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Editorial

They say that "life began in the sea" and that "when it began, the world must have been anoxic and sulphidic". The above convictions are supported by strong scientific evidence, such as the discovery of 1.43 billion year old fossils of deep-sea microbes at hydrothermal vents[1]. Indeed, the existence of life in such extreme conditions has stimulated an increasing research effort on the diversity, ecology and physiology of organisms from vents and other reducing habitats. At the same time, it has also opened new avenues of research in what is regarded as one of biology's most important question — what is the origin of life on Earth? — and even further — is there life somewhere else, within or outside our solar system? These were food for thought in an interesting lecture I have recently attended entitled "Cosmic Darwinism: how universal is life on earth?". The main point of discussion during the lecture was that the occurrence of life was possible not only because of its earthly Darwinian evolution, but also due to what happened previously in the universe, from the very first moment of the Cosmos till the formation of the Galaxies and the so called earthly planets. During the follow-up discussion, biologists and physicists were strongly arguing about the possible and impossible and the limitations set by the physical laws, but eventually, all agreed that any discussion on the potential for the existence of life outside our planet should mainly be based on biochemistry. In a nutshell, everybody agreed that when searching for life outside our planet, we should not expect anything larger than an extremophile microorganism. However, I could not help of thinking that some of the strangest and most enigmatic representatives of meiofauna could be strong alternatives and, as you will read below, there are maybe good reasons for it.

In the last two issues of Psammonalia, we presented two independent reports on meiofauna from reduced chemosynthetic environments (see the ChEss report in issue p156 and Viky's Kalogeropoulou report from a similar workshop in this issue). This is not surprising considering that recent advances in technology (e.g. towed cameras, ROV's and submersibles) have allowed us to explore and determine the biogeography of deep-water chemosynthetic ecosystems at a global scale and to better understand the processes driving these ecosystems. Indeed, global studies at hydrothermal vents and other reducing environments (e.g. cold seeps, whale falls, sunken wood and other areas of low oxygen) have revealed a multitude of species adapted to utilize the chemosynthetic productivity in these habitats, as well as novel mechanisms that maintain biodiversity both at local and regional scales. Meiofaunal studies from reduced habitats had their own share during the last decade, shedding new light over the old debate on the existence or not of a "thiobios". Among other fascinating discoveries, I should mention the existence of a variety of detoxification mechanisms, the symbiosis with sulfide- or methane-oxidizing bacteria, the ability to uptake dissolved organics through the body wall or the ovoviviparous reproduction. However, there is one particular example, which, in my opinion, stands out. This is the striking discovery for the first time of multicelular animals living entirely without oxygen[2]. The fascinating animals were all members of the phylum Loricifera possessing H2- instead of the normal O2-producing mito-

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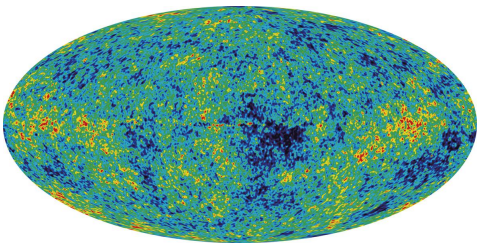
[2] Danovaro R, Dell'Anno A, Pusceddu A, Gambi C, Heiner I, Mobjerg Kristensen R (2010) The first metazoa living in permanently anoxic conditions. BMC Biology 8:30

chondria for all other known metazoans. The animals were found in L'Atalante, a 3500 m deep hypersaline anoxic basin from the central Mediterranean. Back in 2003, during a bio-technologically oriented research project (BIODEEP), my own work on sediments from L'Atalante basin[3] failed to reveal any of the loriciferans found during the above study. The reason for this failure may be due to methodological differences. Reading the paper through carefully it appears that the authors must have processed a whole box-core sample in order to collect the amount of loricifera specimens reported in the study. This is of course against one of the most advertised meiofauna advantages, that is they can be studied by using small, easily processed samples. We all know how demanding it is to process large volumes of sediments and I admit that it never occurred to me to sieve an entire box-core sample through a 20 μm mesh. This shortfall clearly shows that great discoveries can be made by simply not following instructions.

But why is this discovery important? Because it opens a whole new perspective on how life may have began on earth and, to return to the "Cosmic Darwinism" lecture above, because it may provide insights into our search for life on other planets. To phrase it differently, our small "alien" creatures seem to have a great potential in many scientific fields, not only those dealing with the remote and extreme environments found at the deepest part of our oceans, but even those fields being active outside our small planet. Thus, it is with great pleasure to see the recent effort of fellow meiobenthologists to study chemosynthetic ecosystems and I really believe that it depends upon us to expand meiobenthology into unexplored and exciting new fields!



WMAP image from NASA
377.000 years A.B.B.
When it all began!

In my previous editorial I was talking about how we could use the regulatory impact of meiofauna on bacteria to perform biodiversity and ecosystem function (BEF) studies. Little time passed before an interesting study from a microcosm experiment[4] showed that meiofauna can enhance the mineralization of organic matter, thus proving that they are important for the functioning of aquatic ecosystems. It remains to see whether we can successfully manipulate the number of species and not just their densities.

Till our next autumn issue, I wish you all the best!

by Nikos Lampadariou

Workshop on coupling between meiofaunal and microbial biodiversity and ecosystem function

Ghent University (17-18 November 2011)

Chemosynthetic ecosystems in the deep sea are characterized as highly diverse and extremely productive habitats which are mainly fuelled by chemical substances outflowing from the seabed rather than the organic material deriving from the sea surface primary production. Several adaptations are observed in the faunal organisms found in extreme habitats such as vents, cold seeps, mud volcanoes and sulphidic brine pools. Some examples of these adaptations, in an attempt to survive the extreme conditions prevailing in those environments, are specialized chemosynthetic species as well as the many symbioses and cooperation between species. Furthermore, these ecosystems are incredibly fragmented, existing and appearing in many places across the European margins. The fractured nature of these habitats raises questions regarding the extent of interconnectivity of these ecosystems and the capability of species to

[3] Lampadariou N, Hatziyanni E, Tselepides A (2003) Community structure of meiofauna and macrofauna in Mediterranean Deep-Hyper-saline Anoxic Basins. In: Briand F (ed) Mare Incognitum ? Exploring Mediterranean deep-sea biology, pp. 55-60. CIESM Workshop Monographs No 23, Monaco, Heraklion

[4] Nascimento FJA, Näslund J, Elmgren R (2012) Meiofauna enhances organic matter mineralization in soft sediment ecosystems. Limnology and Oceanography 57:338-346

detect and colonize them and hence contribute to the sustenance of the rich communities they comprise.

In an attempt to investigate the biodiversity of chemosynthetic ecosystems a workshop was organized within HERMIONE project and held in the Marine Biology Research Lab at Ghent University (17-18 November 2011). During the workshop a data integration strategy was approved in order to compile all available chemosynthetic data (available through the information system PANGAEA) regarding biodiversity across all organism size-classes of several chemosynthetic habitat types along the European margins. This effort will result in an integrated study on chemosynthetic deep-sea biodiversity along the European margins in the near future. The main objective of this synthesis project is the comparison of the biodiversity of different size classes from different chemosynthetic environments along the European margins with the Nordic margin, the Gulf of Cadiz and the Mediterranean Sea as main regions of the study.

According to this main objective, four questions were addressed and explored through the workshop:

1. What are the major scales of turnover in biodiversity? Do we observe the largest turnover at micro (within habitats), meso (between habitats), macro (between seeps or MV's from the same region) or mega scale (between regions) for different taxa/size groups/functional groups (chemo vs non chemosynthetic species)?
2. What is alpha, beta and gamma diversity for the different regions, and can we identify regional hot spots of biodiversity?
3. What is the degree of interconnectivity between different seeps at different scales? Can we identify true endemics and cosmopolitan species/taxa?
4. What is the relationship between biodiversity and seep intensity (or productivity)? Are the most productive sites the least diverse?

The attempt of compiling different datasets collected by different researchers from different groups, who usually do not follow a similar protocol, is generally a big challenge without any general agreements on the level of comparison and on the organization of the data. Thus, the next step was to discuss and decide on the level of organization of the data and the methods for quantitative analysis. The general and basic aim was to compare patterns in diversity between different size groups and taxa, among different regions and different structures or habitats. So, all faunal data were decided to be compared at four different spatial scales: microscale (between replicates within a single habitat), mesoscale (between habitats within a single seep or mud volcano), macroscale (between seeps in one region) and megascale (between regions). As chemosynthetic ecosystems are characterized by high habitat heterogeneity driven by different seep intensity, biochemistry and presence or absence of microbial mats and large organic structures, several different habitats can be identified. Thus, five habitats were decided that could fit best to most of the available sample sites, the fully oxygenated reference sites, habitats with no visible fauna, habitats with visible fauna, seep periphery and carbonate crusts. The taxonomical level of each benthic group was also determined.

This integration will provide us a unique dataset and great new insights in the biodiversity of European seeps at different spatial scales. What is more, this integrative collaboration should lead to some synthesis publications before the end of the HERMIONE project. According to the plan and the several deadlines that were set, our next meeting will be soon held in Paris (26-27 June 2012).

by Vicky Kalogeropoulou

Links for Scholarships – Internships – Job Opportunities

During our last Psammonalia editorial board meeting we thought that both our newsletter as well as the IAM web-page could serve as place to notify jobs and various other funding opportunities especially for students and young or independent researchers. Funding may include personal fellowships, international exchange, seminars and travel. If you have or are aware of such opportunities, please sent us a notification.

Below is a first list related to biodiversity and taxonomy:

- http://goo.gl/y3iMw
- http://goo.gl/NP31K
- http://goo.gl/wQJrp

- http://eol.org/info/fellows

Call for papers for MEIOFAUNA MARINA

Dear meiobenthologists, you all know **MEIOFAUNA MARINA**, the one and only scientific journal dedicated exclusively to (marine) meiofauna. Initiated as Mikrofauna des Meeresbodens by Peter Ax in 1973, the journal experienced two changes of name, Microfauna Marina (1984) and **MEIOFAUNA MARINA** (2003), but the emphasis remained the same over all those decades: publishing high-standard and peer-reviewed scientific studies on (not exclusively!) marine meiobenthos. A number of chief editors took and left charge, and since the regrettable leaving of Andreas Schmidt-Rhaesa at the end of 2011, Antonio Todaro and Kai Horst George sign for the continuance of the journal.

Since many years, the main problem of the editors is attracting sufficient manuscripts for publishing. As you all know, **MEIOFAUNA MARINA** is published only once a year, which is due to the low rate of submitted manuscripts. Andreas Schmidt-Rhaesa appealed urgently for submissions at TWIMCO (Ravenna, 2004), followed by Antonio Todaro in 2007 at THIRIMCO (Recife), and by Kai Horst George in 2010 at FOURTIMCO (Gent). From the sight of potential authors, the main hurdle was and still remains, however, a missing Impact Factor (IF), which has been accomplished as a generally accepted index describing a journal's quality (perhaps more adequate: its receipt within the scientific community) by means of citation rates of the papers published therein. Thus, it may generally be stated that contributions published in high-ranked journals are considered as scientifically relevant, while those edited in low-ranked journals are not; even worse if a journal lacks an IF at all.

Since several years, the publisher is trying to get Meiofauna Marina indexed, and we are hopeful to finish that process soon. However, for future maintenance of an IF, the journal needs to enhance the number of issues per year. One single issue of **MEIOFAUNA MARINA** per year is much too little and may even be one main reason for the delay in getting indexed. Nonetheless, our pleas over the past years show positive effects: while former **MEIOFAUNA MARINA** volumes did not reach 10 papers, their number happily raised up to 14 in volume 19 (2011)! For 2012 (i.e. volume 20), just one submission has reached the editorial office so far. Therefore, we would like to encourage all of you submitting manuscripts concerned to any studies on meiobenthic organisms to Antonio Todaro (antonio.todaro@unimore.it) or Kai Horst George (kgeorge@senckenberg.de).

With kind regards

Kai Horst George

Antonio Todaro

Meiofauna Marina

Upcoming conferences

The following conferences might be of interest:

13th International Deep-Sea Biology Symposium (3 – 7 December 2012, Wellington, New Zealand)

Don't forget to register for the upcoming 13th International Deep-Sea Biology Symposium in Wellington, New Zealand. The deadline for abstract submission is the 30 of June.

- Host: National Institute of Water & Atmospheric Research
- Venue: The Symposium will take place at the Museum of New Zealand, Te Papa Tongarewa
- Where: Wellington, New Zealand
- When: 3 - 7th December 2012

More information can be found at: http://www.confer.co.nz/dsbs2012/

7th Symposium on the Atlantic and Iberian Margin (16 – 20 December 2012, Lisbon Spain)

The SYMPOSIUM ON THE ATLANTIC IBERIAN MARGIN, with well-established tradition in the scientific community, is successfully organized every three years since 1994. The symposium aims at bringing together researchers from diverse scientific disciplines and different institutions contributing to build up knowledge under holistic and integrative perspectives on past, present and future processes acting on the Iberian Atlantic Margin.

Important dates:

- 31 July 2012 Deadline - submission of abstracts
- 31 September 2012 Notification - abstracts acceptance
- 15 October 2012 Deadline of registration - reduced fee

More information can be found at: http://www.fc.ul.pt/en/conferencia/mia-2012

Recent Literature

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INTERNATIONAL ASSOCIATION OF MEIOBENTHOLOGISTS

APPLICATION FOR MEMBERSHIP OR RENEWAL

The International Association of Meiobenthologists is a non-profit scientific society representing meiobenthologists in all aquatic disciplines. The Association is dedicated to the dissemination of information by publishing a quarterly newsletter and sponsoring a triennial International Conference. The newsletter, Psammonalia, is published mid-month in February, May, August and November. Membership is open to any person who actively is interested in the study of meiofauna. Annual membership dues are EU$10 (US$10) and payment for up to 3 years in advance is possible. New members will receive Psammonalia beginning with the February issue of the year joining. Additional contributions to the Bertil Swedmark Fund, used to support student attendance at the triennial conferences, is encouraged.

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Research interests: _____

(*) New members are encouraged to introduce yourself to members in a short bio (ca. 10 lines).