of freshwater crustaceans, especially on Copepoda and Cladocera.

Dr. Tamara Vucetic (Split, Yugoslavia), interested in marine zooplankton ecology (copepods, chaetognaths, pelagic fish) is going to be 70 in September.

Dr. Helmut Kunz (Bischmisheim, Germany) will celebrate his 85th birthday in October. He works on the taxonomy of marine harpacticoids, at times also freeliving marine cyclopoids. We will present an interview with him in the autumn issue.

ANNOUNCEMENTS ANNOUNCEMENTS ANNOUNCEMENTS

ADVANCED COURSE ON MARINE ZOOPLANKTON ECOLOGY

General objectives

The flux of organic matter in the oceans is mediated to a large extent by the activity of zooplanktonic organisms. Pelagic trophic relations, community metabolism, secondary production, and fine-scale distribution patterns in the major functional regions of the oceans are among the fundamental topics for assessing the role of marine zooplankton on fisheries and on the global carbon cycle. Those topics have been covered by several interdisciplinary programs (e.g., GLOBEC, JGOFS, etc.) especially through the initiative of European and North American institutions. Comparatively few studies have been performed in Latin America so far. The IOC/MCT/CNPq advanced course on Marine Zooplankton Ecology addresses Latin American scientists and graduate students interested in improving their knowledge on such process studies.

Lecturers:
Dr. Jefferson Turner - University of Massachusetts, North Dartmouth, U.S.A. (leader)
Dr. Ulrich Bathmann - Alfred-Wegener-Institut, Bremerhaven, Germany
Dr. Satoru Taguchi - Hokkaido Regional Fisheries Research Laboratory, Kushiro, Japan

Dates: 1-30 July, 1995

Local organizing committee:
Dr. Frederico P. Brandini (coordinator) and Rubens M. Lopes (secretary)

Address for correspondence:
Centro de Estudos do Mar - Universidade Federal do Paraná
Avenida Beira Mar, s/n° - Pontal do Sul, Paranaguá (PR), 83.255-000, Brazil
Phone: 0055-(0)41-4551333
Fax: 0055-(0)41-4551105

Sponsorship: IOC/UNESCO and MCT/CNPq (Brazil)

Official language: English

Candidate selection: The course is open to 15 Latin American scientists and graduate students. For selection, candidates should send their C.V. and a short letter to Rubens M. Lopes (local organizing committee), stating how attending the course will contribute to their professional qualification. Selected candidates will be requested to present a seminar about their current research activities. The Brazilian Ministry of Science and Technology (MCT) will provide round-trip air tickets and a small stipend for a limited number of participants. Please mention in your letter if you are applying to financial support. Send all correspondence in English.

Application deadline: May 15th, 1995

MORPHOLOGY AND ECOLOGY OF COPEPODS

Proceedings of the 5th International Conference on Copepoda, Baltimore, USA, June 6-13, 1993

edited by
Frank D. Ferrari and **Brian P. Bradley**

This volume provides new information on any aspect of copepod biology. Copepods are an order of exclusively aquatic crustaceans; about 11.500 species are known. They are numerically the most abundant metazoan order in the world and contribute more biomass to the world than any other metazoan order. The articles published here reflect the diverse research interests of copepodologists today and include information on the following aspects of copepod biology: behavior, feeding, genetics, horizontal variations, morphology, phylogeny, reproduction, seasonal changes, and vertical distribution.

SECTIONS

- Maxilliped lecture
- Systematics
- Morphology
- Feeding and reproduction
- Distributions in time and space
- Environmental relationships

1994, Hardbound, 530 pp, KLUWER ACADEMIC PUBLISHERS GROUP, ISBN 0-7923-3225-3

BUSINESS BUSINESS BUSINESS BUSINESS BUSINESS

1. MONOCULUS library

Our greatest concern for the moment is that reprints of the latest publications on copepods don't arrive at the library anymore. Only a minor portion of articles on copepods reaches us from their authors even though these are recipients of the newsletter. Please don't forget the MONOCULUS-library on your mailing list and make sure that reprints of your latest publications are deposited there.

The library has been built up in conjunction with the project of a computerized bibliography of copepod literature. It contains about 13,000 documents (books and reprints, original or copied) at present. To keep the library up-to-date everyone is asked to send reprints of this publications to Kurt Schminke. In case of literature problems everyone can write to the library and ask for having articles copied. This service is not free of charge. Please, send reprints to or ask for information:

MONOCULUS-library
c/o Dr. H. K. Schminke
Fachbereich 7 (Biologie)
Universität Oldenburg
D-26111 Oldenburg, Germany

2. Mailing

Looking at your address label you will find some additional information. This is to remind you of your status in relation to WAC and when to pay the next dues:

86-95 = WAC members, dues paid including printed year
W = membership dues waived
NM = new member, no dues paid
NM95 = new member, dues paid including 95
CM = candidate member, no dues paid
CM95 = candidate member, dues paid including 95

WAC - TREASURER'S REPORT 1993/1994

1. The financial situation

	01.01.-31.12.1994	01.01.-31.12.1995
Balance forward	**15,918.21 DM**	**19,888.89 DM**
Deposits	10,524.80 DM	2,071.06 DM
Interests	340.52 DM	799.57 DM
Total	10,856.41 DM	2,870.63 DM
Expenses		
Transfer to Conference	5,083.20 DM	
Support of MONOCULUS 93/94	1,668.40 DM	1,170.89 DM
Account dues	143.13 DM	152.00 DM
Total	6,894.73 DM	1,322.89 DM
Balance	**19,888.89 DM**	**21,436.63 DM**

Remarks: The total financial situation of WAC looks always better than it actually is. Several members have paid their dues in advance also in 1994. You may be astonished to see that MONOCULUS will be supported with less money than the previous year. Although we have doubled the support of MONOCULUS from 2$ to 4$ per member and year, there is a decrease. This indicates that less members have paid their dues in 1994 and - an important fact - the exchange rate from US $ to German Marks (DM) has decreased as well. I have always taken the exchange rate of 31 December of the financial year and this was 1.5488 DM for 1 US $. Many thanks again to all who have made generous donations to the WAC. This helps the Association to support those members whose dues have been waived and to give grants to some colleagues to attend the next conference at Oldenburg/Germany.

!!!!!!!!!!!!!!!!!!THIS IS YOUR LAST MONOCULUS!!!!!!!!!!!!!!!!!!

In 1994 we had to eliminate a number of colleagues from the mailing list. This edition is now mailed to 378 WAC members. Although we have gained 32 candidate members since the Baltimore Conference, I fear, the number will decrease until autumn, if the following WAC members, who have not paid their dues since 1992, will be ELIMINATED from the MONOCULUS mailing list. This is your last MONOCULUS, if you do not send your dues to Gerd - Bank: Commerzbank Kiel, Account No. 7 233 190, BLZ 210 400 10:

Arbizu, Barnett, Bayly, Bodin, Brownell, Bucklin, Citarella, Conradi, Cowles, Dam, Daro, C.D. Davis, Dawson, Deets, Defaye, Demeulenaere, E. & E. Durbin, Dussart, Fiers, Fleeger, Fukuchi, Gailbraith, Gophen, J. Green, Grindley, R.P. Harris, Hart, Hay, Heip, Hirota, Ishii, Klein-Breteler, Lescher-Moutoué, Lindley, Longley, Lopes, Lopez-Gonzales, McQueen, Mizushima, Öresland, Pesce, Revis, Schwenzer, Seguin, Simenstad, Sprules, Stoch, Stock, Tackx, Taniguchi, Varella, Vuorinen, Walter, Wiebe, Wilkes, Yokouchi.

AGAIN - HELP-**HELP**-HELP - AGAIN

Someone has sent a cheque for 17 DM dues to Kurt Schminke in 1994. Unfortately, Kurt has endorsed the cheques without putting down the name. The sender should please write to Gerd.

Gerd Schriever, Hohenwestedt, Germany

LETTER BOX

Just want to tell you for MONOCULUS that I finished the Ph.D. entitled: Copepod-Chondrichthyan Coevolution: A cladistic consideration. 1994. It is a revision of *Kroyeria* and *Eudactylina* with phylogenetic analyses of them plus *Kroyerina*.

Greg Deets, California

QUERY - **QUERY** - QUERY

Giesbrecht's monograph on the Copepoda of the Gulf of Naples (Fauna Flora Golf. Neapel 19: 1-831, Atlas of 54 plates) is an extremely important work in systematic copepodology, and many new taxa were described therein. The monograph and all of its new taxa are invariably cited as having been published in 1892 (e.g., in Vervoordt's bibliography), and that is the date noted in the publication itself. However, A. Scott wrote in a footnote to the bibliography of his Copepoda of the Siboga Expedition, Part I (1909, Siboga-Expeditie 29a: 1-323, 69 pls) that Giesbrecht's monograph was actually published on 23 January 1893. Scott did not give any source for that information. As far as I know, this later date has not been widely accepted, if indeed anyone has accepted it at all. Redating all of Giesbrecht's new taxa to 1893 would be inconvenient for many workers and could conceivably lead to nomenclatural priority problems. Does anyone have firm information about the exact data of publication of this work?

Mark J. Grygier
14804 Notley Road
Silver Spring
Maryland 20905
U.S.A.

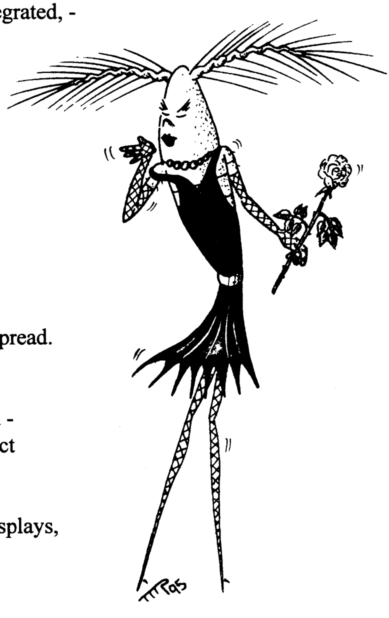
Excerpt from the literature

From: GARSTANG, W. - 1985: Larval forms and other zoological verses. The University of Chicago Press, Chicago: 1-98.

THE NAUPLIUS AND PROTASPIS

The *Nauplius* is a wobbly thing, a head without a body:
He flops about with foolish jerks, a regular Tom-noddy.
Some said he was an ancestor, but others said: „What, HIM?
He's just a *Nectochaeta* with Crustacean skin and limb!"

But *Nectochaeta's* segments all are clearly demarcated,
While in *Nauplius* all five segments with the head are integrated, -
So solidly that boundaries above can not be traced,
And maxillary appendages for some time are effaced.



The simplest *Nauplius* thus has left simplicity behind,
And to the gap forever we should have to be resigned
Had not the ancient Trilobites - Crustacean ancestors -
Behind them left their larval shells on Palaeozoic shores.

These little disks, ¾ of a millimetre wide,
An almost perfect missing link between the two provide:
A quinquepartite axial tract defines the compound head,
And flange-like cheeks of varied form on either side are spread.

Of actual appendages no traces have been found -
Nor could more be expected than streaks upon the ground -
But the transverse equidistant lines that cross the axial tract
Are of uniform appendages as eloquent as fact.

The *Protaspis*, like the *Nauplius*, then a groove behind displays,
Which separates a telson from the head, and so, by ways
Familiar in Annelids, new segments, one by one,
Are interpolated till the whole development is done.

OFFERS OFFERS OFFERS OFFERS OFFERS

Survey of copepodologists of the world

It consists of four parts. Part I: List of copepodologists and their fields of interests (in tabular form), Part II: Taxonomic and subject index to Part I (cross-reference in tabular form), Part III: Directory of copepodologists of the world with (650 addresses), Part IV: National list of copepodologists. Copies are still available. Please contact:

Dr. H.K. Schminke
Fachbereich 7 (Biologie)
Universität Oldenburg
D-26111 Oldenburg, Germany

BOOK Book review REVIEW

Taxonomy and distribution of the marine calanoid copepod family Euchaetidae - by **Taisoo Park** (1995). Bulletin of the Scripps Institution of Oceanography. University of California, San Diego. Volume 29: 203 pp. $ 26.00, paperback

One is afraid that one skill would have almost disappeared from the manufactures of biological sciences: the ability to provide comprehensive monographs on the taxonomy and distribution of animal taxa with a fine resolution to the level of species. Taisoo Park has contributed such a decent book covering the calanoid family Euchaetidae. This review is useful both for systematists and ecologists who have to reliably identify species. For the latter and other colleagues who want to apply taxonomic expertise, it is especially helpful when being provided with appropriate „keys“ for species identification - a service also offered by Taisoo's book.

The remarkable diversity within the family Euchaetidae is well known and their taxonomy has always been plagued by an often confused and difficult-to-use literature. With this revision the euchaetid calanoid fauna can now be put on a firm footing. The number of species in Euchaetidae will probably increase - due to collections from new areas and new systematic techniques to be applied. In any case, future systematic studies of these calanoids will certainly not be as difficult as it has been in the past.

The book gives a revision of the Euchaetidae. Fourteen species of *Euchaeta* and 61 species of *Pareuchaeta*, including 13 new species, are described and their geographic ranges are defined from specimens collected throughout the Atlantic, Pacific, and Indian Oceans. The species of *Euchaeta* are classified into three species groups - *marina, concinna*, and *acuta* groups and the independent species *E. spinosa*. Those of *Pareuchaeta* were classified into six species groups - *malayensis, pavlovskii, norvegica, glacialis, hebes*, and *antarctica* groups - and three independent species - *P. biloba, P. bisinuta*, and *P. grandiremis*. Each of the nine species groups is defined with detailed descriptions of its representative species. Phylogenetic relationships and geographic distribution among species groups and independent species are discussed. Keys for the identification are provided.

The book is written by an author who has contributed descriptions of not less than nine species belonging to *Euchaeta* and *Pareuchaeta*. Taisoo Park worked about half his life on marine calanoids, especially Euchaetidae and Aetideidae. His accurate work was always fully appreciated among his peers. He is a busy researcher, now at the Scripps Institution of Oceanography (San Diego).

The descriptions of various characters are concise and to the point. The variability of certain structures (such as the leg 2 exopods) are considered and adequately illustrated. However, I miss whole-habitus illustrations for most of the species; there are many more characters of body and appendages to be illustrated and scales are missing on the plates. Otherwise are the figures clear and detailed, significant diagnostic or constitutive characters are given in enlarged form. I did not come across a single typing error - so neat the text as the drawings are.

H.-U.D.

MODEL DESCRIPTION MODEL DESCRIPTION MODEL DESCRIPTION

Copepod copepodids

Copepodid stages of *Hemicyclops japonicus* (Copepoda: Poecilostomatoida)
(after HIROSHI ITO & SHUHEI NISHIDA 1995 - J. Crust. Biol. 15(1): 134-155)

Copepodid I (Figs. 1A-J, 2A-C).

Body length 0.61 mm (0.58-0.64 mm), greatest width 0.17 mm (0.16-0.18 mm). Urosome length 0.28 mm (0.25-0.29 mm).

Body (Fig. 1A-C) 5-segmented. Prosome composed of cephalothorax and 1 pedigerous somite. Cephalothorax constructed from ventrally curved cephalosome with very acute forehead, and first pedigerous somite. Ratio of length to width of cephalothorax 1.65:1. Rostrum tapering and slightly bifurcate. Urosome composed of 3 somites. Length ratios of first to third urosomite 26:26:48. First urosomite bearing rudimentary third legs. Second urosomite with pointed posterolateral corners and jagged hyaline membrane on ventral surface of posterior border. Anal somite 2.3 times longer than wide, with pair of transverse rows of spinules half way along ventral surface.

Caudal ramus (Fig. 1A, C) 2.4 times longer than wide, with 6 setae and 1 small setule. Minute lateral setule on anterior part of caudal ramus. Both outer lateral seta and outer terminal seta tipped with 1 flagellum. Outer lateral seta 21 μm, dorsal seta 63 μm, 4 terminal setae from outer to inner 22, 24, 26, and 253 μm, last with minute lateral spinules.

First antenna (Fig. 1D) 5-segmented. Second segment longest and 26 % of first antenna. Armature: 2, 2, 3 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. Number of plumose setae: 2 on third, 1 on fourth, and 4 on fifth segment.

Second antenna (Fig. 1E) indistinctly 4-segmented, last segmentation obscure. First segment with 1 distal seta. Second segment with 1 strong seta and 1 setule. Third segment with outer row of spines, 3 barbed setae, and 1 thin seta. Fourth segment with 1 short stout seta, 2 long stout setae, 1 slender seta, and 2 slender setae with prominent lateral setules.

Labrum (Fig. 1F) acutely triangular lobe with 4 setae and transverse row of spines on central part ventrally and with 2 groups of spines on each posterolateral corner.

Mandible (Fig. 1G) tipped with 2 stout elements and 2 setae, as in adult. Paragnath (Fig. 1H) stout lobe with fine hairs subapically. First maxilla (Fig. 1I) unsegmented and bilobed distally, with 8 setae (5 on one lobe and 3 on other). Second maxilla (Fig. 1J) 2-segmented. First segment with 2 barbed spines and 1 small seta. Second segment with 1 stout and smooth element, 1

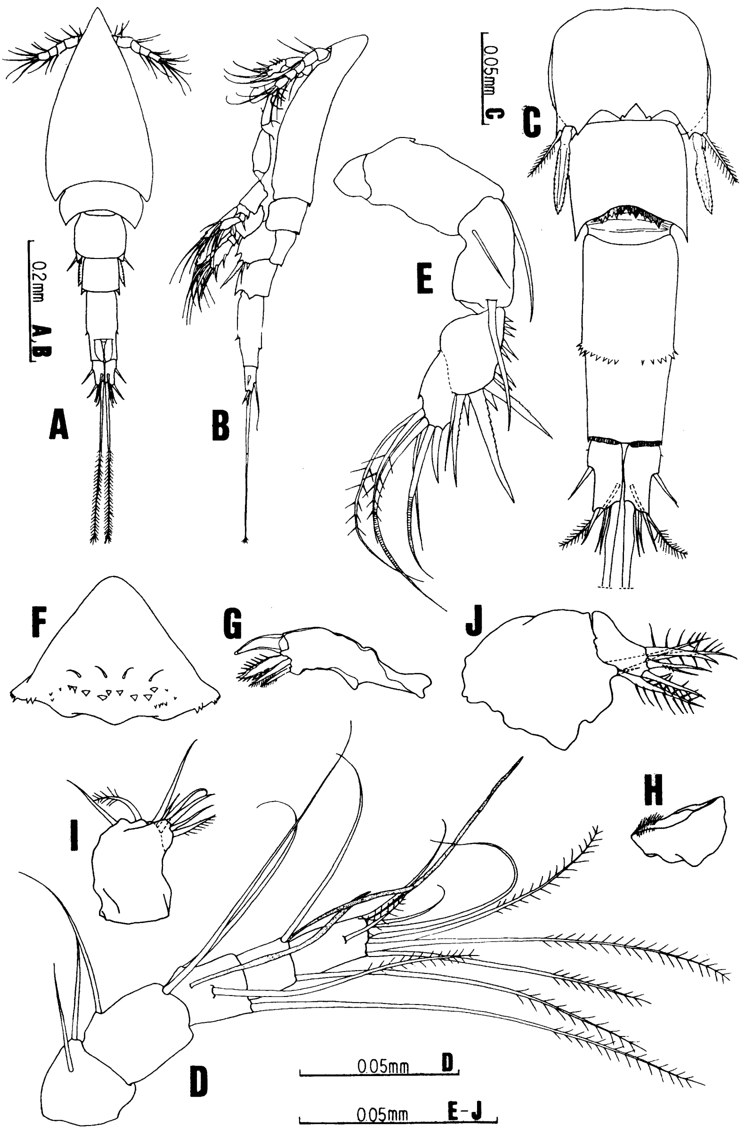


Fig. 1. *Hemicyclops japonicus*, Copepodid I: A, whole animal, dorsal; B, whole animal, lateral; C, urosome, ventral; D, first antenna; E, second antenna; F, labrum; G, mandible; H, paragnath; I, first maxilla; J, second maxilla.

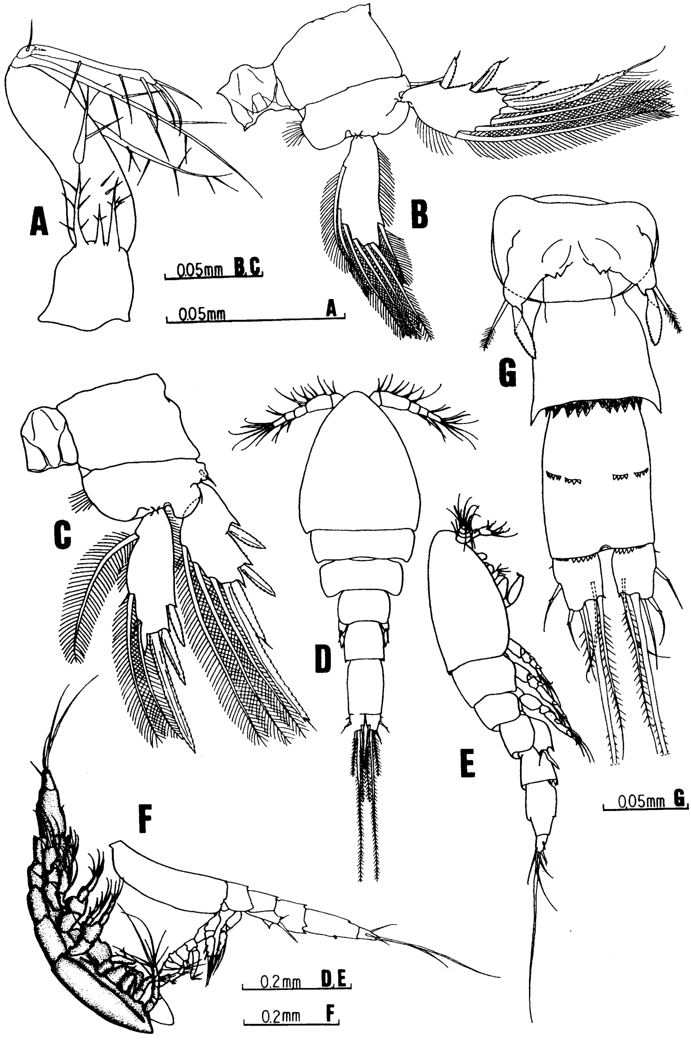


Fig. 2. *Hemicyclops japonicus*, Copepodid I: A, maxilliped; B, leg 1; C, leg 2. Copepodid II: D, whole animal dorsal; E, whole animal, lateral; F, whole animal which failed in complete ecdysis, lateral; G, urosome, ventral.

bifurcate element, and 2 barbed spines. Maxilliped (Fig. 2A) 4-segmented. First segment with 3 barbed setae having obscure articulations. Elongate second segment with 2 barbed setae and 3 small setules. Third segment short, but with longest seta. Fourth segment shortest, with 1 strong and 2 small setae. Longest seta on fourth segment tipped with 4 setules.

Legs 1 and 2 (Fig. 2B, C) with 1-segmented rami. All spines on leg 1 exopod and 2 terminal spines on leg 2 exopod with terminal flagellum. Formula for armature as follows (Roman and Arabic numerals representing spines and setae, respectively):

	Coxa	Basis	Exopod	Endopod
Leg 1	0-0	1-0	IV, I, 3	7
Leg 2	0-0	1-0	IV, 3	III, 3

Leg 3 (Fig. 1C) ventrolateral flap on first urosomite, with 1 spine and 1 seta on posterolateral corners, and 2 denticles on inner ventral margin.

Legs 4, 5, and 6 absent.

Copepodid II (Figs. 2D-G, 3A-H, 4A-C).

Body length 0.55 mm (0.53-0.59 mm), greatest width 0.23 mm (0.22-0.24 mm). Urosome length 0.22 mm (0.20-0.25 mm).

Body (Fig. 2D-G) 6-segmented. Prosome composed of cephalothorax and 2 pedigerous somites. Cephalothorax consisting of cephalosome rounded dorsally and with rounded forehead, and first pedigerous somite. Ratio of length to width of cephalothorax 1:1. Rostrum rounded, similar in following stages. Urosome composed of 3 somites. Length ratios of first to third urosomite 25:27:48. First urosomite with rudimentary fourth legs. Second urosomite with pointed posterolateral corners and jagged hyaline membrane on ventral surface of posterior border. Anal somite 1.36 times longer than wide, with pair of transverse rows of spinules half way along ventral surface. Posteroventral margin with rows of denticles.

Caudal ramus (Fig. 2D, G) 1.02 times longer than wide, with 6 setae and 1 small setule. Minute lateral seta on anterior part of caudal ramus. Both outer lateral seta and outer terminal seta tipped with 1 flagellum. Outer lateral seta 32 μm, dorsal seta 62 μm, 4 terminal setae from outer to inner 27, 44, 306, and 99 μm, inner 3 with minute lateral spinules.

First antenna (Fig. 3A) 5-segmented, second segment longest and 37 % of first antenna. Armature: 2, 6, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. Number of plumose setae: 1 on each of second and fourth, 2 on third, and 4 on fifth segment.

Second antenna (Fig. 3B) 4-segmented. First segment with 1 barbed seta. Second segment with 1 seta and 2 setules. Third segment with outer row of spines, 1 barbed seta, 2 smooth setae, and 1 thin smooth seta. Fourth segment with 3 long stout setae, 2 slender finely barbed setae and 1 haired seta.

Labrum (Fig. 3C) as in adult female, broadly triangular lobe with lateral winglike projections and with 8 setae on anterior part, with 3 rows of spines on posterior part, and 2 rows of spines laterally.

Mandible (Fig. 3D) and first maxilla (Fig. 3E) as in adult. Paragnath (Fig. 3F) stout lobe with 2 rows of hairs and tuft of hairs on apex, as in adult. Second maxilla (Fig. 3G) as in adult female and 2-segmented. First segment with 2 barbed spines and 1 small seta. Second segment with 2 setae, 1 barbed spine, and 1 stout element bifurcated distally. Maxilliped (Fig. 3H) 4-segmented. First and second segments with 2 setae. Third segment short, without seta. Fourth segment shortest, with 2 strong barbed setae, 1 thin smooth seta, and 1 small seta.

Leg 1 and leg 2 (Fig. 4A, B) with 2-segmented rami and with 1 plumose seta on inner expansion of coxa. Leg 1 with 1 spine on inner expansion of basis (legs 2 and 3 lacking spine at

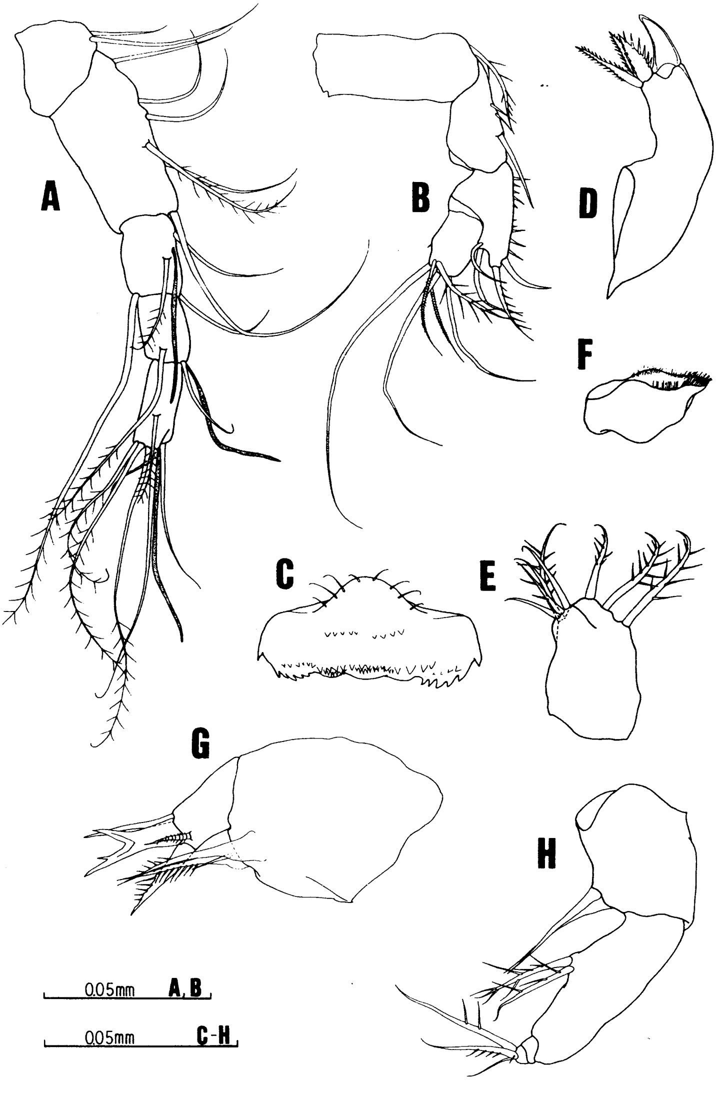


Fig. 3. *Hemicyclops japonicus*, Copepodid II: A, first antenna; B, second antenna; C, labrum; D, mandible; E, first maxilla; F, paragnath; G, second maxilla; H, maxilliped.

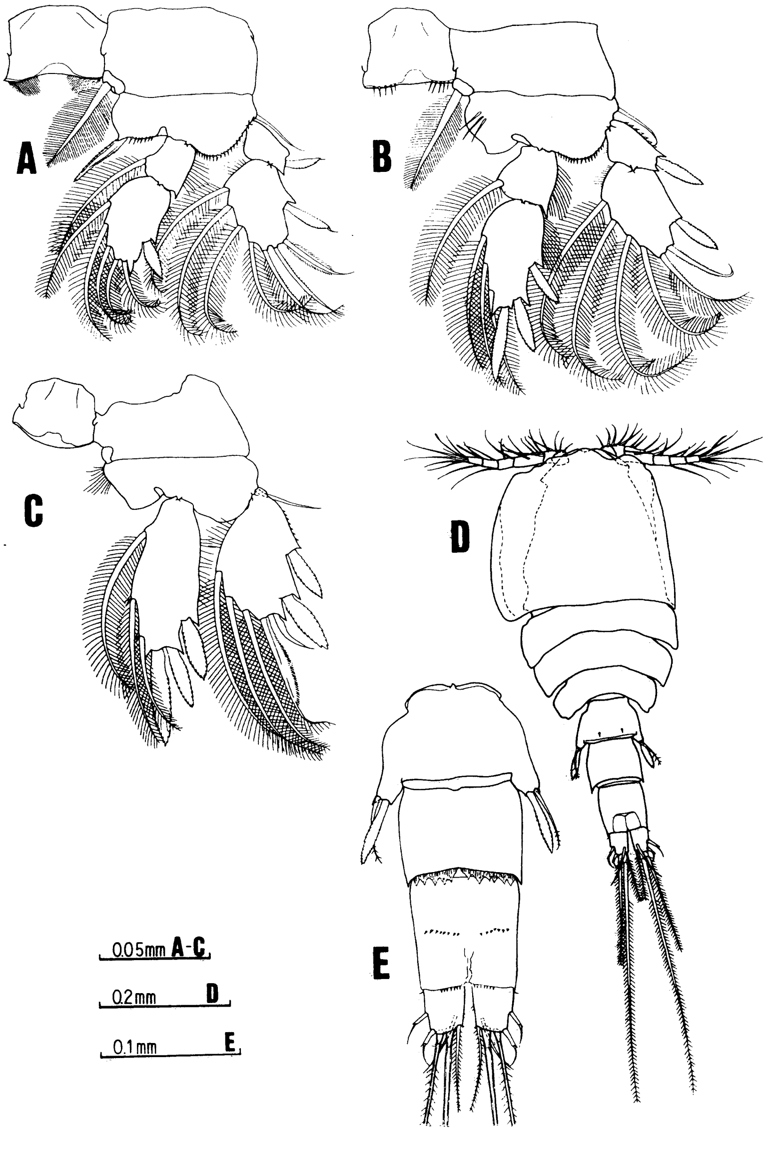


Fig. 4. *Hemicyclops japonicus*, Copepodid II: A, leg 1; B, leg 2; C, leg 3. Copepodid III: D, exuviae of whole animal, dorsal; E, urosome, ventral.

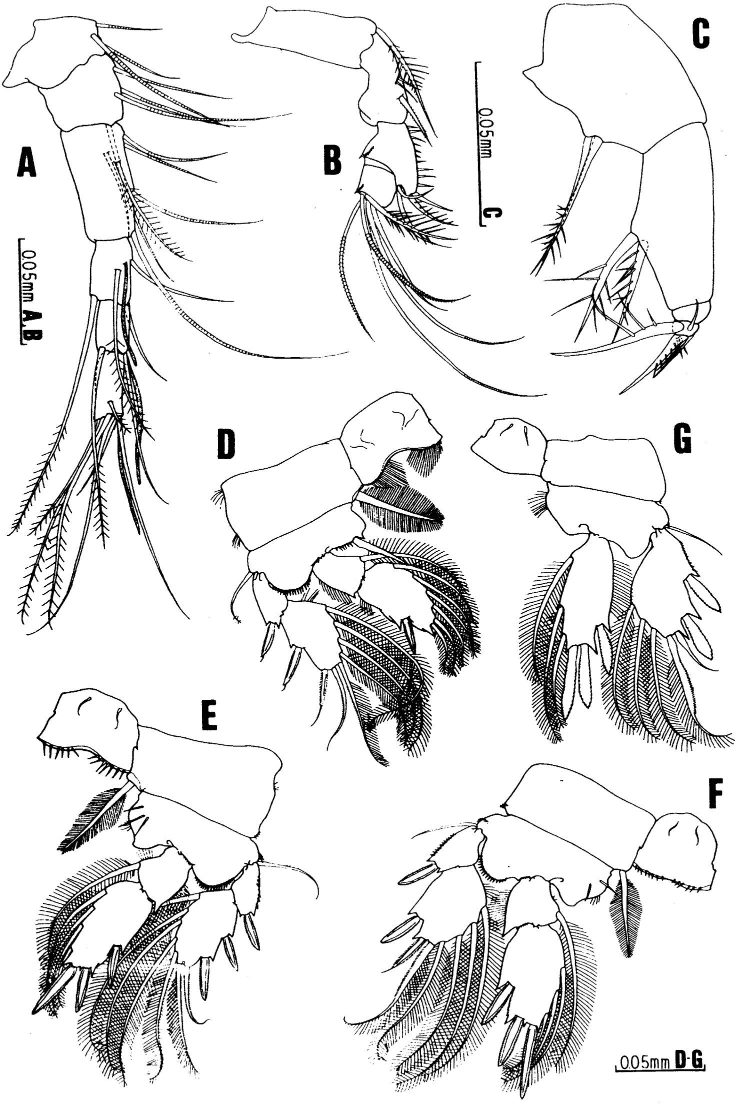


Fig. 5. *Hemicyclops japonicus*, Copepodid III: A, first antenna; B, second antenna; C, maxilliped; D, leg 1; E, leg 2; F, leg 3; G, leg 4.

this location). Intercoxal plate of leg 1 with row of hairs on ventral margin, but plate in leg 2 with spinules. Spinules on inner side of basis of leg 2 and denticulations on area between rami. All spines on exopod of leg 1 with terminal flagellum. Leg 3 (Fig. 4C) with unimerous rami, without inner coxal seta and spinules on intercoxal plate but with line of hairs on inner basal corner. Formula of armature as follows:

	Coxa	Basis	Exopod	Endopod
Leg 1	0-1	1-I	I-0; II, 6	0-1; I, 5
Leg 2	0-1	1-0	I-0; I, 6	0-1; III, 3
Leg 3	0-0	1-0	II, 5	III, 3

Leg 4 (Fig. 2G) ventrolateral flap on first urosomite, with 1 spine and 1 seta on posterior corners, and 2 denticles on inner ventral margin.

Legs 5 and 6 absent.

Copepodid III (Figs. 4D, E, 5A-F).

Body length 0.65 mm (0.63-0.68 mm), greatest width 0.29 mm (0.28-0.30 mm). Urosome length 0.25 mm (0.23-0.27 mm).

Body (Fig. 4D, E) 7-segmented. Prosome elliptical in dorsal view and composed of cephalothorax and 3 pedigerous somites, as in adult. Cephalothorax constructed from cephalosome and first pedigerous somite. Ratio of length to width of cephalothorax 1:1.16. Urosome composed of 3 urosomites. Length ratios of first to third urosomite being 31:31:38. First urosomite with rudimentary fifth legs. Second urosomite with pointed posterolateral corners and jagged hyaline membrane on ventral surface of posterior border. Anal somite 1.2 times longer than wide, with same ornamentation as in Copepodid II.

Caudal ramus (Fig. 4D, E) 1.18 times longer than wide, with 6 setae and 1 small setule as in Copepodid II.

First antenna (Fig. 5A) 6-segmented. Third segment longest and 31 % of first antenna. Armature: 3, 4, 6, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. Number of plumose setae: 1 on each of third and fifth, 2 on fourth, and 4 on sixth segment.

Second antenna (Fig. 5B) as in Copepodid II but third and fourth segment with row of minute spinules on each inner distal corner. Setal formula: 1, 1, 4, and 6.

Labrum and second maxilla as in adult female. Mandible, paragnath, and first maxilla as in adult. Maxilliped (Fig. 5C) 4-segmented. Two thin smooth setae and 1 small seta added on fourth segment. Setal formula: 2, 2, 0, and 7.

Legs 1-3 (Fig. 5D-F) with 2-segmented rami and with 1 plumose seta on inner expansion of coxa. Spinules on inner side of basis of legs 2 and 3 and denticulations on area between rami.

Leg 4 (Fig. 5G) with unimerous rami, without inner coxal seta and spinules on intercoxal plate but with line of hairs on inner basal corner. Formula for armature as follows:

	Coxa	Basis	Exopod	Endopod
Leg 1	0-1	1-I	I-0; II, 6	0-1; I, 6
Leg 2	0-1	1-0	I-0; II, 7	0-1; III, 4
Leg 3	0-1	1-0	I-0; II, 5	0-1; III, 3
Leg 4	0-0	1-0	II, 5	III, 3

Leg 5 (Fig. 4E) represented by posterolateral protuberance on ventral side of first urosomite, with 1 spine and 1 seta.

Copepodid IV (Figs. 6A-F, 7A-D).

Body length 0.79 mm (0.76-0.86 mm), greatest width 0.37 mm (0.35-0.39 mm). Urosome length 0.32 mm (0.30-0.36 mm).

Body (Fig. 6A, B) 8-segmented. Prosome as in adult. Ratio of length to width of cephalothorax 1:1.23. Urosome composed of 4 urosomites. Length ratios of first to fourth urosomite 18:33:22:27. First urosomite with fifth legs. Anal somite shorter than wide, length 0.95 times width at anterior end, and with same ornamentation as in Copepodid II.

Caudal ramus (Fig. 6A, B) 1.28 times longer than wide, with 6 setae and 1 small setule as in Copepodid III.

First antenna (Fig. 6C) 6-segmented. Third segment longest and 33 % of first antenna. Armature: 4, 8, 7, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. Number of plumose setae: 1 on each of third and fifth, 2 on fourth, and 4 on sixth segment.

Second antenna (Fig. 6D) similar to Copepodid III but with 1 spinelike seta added on terminal segment. Setal formula: 1, 1, 4, and 7.

Labrum and second maxilla as in adult female. Mandible, paragnath, and first maxilla as in adult. Maxilliped (Fig. 6E) 4-segmented, 1 thin smooth seta added on terminal segment. Setal formula: 2, 2, 0, and 8, as in adult female.

Legs 1-4 (Figs. 6F, 7A-C) with 2-segmented rami. In leg 4, 1 plumose seta added on inner expansion of coxa and spinules added on intercoxal plate. Formula for armature as follows:

	Coxa	Basis	Exopod	Endopod
Leg 1	0-1	1-I	I-0; II, 6	0-1; I, 6
Leg 2	0-1	1-0	I-0; II, 7	0-1; III, 5
Leg 3	0-1	1-0	I-0; III, 6	0-1; III, 4
Leg 4	0-1	1-0	I-0; III, 6	0-1; III, 3

Copepodid V (Figs. 7E-G, 8A-G, 9A-B).

Female. - Body length 1.04 mm (1.03-1.11 mm), greatest width 0.48 mm (0.46-0.51 mm). Urosome length 0.44 mm (0.43-0.49 mm).

Body (Fig. 7E, F) 9-segmented. Prosome as in adult. Ratio of length to width of cephalothorax 1:1.30. Urosome composed of 5 urosomites. Length ratios of first to fifth urosomite 16:29:20:17:18). First urosomite with fifth legs. Anal somite shorter than wide, length 0.64 times width at anterior end, and with same ornamentation as in adult.

Caudal ramus (Fig. 7E, F) 1.40 times longer than wide, with 6 setae and 1 small setule as in adult.

First antenna (Fig. 7G) 6-segmented. Third segment longest and 37 %. Armature: 4, 15, 9, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. Number of plumose setae: 1 on each of second, third, and fifth, 2 on fourth, and 4 on sixth segment.

Second antenna (Fig. 8A) similar to that of Copepodid IV but distal outer seta on terminal segment being long seta as in adult (spinelike in Copepodid IV). Setal formula: 1, 1, 4, and 7.

Labrum, second maxilla, and maxilliped as in adult female. Mandible, paragnath, and first maxilla as in adult.

Legs 1-4 (Fig. 8C-F) with 3-segmented rami. Formula for armature as follows:

	Coxa	Basis	Exopod	Endopod
Leg 1	0-1	1-I	I-0; I-1 II, 6	0-1; 0-1; I, 5
Leg 2	0-1	1-0	I-0; I-1; II, 7	0-1; 0-2; III, 3
Leg 3	0-1	1-0	I-0; I-1; III, 6	0-1; 0-2; III, 3
Leg 4	0-1	1-0	I-0; I-1; II, 6	0-1; 0-2; III, 2

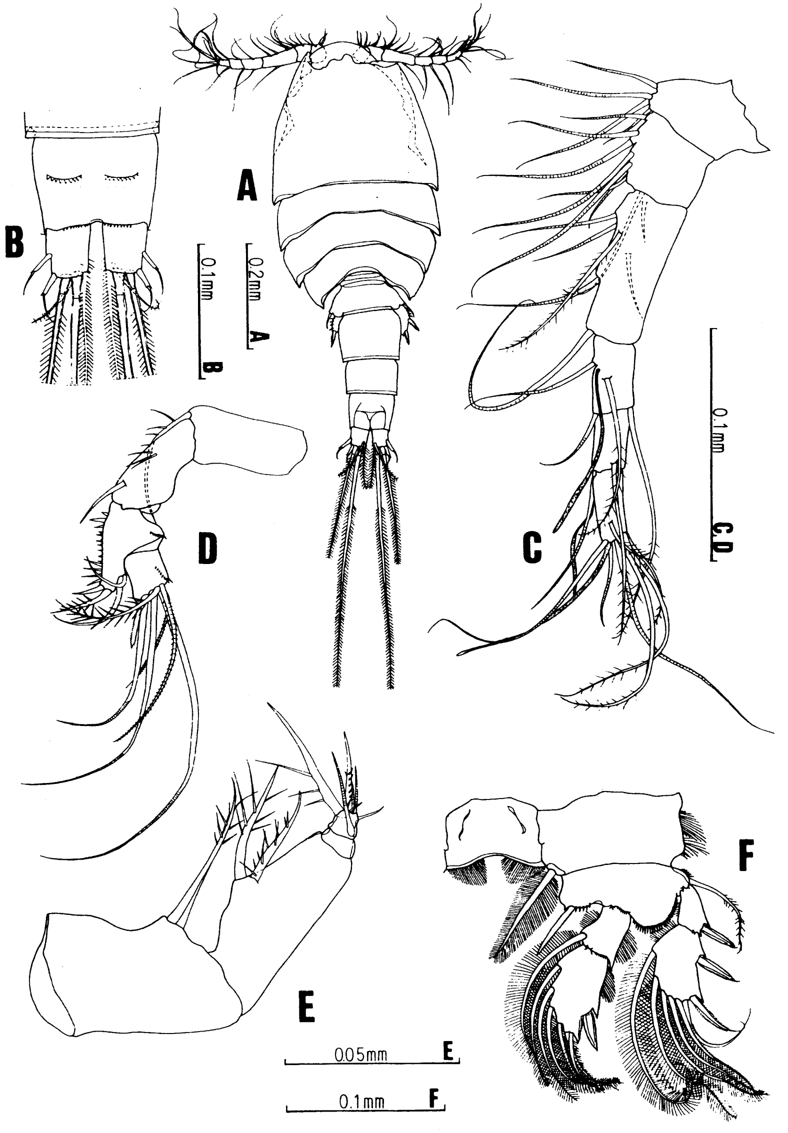


Fig. 6. *Hemicyclops japonicus*, Copepodid IV: A, exuviae of whole animal, dorsal; B, anal somite and caudal rami, ventral; C, first antenna; D, second antenna; E, maxilliped; F, leg 1.

Leg 5 (Fig. 7D) 2-segmented. First segment fused with first urosomite and with 1 dorsal seta, ventral and lateral rows of spinules. Second segment with 1 inner spine, 2 outer spines and 1 seta terminally, row of spinules on outer margin, and 2 spinules on inner margin.

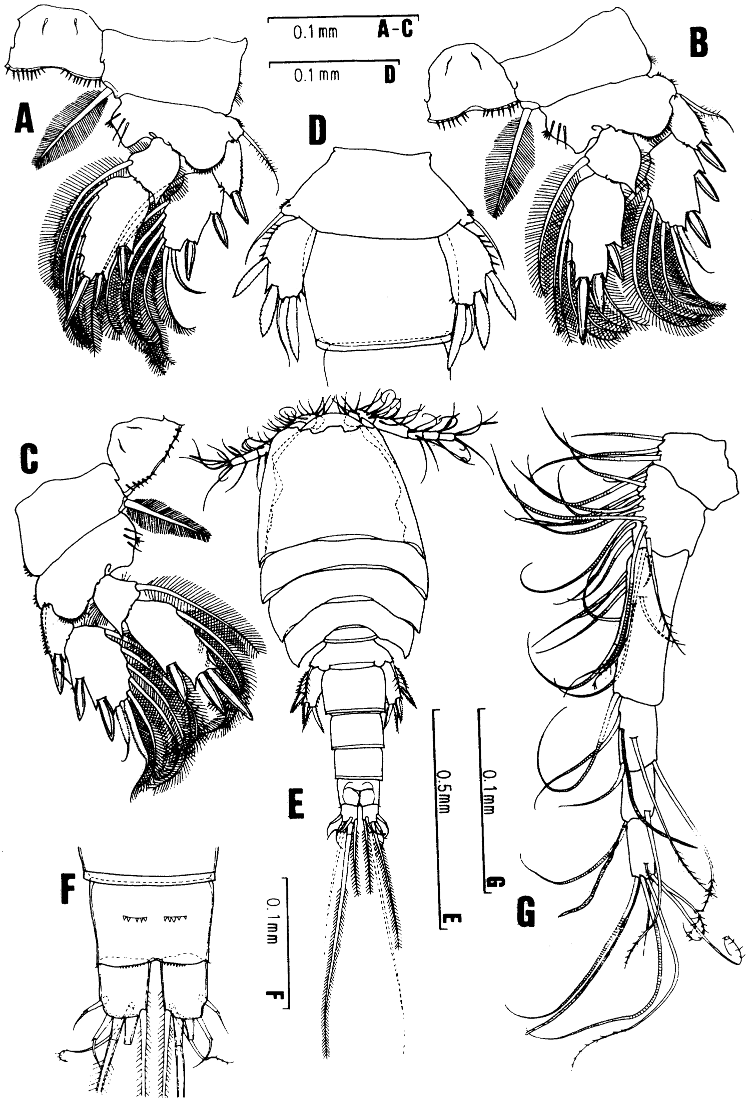


Fig. 7. *Hemicyclops japonicus*, Copepodid IV: A, leg 2; B, leg 3; C, leg 4; D, first to third urosomites, ventral. Copepodid V, female: E, exuviae of whole animal, dorsal; F, anal somite and caudal rami, ventral; G, first antenna. Leg 5 (Fig. 8G) similar to that of Copepodid IV, but number of inner spinules on second segment increased.

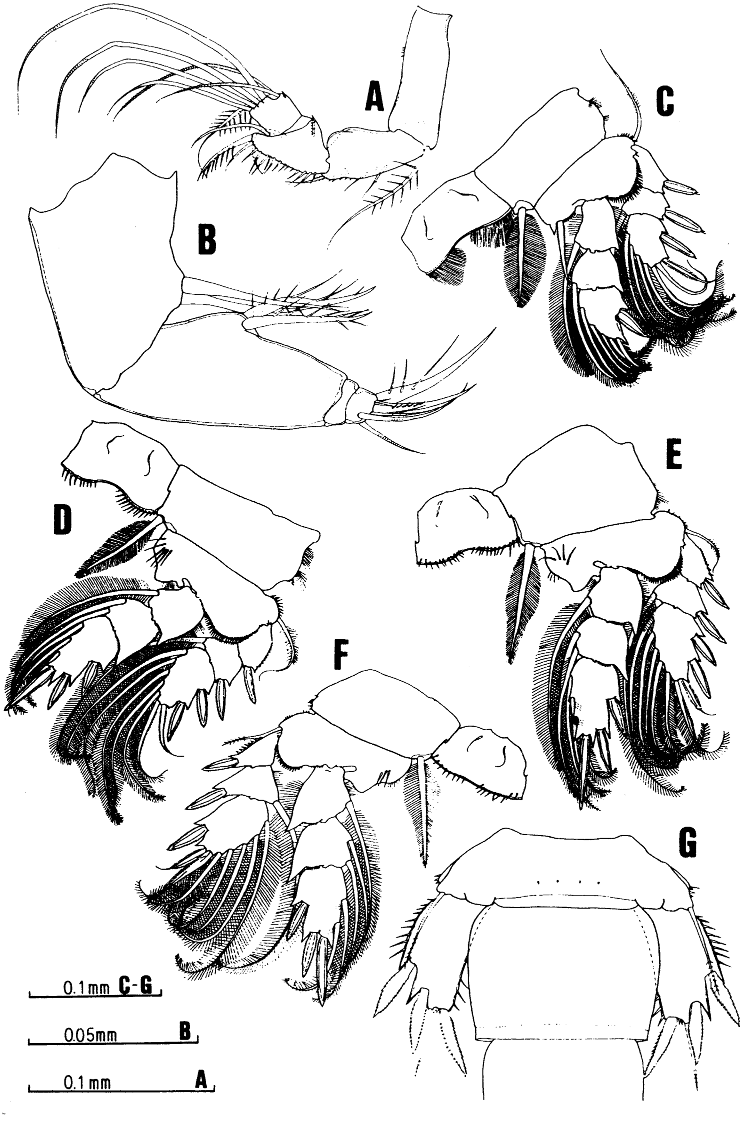


Fig. 8. *Hemicyclops japonicus*, Copepodid V, female: A, second antenna; B, maxilliped; C, leg 1; D, leg 2; E, leg 3; F, leg 4; G, first to third urosomites, dorsal.

Male. - Body length 1.01 mm (0.94-1.08 mm), greatest width 0.45 mm (0.43-0.48 mm). Urosome length 0.43 mm (0.41-0.46 mm).

Body (Fig. 9A) as in female, with same number of somites. Ratio of length to width of cephalothorax 1:1.29. Length ratios of first to fifth urosomite 15:31:22:16:16. Anal somite shorter than wide, length 0.63 times width at anterior end, and with same ornamentation as in female.

Caudal ramus 1.40 times longer than wide, with 7 setae as in adult.

First antenna, second antenna, labrum, mandible, paragnath, first maxilla, and second maxilla as in female. Maxilliped (Fig. 9B) first and second segment thicker than those of female. Armature as in female. Legs 1-5 as in female.

Adult (Figs. 9C-E, 10A-H, 11A-E, 12A-H).

The following supplements the description by Itoh and Nishida (1993).

Female. - Body length of ovigerous female matured in the laboratory 1.23 mm, greatest width 0.57 mm. Urosome length 0.58 mm.

Body (Figs. 9C-E, 10A) 9-segmented, composed of 4-segmented prosome and 5-segmented urosome. Genital complex constructed by fusion of genital somite and first abdominal somite, and swollen laterally near anterior end and with pair of ridges on dorsal surface and pair of genital pores near midpoint of lateral margin; constricted laterally at anterior third and with pair of lateral hooks at posterior third. Egg sacs oval, about 223 x 127 µm, red in live specimens, attached dorsolaterally on swollen part near anterior end of genital complex. Spermatophore cyclindrical, about 88 x 33 µm, attached to genital complex anterior to genital pore.

First antenna (Fig. 10B) 7-segmented as in original description. Armature: 4, 15, 6, 3, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. Number of plumose setae: 1 on each of second, fourth, and sixth segments, 2 on fifth segment, and 4 on terminal segment.

Second antenna (Fig. 10C), labrum (Fig. 10D), mandible (Fig. 10E), paragnath (Fig. 10F), first maxilla (Fig. 10G), and second maxilla (Fig. 10H) as in original description. Maxilliped (Fig. 11A) armature: 2, 2, 0, and 8. In original description, terminal segment describesetae, but one more, minute seta found on terminal segment of present specimen.

Legs 1-5 (Figs. 11B-E, 9D) as in original description.

Male. - Body length of one male matured in laboratory 0.90 mm, greatest width 0.39 mm. Urosome length 0.38 mm.

Body (Fig. 12A) 10-segmented, composed of 4-segmented prosome and 6-segmented urosome.

First antenna (Fig. 12B) 7-segmented as in original description. Armature: 4, 15, 7, 4, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. Number of plumose setae: 1 on each of second, fourth, and sixth segments, 2 on fifth segment, and 4 on terminal segment.

Second antenna, mandible, paragnath, and first maxilla as in female and original description. Labrum (Fig. 12C), second maxilla (Fig. 12D), and maxilliped (Fig. 12E, F) as in original description, with sexual dimorphism.

Legs 1 (Fig. 12G) -6 (Fig. 12H) as in original description.

P.S.: HIROSHI ITOH (Kawasaki) and SHUHEI NISHIDA (Tokyo) have herewith presented what we regard as a model description of a cyclopoid (or in general copepod?) copepodid development. This suggestion is now open for comment. In case you agree or disagree, don't hesitate to let MONOCULUS know. We will be glad to receive any comments for publication in the next issue of this newsletter.

Excerpt from the literature

From: REHBERG, H. - 1880: Zwei neue Crustaceen aus einem Brunnen auf Helgoland. Zoologischer Anzeiger Bd. 3: 301-303.

Hermann Rehberg (1880) reports on *Cyclops helgolandicus* n.sp.:

Wie merkwürdig das Vorkommen von Süßwasserbewohnern auf dieser kleinen Insel schon für sich ist, um so merkwürdiger ist es wohl, dass diese beiden Crustaceen nicht mit Formen des Festlandes übereinstimmen, während sie in anderer Weise aufs Deutlichste ihre Stammeltern, *Pleuroxus trigonellus* O.Fr. Müll. und *Cyclops pulchellus* Koch, erkennen lassen. Abweichend gebildet zeigt sich *Cyclops helgolandicus* von *C. pulchellus* Koch durch geringere Körpergröße, durch die Gliederzahl der vorderen Antennen, die bei ersteren 14, beim letzteren dagegen 17 beträgt, durch eine bedeutende Verkürzung des Grundgliedes vom rudimentären Fuße und durch eine geringere Länge der zweiten äußeren Furcalborste. Anderseits zeigen beide Arten große Übereinstimmungen. So findet sich bei beiden im ersten Viertel der Furca ein Besatz feiner Borsten und die seitliche Furcalborste steht im dritten Fünftel der Furcalänge, Merkmale, die diesen Arten allein zukommen. Ferner stimmt die Bedornung der Füße bei beiden Arten überein. Betrachten wir nun die auffällig verschiedene Gliederung der ersten Antennen, so finden wir doch wieder darin eine Übereinstimmung, dass das 7. Glied derselben bei *C. helgolandicus* der Länge des 7. und 8. von *C. pulchellus* und das 8. des ersteren, der des 9., 10. und 11. entspricht. Ebenso auffällig zeigt die Bildung des Postabdomens bei *Pleuroxus puteanus*, der sich in der Körperform dem *Pl. hastatus* G.O. Sars anschließt, die Abstammung von *Pl. trigonellus* O.F. Müller.

Wie wir uns auch die Überführung dieser Thiere in den Brunnen denken mögen, so können wir mit Gewissheit annehmen, dass sie als *Pleuroxus trigonellus* O.F. Müller und *Cyclops pulchellus* Koch in denselben hineingelangt sind und erst durch die vom Einfluss des Meeres veränderte chemische Beschaffenheit des Brunnenwassers genannte Umbildungen hervorgebracht sind. Da der Brunnen vollständig überbaut ist, so ist es sehr wahrscheinlich, dass gleich beim Ausgraben (1809) desselben, zu welcher Zeit er wohl am längsten offen stand, die Thiere in denselben überführt sind und es wären so die beschriebenen Umbildungen in einem Zeitraume von 71 Jahren erfolgt.

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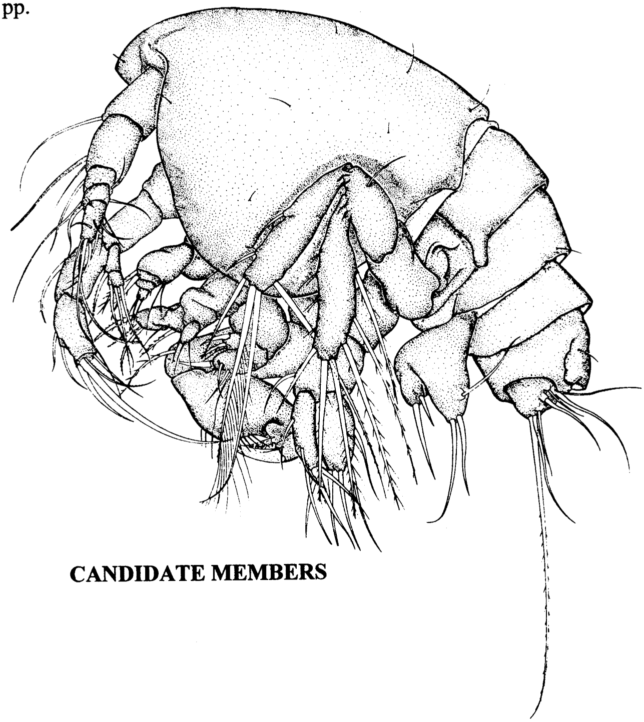

CANDIDATE MEMBERS

BRANDORFF, G.-O. Dr.
Wulfsdorfer-Weg 64
D-22926 AHRENSBURG
Germany

Born in 1946 in Oldenburg i.O. (the MONOCULUS capital). In 1968 I began to study biology, marine biology, geology and limnology at the University of Kiel. In 1972 I obtained my Master's Degree (Dipl.-Biol.) with a thesis about the taxonomy of South American Diaptomidae at the Max-Planck-Institute of Limnology in Plön under the guidance of Prof. Noodt. I described five new species. The material was collected by Prof. Sioli in the fourties and fifties in the Brazilian Amazon region. From 1974 to 1975 I stayed in Manaus, Brazil for two years to do the fieldwork for my Ph.D. thesis about the population dynamics of the crustacean plankton in an Amazonian white water lake. At that time I introduced a nice Brazilian girl (Elsa Hardy) to the work with crustaceans. Probably this was the beginning of more intensive studies of microcrustaceans in Amazonian waters.

Because of health troubles I could not return to Brazil. So in 1979 I got a job at the environmental authority of Hamburg. There I have nothing to do neither with crustaceans nor with taxonomy. In 1992 I went back to Brazil for the first time after 16 years of absence. I rediscovered my love for the Diaptomidae. So every sparetime I have I am working to complete my literature about South American Diaptomidae and will start again with the taxonomy of these animals.

IVANENKO, V.N.
Department of Invertebrate Zoology
Biological Faculty
Moscow St. University
MOSCOW 119899
Russia

Tel: (7-095)-939-36-56, 932-89-82
e-mail: ivanenko @ inv.bio.msu.su

A research scientist. Master of Science thesis is about postembryonic development of *Scottomyzon gibberum*, a symbiotic copepod from the White Sea starfish *Asterias rubens*. Current project supported by Universities of Russian and International Science (Soros) Foundation grants are on diversity of copepods associated with marine invertebrates. I have worked at the White Sea Biological Station (about eight times) and took part in expeditions to Caucasus Mountains, South Taiga, and Volcanic Lakes of Kamchatka. I had chances for working at the Museum of Natural History, Smithsonian Institution, Washington DC and studying at Dartmouth College, Hanover, NH, USA. I am a certified SCUBA diver with experience in the White Sea (the guarder was an international SCUBA diving instructor, M. Polterman, Germany).

Research projects and publications:
- Asterocherids from the White Sea (Copepoda, Siphonostomatoida, Asterocheridae). Ph.D. Thesis. Advisor: Drs. A Smurov and M. Heptner. In preparation.
- About finding and location of bacteria on *S. gibberum*, a symbiotic copepod from the starfish *Asterias rubens*. Coauthor: A Smurov. Doklady Akademii Nauk. In press.
- Morphology and settlement of the first copepodid stage of *S. gibberum*, a symbiont from the White Sea starfish *A. rubens*. Coauthor: A. Smurov. Zoological Journal. In press.
- Postembryonic development of *S. gibberum*. M.S. Thesis. Advisors: Drs. A. Smurov and M. Heptner. Spring 1994.
- Growth and changes in cuticular structure of adult females symbiotic copepod *S. gibberum*. Coauthor: A. Smurov, Ph.D. Doklady Akademii Nauk. 1993. V. 333. N 4: 552-554.

KANG, HYUNG-KU
Korea Institute of Ocean Science
National Fisheries University of Pusan
714-1 Udong, Haewundae-gu
PUSAN, 612-021
Korea

I am glad to introduce myself as a young planktologist. I am a Ph.D. student in the Department of Marine Biology, National Fisheries University of Pusan (NFUP) in Korea. I have been also a research assistant in the Korea Inter-University Institute of Ocean Science (KIOS) since July 1994. I graduated in the department with the degree of Master of Science in February 1989.

I am interested in plankton ecology, particulary in population dynamics and secondary production of marine copepods, identification of developmental stages of copepods, and rearing of copepods. Now I am studying the secondary production of marine copepods *Acartia steueri* in a small semi-enclosed bay for my dissertation.

MARSHALL, A.J.
Department of Aquaculture
University of Tasmania
P.O.Box 1214
LAUNCESTON
Tasmania 7250
Australia

Tel: (+61)243 801 / Fax: (+61) 243 804
e-mail: amarshal @ postoffice.newnham.utas.edu.au

I am currently enrolled in studies toward achieving a Doctorate of Philosophy in Aquaculture at the University of Tasmania, having completed a Bachelor of Agricultural Science with First Class Honours in 1993. I commenced Ph.D. studies in August 1994 intending to identify and establish a 'new zooplankton' species as a live food organism (LFO) for first feeding fish larvae, in particular those of native marine species exhibiting potential as aquaculture species such as the banded morwong, *Cheilodactylus spectabilis*, striped trumpeter, *Latris lineata*, and gold snapper *Lutjunas johnii*, to mention a few.

My honours project investigated the effect of diet on the relative growth and productivity of the harpacticoid *Tisbe* sp.. Ovigerous females were isolated in 10 ml of 0.45 micron filtered, autoclaved, natural seawater and fed one of five diets: 1) oven dried powdered mussel meat *Mytilus edulis*, 2) freeze dried green sea lettuce, *Ulva* sp., 3) a bacterial biofilm comprising five marine bacteria isolated from a dedicated larval rearing system, 4) axenic cultures of the microalgae *Dunaliella tertiolecta* or 5) *Tetraselmis suecica*. Diet and productivity were assessed on the basis of length parameters and the demographic variables: mean generation time, natural rate of intrinsic increase, and net reproductive rate. The findings revealed microalgal diets to be inferior to the three substrate type diets, suggesting mass culture of *Tisbe* sp. may be free of the labour demands associated with the maintenance of microalgal cultures necessary for the production of the traditional LFO *Brachionus plicatilis* and *Artemia* sp.

Following completion of my honours project I was employed by the Tasmanian Department of Primary Industries, Sea Fisheries Division to assist with the maintenance of *Brachionus plicatilis* (rotifer) cultures, and to investigate the effect of oxygen supplementation on culture productivity, the positive results of which were presented as an internal report. During my period of employment I was encouraged to apply for a Cooperative Research Centre for Aquaculture Ph.D. Scholarship to establish a new LFO exhibiting culturability and superior nutritional value to traditional LFOs rotifers and *Artemia*, which I was duly granted.

My interest in WAC stems from a desire to identify and devise culture methods suitable for a marine type copepod species. Copepods represent a viable alternative LFO as they are recognised as being nutritionally superior to rotifers and *Artemia*, especially with respect to essential fatty acid compositions; offer a wide range of sizes due to the number of distinct life stages suitable for marine larvae possessing gapes of less than 100 microns at first feeding; and the possibility of utilising food sources other than microalgae.

In October 1994 I was offered the opportunity to travel to six of the seven states of Australia and present the results from my honours project to members of national aquaculture research institutions and representatives from government and industry enterprises. The information presented was received positively with numerous suggestions offered with regard to the direction future research could take. The major problems requiring attention are those pertinent to the selection of target copepod species, their isolation and maintenance in culture, the low density of copepod cultures reported to date, identification of efficient food sources and harvesting techniques. During the next three years I hope to address these aspects in view of achieving the final goal identifying an alternative or supplementary LFO for marine fish larvae.

SMUROV, A.
Department of Invertebrate Zoology
Biological Faculty
Moscow State University
MOSCOW 119899
Russia

In 1966 I became a student, in 1971 postgraduate, in 1975 junior research scientist, in 1980 senior instructor, and in 1986 associate professor (docent) of the Moscow State University, Biological Department, Chair of Invertebrate Zoology.

Dissertation for the degree of Candidate of Biological Sciences was defended at Moscow State University in 1976. The title was: „Some statistical methods in the study of spatial distribution of organisms“. I am the author of one book and about 40 scientific papers. Some of the papers concerning a spatial population structure were translated abroad.

I have participated in many expeditions to different regions. In 1980 I was in charge of the expedition to the tropical areas of the Indian Ocean, and in 1990 I was a member of an expedition to Vietnam. In this prolonged expeditions coral reef communities were investigated. I am a member of the Commission on Natural Systems Ecology of the State Committee of Education and a scientific secretary of the Soviet-Italian inter-university ecological commission.

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Study of Copepoda Parasitica of the Black Sea fishes

L. Tkachuk
Institute of Biology of the Southern Seas, 2, Nakchimov av., 335011, Sevastopol, Ukraine

According to the literature the study of copepod parasitic fauna of the Black Sea fishes began around the middle of the XIXth century. These were works by G. Ratke (1837), V. Czernyavsky (1868), V. Ulyanina (1872), A. Markevicha (1932, 1934, 1940, 1952, 1956), S. Osmanova (1940), T. Pogoreltsceva (1952, 1964) and other brief reports. The most generalized information on copepod parasitic fauna can be found in the „Determinator of parasitic vertebrates of the Black and Azov Seas“ (1975), it listed 29 species. The researches of copepod parasitic fauna of the Black and Azov Seas, started by us in 1990, were a great surprise to us, as we found only two species of parasitic copepods on 827 fish specimens, referrring to eleven species: *Caligus hyalinus* Czerniavsky, 1868 and *Dichelesthium oblongum* (Abildgaard, 1794). We have done a detailed study on the selected material and a mathematical processing of morphological data on *C. hyalinus* and confirmed its independence (Tkachuk, 1991). Earlier *C. hyalinus* was considered a synonym or subspecies of *C. centrodonti* Baird, 1850 (Determinator, 1975).

Now we continue this research. It is stipulated with an intensifying influence of an anthropogenic factor on the quantitative and qualitative structure of the Black Sea copepod parasitic fauna. In perspective we wish to do fauna revision, to determine a structure of the species being potentially dangerous for mariculture objects, to compose atlas-textbooks on the Black Sea copepod parasites under new ecological conditions.

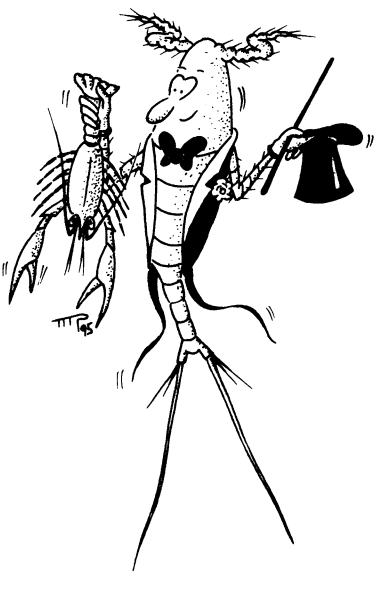
The author of this research is the senior scientific worker of the Institute of Biology of Southern Seas, Lidiya Tkachuk. I am 48, was born and grown up on the Azov Sea coast, so the sea has always been a part of my life. I have got my higher education in Moscow, finished my postgraduate study in Sevastopol and defended my thesis „Helminthofauna of the main martetable fishes of the southwestern part of the Indian Ocean" in 1980 in Moscow. I have taken the scientific degree of „Candidate of biological sciencies". Twice I took part in long scientific cruises in the Indian Ocean. I have 15 years of scientific work and wrote 53 scientific articles in the area of marine parasitology.

ALEKSEEV, V. Prof. Dr.
Zoological Institute of
Russian Academy of Sciences
Universitetskaja nab., 1
199034 ST. PETERSBURG
Russia
e-mail: AVR @ ZISP.SPB.SU

BERSANO, J.G.
Lab. de Zooplancton
Depto. de Oceanografia
Fundacao Universidade do Rio Grande
Cx. Postal 474
RIO GRANDE - R.S. /CEP 96.201-900
Brasil
e-mail: posJBF @ brfurg.Bitnet

CHULLARSON, S.
Department of Biology
Faculty of Science
Ramkhamhaeng University
Bangkapi
BANGKOG 10240
Thailand
e-mail:supawade @ ramL.ru.ac.th

KARAYTUG, S.
The Natural History Museum



Department of Zoology
Cromwell Road
LONDON SW7 SB0
Great Britain

KIM, J.
Department of Molecular Biology
Seoul National University
SEOUL 151-742
South Korea
e-mail: jiheekim @ powerl.snu.ac.kr

MHAISAN, F.T. Dr.
Department of Biology
College of Education
(IBN Al-Hattham)
University of Baghdad
BAGHDAD
Iraq
Tel: Baghdad 4226001 Ext. 130

MINKINA, N.I.
A.O. Kovalewsky Institute of Biology
of the Southern Seas
of Ukrainian Academy of Science (IBSS)
2 Nakimov Ave.
SEVASTOPOL 335011, Crimea
Ukraine
e-mail: /I-G/G-VALENTIN/S-SHAIDA/
-O-CML/ADMD-SOVMAIL/C-SU
SPRINT.com

MIRABDULLAEV, I.M.
Institute of Zoology
700095 TASHKENT
Uzbekistan

SHIMANAGA, M.
Ocean Research Institute
University of Tokyo
1-15-1, Minamidai
Nakano-ku
TOKYO 164
Japan
e-mail: motohiro @ ori-u-tokyo.ac.jp

SOH, H.Y.
Fisheries Laboratory
Hiroshima University

1294 Takehara-cho
Takehara
HIROSHIMA 725
Japan

SONG, S.J.
Department of Biology
College of Natural Sciences
Taegu University
KYUNGBOOK 713-714
South Korea

TKACHUK, L. Dr.
Institute of Biology of Southern Seas
2, Nakhimov Ave.
335011 SEVASTOPOL
Ukraine

CHANGE OF ADDRESS

FAVA, G. Prof.
Università di Padova
Dipartimento di Biologia
(Sez. Genetica)
Via Loredan 10
I-30131 PADOVA
Italy

ITOH, H.
Suidosya Co., Ltd.
2-30-8 Kamiasao Asao
KAWASAKI 215
Japan

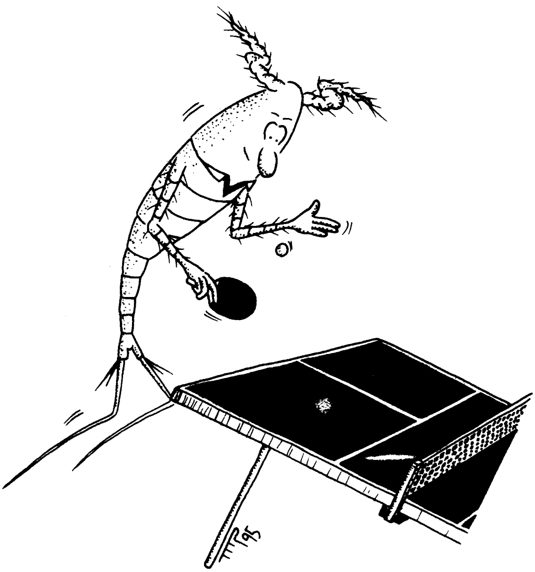
JONES, J.B. Dr.
Animal Health Lab
3 Baron-Hay Court
SOUTH-PERTH
Western Australia
FAX 0061-9-474-1881

SAITO, N.
Suido-sha Co. Ltd.
30-8 Kamiasou, 2-chome
Asou-ku
KAWASAKI 215
Japan

UEDA, H. Dr.
Nakajima Marine Biological Station
Ehime University
Nakajima-cho, Onsen-gun
EHIME 791-45
Japan

e-MAIL ADDRESSES

Jeff Cordell CORDELL@FISH.WASHINGTON.EDU
G. Gardner GGARDNER@KEAN.UCS.CA
G. Schriever SCHRIEVER@BIOLAB.COM



SIXTH INTERNATIONAL CONFERENCE ON COPEPODA

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Please return to:

Dr. Horst Kurt Schminke
Universität Oldenburg
Arbeitsgruppe Zoomorphologie, FB 7
D-26111 Oldenburg, Germany