PSAMMONALIA

Newsletter of the International Association of Meiobenthologists

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Newsletter of the International Association of Meiobenthologists

editor : RICHARD WARWICK
production editor : Mel Austen

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"This newsletter is not deemed to be a valid publication for formal taxonomic purposes"

EDITORIAL

Included with this issue are the IAM Constitution and the current list of members names and addresses. Membership is still healthy, with 280 subscribers from 36 countries. Psammonalia is arguably the longest running newsletter of its kind, and next November sees the 25th anniversary of the first issue, when we hope to produce a special commemorative edition. Financially we are maintaining an even keel, although postage by air mail is proving expensive: members from far–flung outposts such as the Antipodes will note that the postage of four issues costs us more than their annual subscription, so they are getting very good value!

I was delighted to hear from Olaf Giere that things in his laboratory are not looking as "pessimistic" as I made out in my first Editorial. He has recently got financial support for work on "sulphide fauna" which includes, as meiobenthologists know, quite a bit of meiofauna work. He suggests that maybe this "success" is more because of the rather new field of sulphide studies than of meiofauna, but nevertheless it sounds encouraging. Moreover, he says his university students have an increasing enthusiasm for meiofauna studies, and he has more graduate students than ever.

This time I would like to return to a topic which I touched on briefly in that first Editorial, that is the application of meiofauna to pollution effects monitoring programmes. This is partly prompted by a letter from Gunter Arlt about the problems of convincing statutory bodies that meiofauna are useful in the routine pollution monitoring context, and partly by recent signs that these statutory bodies, within the UK at least, do appear to be starting to listen to our arguments.

Techniques for determining the biological effects of pollutants are now being developed and tested for all levels of biological organisation from the sub–cellular, through whole organism physiology to the community. Biochemical methods, usually performed on tissue homogenates, mainly involve measuring the level of induction (i.e. stimulation) of enzymes associated specifically with the detoxification or excretion of pollutants such as heavy metals or organic compounds. These methods build on our wide body of knowledge of mammalian enzyme systems, which in the marine situation seem to be translatable to fish and some benthic invertebrates such as mussels and crabs. Histological methods are able to detect cell damage microscopically in thin sections of tissues. Physiological methods usually measure perturbations of the energy balance equation, one particularly successful method being the estimation of "scope for growth" by difference from laboratory measurements of consumption, respiration faeces production and excretion. I think we have to admit that we are not ready to apply any of these techniques to meiofauna, and that large organisms are much more convenient to use in these contexts.

It is at the community level where meiofauna come into their own, and it is community–level monitoring that is currently the most prevalent, well validated and practicable, and which is becoming incorporated into pollution–monitoring legislation. A wide variety of methods for analysing community data is now available, ranging from univariate measures such as diversity indices, graphical representations of relative species abundances such as dominance curves, and multivariate methods of classification and ordination. There is much current debate as to which statistical methods are the most appropriate, but surprisingly little consideration is being given to the question of which components of the biota are the most appropriate and practical to study. The soft–bottom macrobenthos have traditionally had a strong monopoly, despite the inherent advantages of the meiobenthos. These advantages are perhaps worth reiterating here.

Because of their small size and high density in marine sediments, quantitative sampling of the meiobenthos is easy from small ships, open boats etc. The small volume of the samples means that they can easily be transported to the laboratory, and need not be processed on board ship. Their generation times are usually measured in months rather than years, so that their potential response time to pollution events is much faster than that of the macrobenthos. Because they have direct benthic rather than planktonic development, unperturbed meiobenthic communities are inherently more stable than macrobenthic ones, providing a more constant baseline against which man–induced changes can be assessed. This entirely benthic life–cycle also means that they cannot avoid pollution effects during the critical larval stages, and thus they are potentially more sensitive to pollution affects. Also, the meiobenthos remain species rich in natural situations where there may be few macrobenthic species (e.g. estuaries or exposed beaches), so that the information content of meiobenthic community data is high.

The meiobenthos have not been widely considered as suitable candidates for pollution monitoring because of the perceived disadvantage that their taxonomy is difficult. I remember Bruce Coull once telling me that he thought meiofauna were inappropriate for use in pollution studies because of this, and at that time I think he was right. Identification of almost all the meiobenthic taxa to species level presents difficulties even in Europe and North America, and in many parts of the world the fauna is almost completely unknown. How-

ever, two factors mitigate to a considerable degree against this problem:

i. The robustness of community analyses to the use of taxonomic levels higher than species. Many studies have now shown that community responses to pollution are evident even when the fauna is analysed to higher taxonomic levels such as genus, family or even phylum, and that surprisingly little information is lost by this.

ii. The cosmopolitan nature of most meiobenthic *genera*, and the increasing availability of easily used keys to genera. For example, the pictorial keys to marine nematodes that Howard Platt & I produced have now been used successfully in many non–European countries by people with little or no previous experience with nematodes.

The concept of pollution "indicator species" does seem to be as equally applicable to meiobenthos as macrobenthos. Our equivalent of *Capitella capitata* as an indicator of organic enrichment might be *Tisbe* spp. among the copepods, or large oncholaimids among the nematodes. Indeed, Tom Bongers and his colleagues at the Agricultural University of Wageningen are taking this concept further and developing a "maturity index" for whole nematode assemblages, both terrestrial and marine, in which every genus present in the sample is scored on a scale of 1 to 5 based on an empirical assessment of whether they are colonisers (what we used to call *r*–strategists) or persisters (K–strategists).

The arguments in favour of meiofauna now begin to seem very convincing. I am pleased to say that several statutory bodies responsible for the monitoring of pollution effects in the UK are beginning to listen to these arguments, and have commissioned the Plymouth Marine Laboratory to explore the possibilities further and develop appropriate protocols. The Ministry of Agriculture, Fisheries and Food (MAFF) are funding a programme to compare meiobenthic community responses to different classes of pollutants (organic enrichment, toxic chemicals etc.) in UK coastal waters, the UK Department of the Environment (DOE), together with the newly formed National Rivers Authority (NRA) are funding an experimental programme using laboratory microcosms to underpin and validate the MAFF–funded field programme. We will probably be looking for a qualified person to help with the field programme next April. If anybody is interested in working in Plymouth for two or three years perhaps they would like to write to me, informally, and I will send them more details of the project. **Richard Warwick**

NEW MEMBERS

Dorte Westphalen
Bermuda Natural History Museum
P.O. Box Fl 145, Flatts,
Smith's 3, BERMUDA.

I am a marine biologist from the University of Hamburg, West Germany. In April 1990 I finished my Masters thesis entitled "Recent stromatolites from Bermuda and their meiofauna". I am presently continuing my studies on stromatolites (unconsolidated laminated nodules composed of sediment particles and cyanobacteria) and their meiofauna at the Bermuda Biological Station and the Bermuda Natural History Museum. The subject of my PhD is "Genesis and structure of recent stromatolites from Bermuda and their significance as a habitat for meiofauna". I am registered at the University of Hamburg under the guidance of Dr Olav Giere and advised by Dr Wolfgang Sterrer here in Bermuda. I am especially interested in the active migration of the meiofauna from the surrounding sediment into the stromatolites and through passive dispersal via sediment particles onto the surface of the stromatolites. The resulting zonation of the organisms will be investigated and correlated with abiotic and biotic parameters. The distribution of the sulfide system inhabitants (especially Gnathostomulida and Stilbonematinae) is the focal point of my research.

Nicola Reiff
Biologische Staatssammlung Munchen
Munchhausenstr. 21
D–8000 Munchen 60
GERMANY

For about a year and a half I have been studying for my PhD on chironomid pupal exuviae as biological indicators of the trophic state in the littoral of some Bavarian lakes, and work with six colleagues who are also studying trophy–indicative biocoenoses. My professor is the Director of the "Zoologische Staatssammlung Munchen" (ZSM) who kindly allows us to work in its premises. As I have always been very interested in the marine "lower invertebrates", especially the "worms", I intend to specialize in marine nematodes as well as chironomids and hope eventually to study changes in the nematode fauna of the Mediterranean in relation to domestic pollution.

CHANGE OF ADDRESS

See appended address list for the new addresses of:–
Leon M. Cammen
Jeffrey B. Frithsen
R. Deedee Kathman
Alain Dinet

NEWS FROM MEMBERS

Alain Dinet writes:–

After spending six years in L'Houmeau participating in the creation of a new laboratory and working on oyster pond and salt–marsh ecosystems, I got the opportunity to switch back to deep–sea research on a programme dealing with fluxes at continental margins (ECOMARGE = part of France–JGOFS) with a personal interest in the study of benthic processes using manned submersibles.

Gunter Arlt writes:–

For two weeks during the summer I attended a marine biology course run by Kiel University (Wolfram Noodt) in Kristineberg, Sweden. In October I organized the Meiofauna Working Group meeting of the Baltic Marine Biologists on the island of Hiddensee where the future of meiofauna research in the Baltic was discussed. In order to keep meiofauna research alive in this region it will probably have to be in the context of studies involving the whole benthic fauna.

David G. Frey writes:–

With reference to the note on IRWIN LOOPS on page 6 of Psammonalia No. 89. There is no shortage of such loops except for the name. We make them easily by electrolyzing tungsten wire to a tapered point in a 6–volt circuit, then with fine forceps bending the thin wire into a loop of the desired size. Loops can be made small enough to pick up objects 50µm in diameter or even smaller. Our smallest loops are for immature instars of the smallest chydorid anomopods, which are about 0.1 – 0.15mm long. A microscope transformer provides the 6– volt circuit. One lead is bare wire, the other an alligator clamp for holding a piece of tungsten wire about 2cm long. The electrolyte is roughly 20% KOH because of its extensive use in paleolimnology, but any electrolyte will serve as well. Only about a minute or two is required to make a point, depending on the strength of the electolyte, and tungsten is used because it is not reactive to acids, alkalis or ordinary laboratory solvents and it can be readily cleaned in a flame.

EDITORS NOTE. The technique of sharpening tungsten wire (of approx. 0.25mm diameter) by electrolysis in KOH is the one used by most meiofauna copepodologists for making dissecting needles.

Olav Giere writes:–

"After having read at Hamburg University a lecture on meiobenthology for some years now, I will use a sabbatical next year to write it down in the form of a textbook (in English), due to be published by Springer Verlag, Berlin, New York.

This book will not be so much method–orientated as is our 'Introduction to the study of meiobenthos' and, thus, will rather supplement it than compete with it. I will try to cover all relevant facets both in the systematic and ecological parts and also deal with aspects of meiofauna for applied studies the value of which was pointed out so rightly in Richard Warwick's first editorial. Considerations on distribution processes and on specialities from selected habitats will be reported as well. The main problem is to cover the relevant literature at the most recent level possible."

Yoshihisa Shirayama writes:–

The Japanese Association of Benthology was founded on November 10th, 1990 and has now become a formal professional association. It has more than 400 members. The association will publish a journal 'Benthos Research' twice a year. The journal will accept papers from members relating to any aspects of benthology e.g. ecology, taxonomy, phylogeny, paleontology.

For information about membership of the association write to:
The Japanese Association of Benthology
c/o Amakusa Marine Laboratory of Kyushu University
Tomioka, Reihoku–cho, Amakusa,
Kumamoto 863–25, JAPAN.

For information about the journal, Benthos Research, write to:
Dr Isao Hayashi
Editor in chief of Benthos Research
Department of Fisheries
Faculty of Agriculture
Kyoto University
Sakyoku, Kyoto 606, JAPAN.

OBITUARY

It is with great sorrow that we record the sudden death, at the age of 45, of Dr Tatsunori Itô, on 8th April 1990 at Shirahama where the Seto Marine Biological Laboratory of the University of Kyoto is situated. His funeral was held at Sapporo on 13th May 1990.

Dr Itô was born at Sapporo, Hokkaido on 26th January 1945, at the close of the Second World War, and graduated in zoology at the Faculty of Science of Hokkaido University in March 1967. His early postgraduate work was a study of the interstitial harpacticoid copepod fauna of the beach at Ishikari Bay north of Sapporo. In 1969 he was appointed assistant professor at Hokkaido University and he continued his work on the

interstitial harpacticoids of beaches in the Sea of Japan. In 1975, he obtained his Doctor of Science at Hokkaido University and the title of his thesis was "Biological studies on the family Harpacticidae Sars from Japan, with reference to the phylogeny of the subfamily Harpacticellinae Lang (Copepoda, Harpacticoida)". During 1976 and 1977 he spent time at the Naples Zoological Station where he studied the interstitial harpacticoids of Italy. Early in 1979 he carried out the faunistic survey of the harpacticoids in the deep sea around the Philippines and Taiwan

In 1981 Dr Itô moved to Kyoto University, Seto Marine Biological Laboratory where he was appointed assistant professor. Immediately on tranferring to this laboratory he attended the First International Conference on Copepoda held in Amsterdam where he gave a paper on the importance of developmental stages in the study of phylogeny. This, and the study of the cypris Y larva found in Tanabe Bay near the laboratory increasingly occupied this thoughts and research in subsequent years. In 1987 he visited Drs. Ho, Shram and Newman in America where he collected his beloved Harpacticidae and had long discussions about the Remipedia. In 1988, along with Dr Morino and Dr Kikuchi he visited China to study the meiobenthos of the Yangtze River and in the same year was visited at the Seto Marine Laboratory by Dr Grygier with whom he wrote a paper on the larval development of Ascothoracida.

At the time of his death Dr.Itô was one of the worlds most respected copepodologists in the field of phylogenetic taxonomy and during his life described 59 new species, wrote 58 scientific papers and a book (in Japanese) entitled "Organisms in sand intertices". This, in itself, is a fitting memorial to a man who will be remembered with respect and affection by all who knew him.

Yoshiaki Kikuchi.

REPORTS OF MEETINGS

FOURTH INTERNATIONAL CONFERENCE ON COPEPODA, JAPAN

The conference was attended by 116 participants from 17 countries. 63 oral contributions were presented in 5 symposia and 5 contributed paper sessions. 22 presentations were given as posters. The meeting took place at Karuizawa Seminar House of Nihon University in the refreshing mountain forests west of Tokyo between 16–20 September 1990. The Seminar House provided us with the unique opportunity to combine, under one roof, conference lectures and poster demonstrations with discussion, sleeping, eating, celebrating and bathing japanese style.

The major emphasis of the meeting was on planktonic copepods, especially their distribution in coastal waters, feeding and behaviour in low food environments, and role in fisheries. Another major topic was symbiotic copepods, especially associates and parasites of invertebrates; their systematics, zoogeography and life histories. Unfortunately marine and freshwater meiobenthologists formed a rather small party and only three members of IAM participated. However it was encouraging to learn that a few young Japnaese copepodologists intend to follow in the late Dr Itô's footsteps and start research on deep–sea meiofauna communities and sea–ice meiofauna ecology. The meiofaunal Harpacticoida were dealt with in 3 contributed paper sessions on phylogeny, freshwater and marine benthic copepods.

The usefulness of postembryonic characters for phylogenetic considerations in Harpacticoida was shown by H–U DAHMS and two papers by R.HUYS & G. BOXSHALL presented a new phylogeny of the Copepoda covering all ten orders. Refuting the Gymnoplea as a paraphyletic taxon, they divided the Copepoda into two distinct infraclasses, the most primitive Progymnoplea (= Platycopioida) and the Neocopepoda (= remaining orders). The adaptive significance of copepod naupliar morphology and behaviour was the subject of F. KOGA's contribution and how remarkably body form, appendages and behaviour may change during metamorphosis from nauplius to copepodite within the Harpacticoida was shown by H–U DAHMS. The significance of furcal sexual dimorphism in the Parastencarididae, together with examples from other harpacticoid families, was discussed by H.K. SCHMINKE.

Harpacticoids were the subject of 4 posters. T. ISHIDA, in his contribution on "Variation in the species of freshwater harpacticoid copepods in Japan, I, *Canthocamptus mirabilis* Sterba", showed marked morphological differences between two populations of this species in west and east Hokkaido which he suggests are in the process of speciation. Results on the "Zonation of meiofaunal copepods in the Pauatahanui Inlet, New Zealand" were presented by N.IWASAKI & J.B.J. WELLS who showed that the distribution patterns were affected by environmental factors. I–H KIMS poster described both sexes of a new harpacticoid *Namakosiramia koreensis* from a Korean holothurian, the first time that the male has been described in this genus. G. SHRIEVER's poster posed the question "Can benthic Copepoda Harpacticoida be used as indicator organisms in the German deep sea impact study

DISCOL?". Preliminary results demonstrate that this is possible in a deep sea recolonization study investigating the impact of manganese nodule mining. Finally, the first polar non–vertebrate metazoan to have been reared throughout its lifecycle, a harpacticoid from Antarctic sea–ice, was demonstrated to be a genuine polar r–strategist in the poster of M. BERGMANS, H–U DAHMS & H.K. SCHMINKE.

Although meiobenthic topics made up only a small proportion of the overall presentations, it was possible for meiobenthologists to learn a lot from the other copepod groups in disciplines such as morphology (functional, internal, external), growth, phylogeny, zoogeography, reception and communication, predator/prey and host/parasite interactions and life–histories. For example, symbiotic copepods, expecially those of benthic invertebrates, may be closely related to free–living substrate bound taxa and experience of both groups is necessary in order to elucidate their phylogenetic relationships. Similarly studies of near bottom planktonic copepods show that many of these are directly linked to the substrate through features of their life habits and consequently exhibit adaptations similar to epibenthic harpacticoids and cyclopoids. Conversly, as it is known that many meiofauna taxa become actively or passively suspended in the lower water column, future investigations of the the hyperbenthos and hypoplankton should be feasible in joint efforts with the same type of elaborate sampling gear.

Hans Dahms.

POWER PLAY

ACT 1

IN THE PUB

"Be a great pal and gimme another beer, Vinz!"

"Sure, Dave. One beer coming up."

"And how is life in your stuffy laboratory?"

"Here you are. Well, I wouldn't call it stuffy, after all....."

"Oh, come on, give me a break! You are working in the taxonomy lab. aren't you? If that isn't stuffy, then what is?"

"I don't know, the air conditioning works well and ....."

"In the end, I suppose you feel like a museum specimen yourself! Hahahahahahaha"

"err....."

"Seriously now, you don't really think for a minute that you are actually doing science, do you?"

"Actually, I do"

"For Christ's sake, man. Any amateur can do what you are doing! No, take some advice from a friend: go and do some real science, something in which you have to use your brains. Switch to ecology!"

"Dave, do you actually know what you are talking about? You sure you know what taxonomy really is all about?"

"Hell, of course I know what I am talking about! I am doing it myself all the time. Haven't you seen me sitting for hours at a time identifying animals?"

* * * *

ACT 2

AT A CONFERENCE

"Hello, old bugger!"

"Oh, hi there, Dick"

"Long time, niet gezien, eh!"

"Yeah, it must have been over a year now since we ...."

"Did you hear the talk of that last sucker?!"

"Well, yes, I was there. But I don't think it was all that bad"

"You bet it wasn't! Such talks should be forbidden."

"I thought he made some very valuable contributions to the taxonomy of ...."

"Exactly, taxonomy, that's what it was. Now don't get me wrong: taxonomy is necessary, I suppose, but there is no valid reason for letting it ruin a potentially very interesting symposium!"

* * * *

ACT 3

IN CORRESPONDENCE

Dear John

I hereby include a project proposal for you to consider. As you can see, once again one of those stamp collectors is trying to squeeze money out of our fund. Taxonomy indeed! From where do they keep getting the nerve to ask us to fund their bullshit? Can you imagine: some senile weirdo discovers an old and smelly cave, and claims it is of interest to the United States of America to give him money, so that he can start digging around and make drawings of slimey slugs and rotten shrimps that you can't even see. Needless to say I want you to shoot it down in very explicit language. I am counting on you!

By the way, Friday is still on. Jenny is not feeling well, but I think we can go very easily without her, if you catch my meaning, old boy!!!

Yours

Marc

* * * *

Dear Sir

re: your project proposal

We regret to inform you that, after due consideration of the above project, we cannot retain it for funding by our

organisation. We stress that this decision is largely a result of the enormous number of proposals submitted to our Fund each year, and does not necessarily imply criticism of your research. Referee reports are included.
Yours sincerely
Dr Marc Drol
Professor of Ecology
* * * *

ACT 4

AT HOME

"Hello? Dr Pome from Australia here. Is this Dr Deevy, please?"
"Speaking"
"Good Morning Dr"
"Not really!"
"I beg your pardon?"
"I said, not really. Do you realize it's 3am right now?"
"Oh dear, I miscalculated the time difference again. I am so sorry! Did I wake you up?"
"Have a guess!"
"I'm terribly sorry"
"Forget it. By the way, you don't sound at all Australian!"
"Certainly not, I'm British!"
"Great. What can I do for you, Dr Pome?"
"Well, Dr Deevey, I am working on the ecology of sublittoral meiobenthos in Jarvis Bay. Now, as you know, taxonomy of these groups is very difficult indeed and as an ecologist, I don't really have time to try and identify them all myself. The bloody harpacticoids are giving us real problems, so I was wondering if you could perhaps have a look ....."
"Yeah, I suppose so. Well, I suggest you send me some of the specimens and I will have a look at them as soon as I can."
"Actually, Dr Deevey, I already took the liberty of sending some material to you and it should arrive any moment"
"Did you now?! Well, I suppose that's all right. Saves us both some time."
"But I wanted to make sure that you knew about it in advance. After all, you might not know what is happening if you get word that a parcel of 100kg is waiting for you at the airport. Anyway, thank you very much indeed Dr Deevey. Bye!"
"Hey, wait! What do you mean? 100kg? Hello? Hello? Shit!"
* * * *

ACT 5

AT ANOTHER CONFERENCE

"Hi"
"Hi"
"Good talk that, Hum?"
"Yeah, not too bad"
"I was impressed by the guy's knowledge of his group and evolutionary processes. He really mastered his stuff!"
"Sure, he was OK. But don't exaggerate. After all, it was only taxonomy"
"Yes, of course, you're right. I am sorry. I forgot. I am really sorry"
"Forget it, nobody's perfect. So, what are you working on?"
"Oh, well, eh .... I work on African animals"
"Really? Great, so am I! We should talk then. What group are you working on?"
"Oh, small creepy crawlies. Nothing special really"
"Well, my group is not exactly of a spectacular size either. What are doing with them?"
"Well .... actually ..... I just try to get their, err... taxonomy sorted out. Err.., sort of....."
"You mean you are a taxonomist?!?"
"Ssssh! Not so loud!"
"You mean you are actually a taxonomist and you dare admit it in public?"
"Well, I.. err.... Well, yes! There is nothing wrong with that is there? After all, taxonomy is a perfectly valid and acceptable science, isn't it?"
"I suppose so. If you look at it that way. Then again, you are still young, so perhaps ....."
"So I am forgiven?"
"Yeah, sure"
"Thanks. So what is your field?"
"err....."
"Well?"
"You really want to know?"
"Of course"
"Well, all right then. I work on the taxonomy of African ostracods. There!"
"You mean you are also ....."
"SHHHHH!!!"
".... a taxonomist? And just a few minutes ago, you .....!"
" I know, I know! But you can't be too prudent around here. I don't want the whole symposium to know!"
"No, I suppose not. What's your name, anyway?"
"Martens"
"You're the Martens working on African ostracods?"
"That's right. You heard of me?"
"You bet! You're the bastard who synonymized my perfectly valid genus! Now let me tell you exactly what I think of you, you scum ....."
END

Koen Martens (October 1990)

FUTURE SCIENTIFIC MEETINGS

FIFTH INTERNATIONAL SYMPOSIUM ON AQUATIC OLIGOCHAETE BIOLOGY

This will be held at Tallin, Estonia, from September 15–21, 1991. The organiser is Dr T. Timm. Registration details are available through :

Henn Timm
Oligochaete Symposium
Institute of Zoology and Botany
V Anemuise 21
SU–202400 TARTU
ESTONIA
telefax: SU 01434 31466

6TH SYMPOSIUM
DEEP–SEA BIOLOGY
COPENHAGEN, DENMARK 30 JUNE–5 JULY 1991

General themes :

1. Deep sea biota and community structure
2. Seamount biology
3. Dispersal of deep–sea faunas (vents, cold seeps, wood, etc.)
4. Behaviour
5. Deep–sea microbiology
6. Major projects (already in progress for some time)

organizers: Jørgen B. Kirkegaard, Reinhardt M. Kristensen, Ole Tendal, Torben Wolff

For details, see "Deep–Sea Newsletter" No.17, Sept. 1990 or contact

6th Deep–Sea Biology Symposium
Zoological Museum, Universitetsparken 15
DK 2100 Copenhagen Ø, Denmark

CONSTITUTION OF THE INTERNATIONAL ASSOCIATION OF MEIOBENTHOLOGISTS

Article 1. *Name*

The name of the Association shall be the International Association of Meiobenthologists.

Article 2. *Objectives*

The objectives of the Association shall be the general advancement and promotion of the study of meiobenthos in all its aspects.

Article 3. *Capital and Income*

The capital and income of the Association shall be devoted solely to the furtherance of its objectives as stated in Article 2, and no portion thereof shall be paid to any officer or member of the Association except in respect of the repayment of any out–of–pocket expenses properly incurred, or reasonable and proper remuneration in return for services rendered to the Association.

Article 4. *Dissolution*

In the event of the Association being dissolved for any reason, the surplus funds remaining after payment of debts and liabilities shall not be distributed among members, but shall be paid or transferred to some other institution or institutions, approved by the Council, having objectives similar to those of the Association. Any outstanding liabilities of the Association at dissolution shall be shared equally among the membership.

Article 5. *Dues*

Annual dues will be charged to cover expenses of the Association and will be set by the bylaws.

Article 6. *Officers and Elections*

The elective officers shall be a Chairperson, a Treasurer, and up to four additional members comprising the Executive Committee. The Chairperson and Treasurer shall be elected every three years and the former shall then automatically become a member of the Executive Committee during the three years following his/her tenure as Chairperson. Previous Chairpersons of the Association shall thereafter continue on as ex–officio members of the Executive Committee.

The remaining Executive Committee members shall be elected every six years and shall hold office for six years. The expiration date of the terms of office of these Executive Committee members shall be arranged so that only two members of the Committee will be elected in any triennium.

All newly elected Officers shall assume their duties at the beginning of the next calendar year following their election.

Article 7. *Council*

The Council shall consist of the Executive Committee and the Board of Correspondents.

Article 8a. *Chairperson*

The Chairperson shall act as Editor of the Newsletter and in this capacity shall be responsible for the production of the Newsletter of the Association.

Article 8b. *Treasurer*

The Treasurer shall keep the financial records of the Association and shall present an annual statement of the accounts at the end of each calendar year, to be included in the first issue of the Newsletter of the Association of the succeeding year.

Article 9. *Executive Committee*

The Executive Committee shall be responsible for the business affairs of the Association. It shall assist the Chairperson in the production of the Newsletter of the Association and it shall perform such other duties as may be assigned by the Chairperson.

Article 10. *Board of Correspondents*

The Board of Correspondents shall consist of up to twelve members of the Association and shall be appointed by the Chairperson with the advice and consent of the Executive Committee. The Board of Correspondents shall assist the Chairperson and other members of the Executive Committee in gathering literature and news items for the Newsletter of the Association and shall perform such other duties as may be assigned by the Chairperson. The Board of Correspondents shall retire automatically with the retiring Chairperson.

Article 11. *Nominations*

Nominations for any office may be made in writing by any two members of the Association not later than April 1st in an election year. The Council must certify that each candidate is willing to stand for office and serve if elected. The Council shall give due consideration to equitable representation of the geographical

distribution of the membership of the Association. Additional nominations for officers may be made by the Council.

Article 12. *Elections*

Should elections of Officers be necessary, these will be held by mail ballot. The Chairperson in his/her capacity as Editor, shall mail ballots to each member in the May issue of the newsletter in an election year. A brief biographical sketch of each candidate shall accompany the ballots. The Chairperson shall count and record the votes received by November 1st and include the results in the November issue of the newsletter. The candidate or candidates receiving the greatest number of votes shall be elected to office. The Chairperson shall notify the candidates for office of the vote by mail. In the event that a vote results in a tie, the members of the Council shall vote by mail to resolve the tie. Should a tie still result the Chairperson shall have the deciding vote.

Article 13. *Finance*

The expenses of the Association shall be paid from the funds of the Association within the limits in the budget of the Association. The Chairperson shall authorize all payments.

Article 14. *Bylaws*

Bylaws to augment this Constitution may specify details and less fundamental provisions, but shall not alter the intended meaning of this Constitution, or circumvent its provisions.

Additional bylaws may be proposed in writing by any two members in good standing and shall be adopted if a majority of the members are in its favour as shown by a mail ballot.

Bylaws may be amended upon recommendation by the Council, by a majority vote of members of the Association in good standing in a mail ballot.

Article 15. *Amendments*

This Constitution can be amended only by a two–thirds majority of those members in good standing voting in a mail ballot. Amendments may be proposed by any member in writing to the Chairperson who shall submit such proposal to the Council for consideration and vote. Any amendment that five members of the Council deem worthy of consideration shall be submitted to the members of the Association for vote.

Proposed constitutional amendments must be included in a newsletter 6 months in advance of balloting in order to receive and include in the balloting issue any comments received during this interim. The close of receipts for ballots shall be the first day of the sixth month following the balloting issue and the results shall be included in that month's newsletter.

Article 16. *Enabling Article*

This Constitution and its accompanying bylaws shall be adopted in full force and effect from January 1st 1971.

BYLAWS OF THE ASSOCIATION

Bylaw 1. *Annual Dues*

Annual dues for Regular Members shall be determined by the Council at a rate consistent with the currency under which the treasury is operating at a given time. The rate for Sustaining Members and the rate for Patron Members shall be five times that of Regular Members. Dues shall be payable in advance before January 1st to the Association. Payment of annual dues shall be made in International Money Orders or form of payment not subject on conversion loss to the Association in the currency under which the treasury is operating at a given time. Current dues plus one additional year's dues may be paid at one time. The Chairperson may send PSAMMONALIA via air mail to any member who requests this service and who pays the additional postal expenses.

Bylaw 2. *Membership Rights*

No membership rights shall be continued longer than six months from date notifying arrears.

Bylaw 3. *Newsletter*

The Newsletter of the Association shall be called "PSAMMONALIA". Its purpose shall be to promote the objectives of the Association as defined in Article 2.

Bylaw 4. *Conferences*

Conferences of the Association shall be held triennially, if practicable. The purpose of such conferences shall be to promote the objectives of the Association as defined in Article 2. Business of the Association may be conducted at such conferences, including nomination and election of officers, adoption of bylaws, and amendment of the Constitution or its bylaws, in accordance with the articles of the Constitution, but with a vote of the members in good standing substituting for a mail ballot.

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