BOOK OF ABSTRACTS

FourtIMCo (Ghent, Belgium, 11-16 July 2010)
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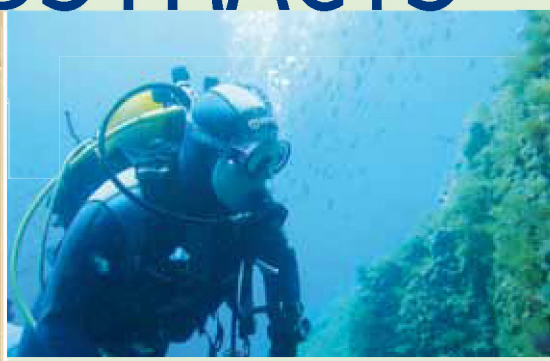

14th International Meiofauna Conference

Ghent, Belgium

11-16 July 2010
FourtIMCo

VLIZ SPECIAL PUBLICATION 44

Organized by:

Research Group Marine Biology
Biology Department
Ghent University
Krijgslaan 281, S8
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PREFACE

The meiobenthologists' international meetings began officially in Tunisia, in 1969, when 28 researchers gathered to discuss the taxonomy and ecology of meiobenthos. A second meeting followed four years later in York (UK), in 1973, and a third one occurred in Hamburg (Germany) in 1977. From then onwards, the tri-annual International Meiofauna Conference was born. Every three years, more participants join the group, and there seems to be an ever increasing wealth of knowledge being shared at these events.

So far, 13 IMCo's have taken place.

Ghent University, its Marine Biology Research Group and the International Association of Meiobenthologists, are proud to have welcomed all meiofauna students, scientists and enthusiasts to FourtIMCo, the 14th International Meiofauna Conference, in Ghent, 11-16 July 2010.

FourtIMCo provides a multidisciplinary forum to researchers from disciplines such as community and population ecology, taxonomy, phylogeny and phylogeography, environmental studies, biogeochemistry and microbiology, that study habitats from freshwater over estuarine to marine environments. The meiofauna is the overarching theme connecting these very different lines of research and habitats with studies also involving meiofauna as one component of larger and more encompassing research themes, such as benthic carbon flows, foodweb models, biodiversity studies, environmental impact and management among others.

During the FourtIMCo conference, 73 abstracts were given in oral presentations, and 128 abstracts as poster presentations, by 180 scientists from 28 countries.

The FourtIMCo programme hosts sessions on the following themes:

- Biodiversity and biogeography of meiofauna (27 oral and 50 poster)
- Taxonomy and phylogeny of meiofauna (11 oral and 36 poster)
- Meiofauna research as a basis for environmental management (11 oral and 11 poster)
- Freshwater meiofauna (7 oral and 6 poster)
- Ecological interactions and energy flow (14 oral and 8 poster)
- Meiofauna in pollution studies (6 oral and 12 poster)

M. Vincx
Chair of FourtIMCo

P. Santos
Chair of IAM

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KEYNOTE PRESENTATIONS

MEIOFAUNA IN FRESHWATER: CURRENT KNOWLEDGE ON NEMATODES

Abebe Eyualem

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Freshwater covers a small fraction of the earth's surface but holds a disproportionately high animal diversity. Current estimate of global animal species diversity in freshwater is about 126,000, and a large proportion of this known diversity is that of arthropods followed by vertebrates. Of the meiofaunal phyla known from freshwater, remaining phyla contribute about 10% of the diversity in the following order starting from the least to the most diverse: Nemertea, Cnidaria, Tardigrada, Bryozoa, Porifera, Gastrotricha, Platyhelminthes, Nematoda, Rotifera, Annelida and Mollusca. Nematodes in freshwater are dominated by members of the subclass Dorylaimia with more than 60% of known species. Representative groups of the subclass Enoplia are less in number but those groups are exclusively freshwater, while those of Chromadoria are globally widely reported in freshwater. Overall, 20% of known nematode genera are represented in freshwater and nearly 7% of the 27,300 known species inhabit freshwater. More than half of freshwater nematode species are reported from the Palearctic zoogeographic region with a similar trend for all phyla except Porifera. This, for nematodes, however, may be related to sampling effort rather than inherent higher diversity in the region. Nematode species new to science continue to be described at a rate close to 100 per year but the rate of reports for freshwater nematodes is not progressing at the same rate.

Keywords: nematode biodiversity, freshwater nematodes, freshwater meiofauna, nematode ecology, biogeography.

MEIOFAUNA IN POLLUTION STUDIES

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Invertebrates play an increasing role in assessing the impacts of environmental deterioration in aquatic ecosystems. Especially several meiofauna taxa have a number of promising characteristics which make them models in benthic oceanic and in freshwater systems for environmental assessments, and approaches in ecotoxicology and ecogenomics. They are small, simple in their organization, widely distributed and commonly abundant in freshwaters, estuaries, the coast, and deep sea. Meiofauna is ecologically important for the structuring of biogeochemical cycles in aquatic systems and their food webs. Some meiofauna taxa transfer pollutants across aquatic food chains – leading to bioaccumulation and biomagnification. In recent years there has been a substantial increase of studies related to biochemical and molecular responses of meiofauna following exposure to physical and chemical environmental disturbances in the field and under laboratory conditions. In the field, several meiofauna taxa serve as bioindicators, and shifts in their presence and abundance that alterate their assemblage and community structures can bioindicate either environmental health or its disturbance. In the laboratory, effects of contrasting wave bands of the electromagnetic spectrum – as prime parameters of global climate change – show striking effects on life table parameters, and on proteomic and gene expression alike, so studied in rotifers and harpacticoids. Pesticides, endocrine-disrupting chemicals (EDCs), or polycyclic aromatic hydrocarbons (PAH), nanoparticles and metals have provided reproducible biological and molecular responses when tested with culturable meiofauna taxa. A systems biology approach that integrates most levels of ecotoxicological integration levels will allow a better understanding of toxicological mechanisms: from effects on gene expression and proteomics, to other biochemical and physiological markers, anatomy, behavior, life table parameters, population dynamics to taxocoenotic changes. Overall objective of the present overview is to update our ecotoxicological knowledge obtained from meiofauna taxa in recent years. Problems, controversials and needs for further studies are highlighted.

Keywords: aquatic pollution, ecotoxicology, environmental assessment, field, laboratory, meiofauna.

CONTOURS AND DIRECTIONS OF FOURTIMCO AND PREDECESSORS – MEETING THE DEMANDS OR GOING ASTRAY OF FUTURE PERSPECTIVES?

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The 14th International Meiofauna Conference and its scientific presentations, grouped in various categories, are compared with previous conferences. Based on this analysis the question will be addressed whether present-day meiobenthos research is in the line with the perspectives initially outlined by Prof. Heip for general benthic research. Can we expect conformity in the progress of these two benthic research fields? Which are the advantages and perils of a close harmonization? Would, perhaps, a stronger concentration on microbiological interactions be more promising for a strong future meiobenthology?

Keywords: meiobenthological research directions: present, previous, future.

ASPECTS OF THE BIODIVERSITY, BIOGEOGRAPHY AND ECOLOGY OF DEEP-SEA BENTHIC FORAMINIFERA

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Traditionally, benthic foraminifera have been the domain of geologists who focus their studies on the predominantly calcareous species that have a good fossil record. A substantial body of information, derived mainly from geological investigations, indicates that some species, notably those inhabiting abyssal depths, have cosmopolitan distributions, at least at the morphological level. Recent molecular studies have shown that one calcareous morphospecies (*Epistominella exigua*) is genetically homogeneous in different oceans. On the other hand, species from sublittoral and bathyal continental margin settings appear to exhibit a much higher degree of biogeographic patterning. Biological studies, however, are revealing that these 'hard-shelled' taxa represent only a fraction of foraminiferal diversity in the deep sea. 'Primitive' single-chambered morphospecies with little fossilisation potential abound in deep-sea settings and are particularly common in oligotrophic and extreme hadal environments. They range from tiny agglutinated spheres a few tens of microns in size to giant xenophyophores with dimensions exceeding 10cm. The recent application of 'massive sequencing' to deep-sea sediments suggests that much 'hidden' foraminiferal diversity remains to be uncovered (unpublished results, B. Lecroq and J. Pawlowski, University of Geneva). Our understanding of the biology of these richly diverse protistan assemblages is fragmentary. Given their shear abundance, foraminifera undoubtedly play an important role in ecological and biogeochemical processes in the deep ocean, for example the cycling of organic carbon. Recent studies suggest that some calcareous species are highly efficient consumers of labile organic matter, while monothalamous species, in general, probably have lower metabolic rates and ingest bacteria and more degraded organic material. Clearly, much remains to be learnt about the basic biology, as well as the biodiversity and biogeography, of modern deep-sea benthic foraminifera.

Keywords: foraminifer, biodiversity, biogeography, ecology.

MEIOBENTHIC RESEARCH: TRENDS AND CHALLENGES IN THE PERSPECTIVE OF GLOBAL MARINE ECOLOGICAL RESEARCH

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The main challenge for fundamental marine research over the past decades has been to explore and understand ocean ecosystems with their vast temporal and spatial scales and dynamics, and their interactions with the continents and the atmosphere, as well as increasingly with socio-economic systems. This formidable challenge to obtain a sufficient understanding of the most extensive and complex system on earth in the face of increasing and largely unmanaged human exploitation, will continue to guide research in the coming decade as well.

Over the last thirty years an incredible advance in knowledge on the oceans has been made through the development of new technologies in earth observation and new analytical techniques in chemistry, microbiology and molecular biology, which has allowed a much better understanding of the functioning of marine ecosystems, but at a pace that leaves no doubt that much remains to be discovered.

The main drivers for marine ecological research have been the necessity of a better understanding of processes such as ocean circulation, sediment transport, evolution of life histories and biogeochemical cycles in order to evaluate and eventually manage the human impact on the oceans. In the 60's and 70's the main societal concern was in pollution and eutrophication. Especially in the last decade this has shifted to climate change and biodiversity loss and most recently acidification and hypoxia – and increasingly also noise have become important concerns for marine ecological research.

Meiofauna research has followed the societal concerns of the time. A large literature has been developed in the 60's and 70's of the last century on the impacts of pollution and eutrophication on meiofauna and the statistical methodology required to study those multivariate phenomena. Some efforts were made to culture harpacticoid copepods and nematodes for experimentation or to elucidate life cycles, but meiofauna research has not been able to sustain such efforts or to define model species useful in other areas of science such as molecular biology. Moreover, most research was coastal and knowledge on deep sea meiofauna has become only gradually available and is still slowly accumulating today.

Many efforts were made to understand meiofauna productivity and its putative impact on mineralization and thus on the carbon and nitrogen cycles because of the abundance of meiofauna in marine sediments. The impact and relevance of

meiofauna research on understanding the new grand challenges has been rather restricted. However, in subject areas where meiofaunal life cycles and metabolism differ from macrofaunal ones there is still scope for new efforts. A few examples may be their role as intermediates between the microbial food web and the macrofauna, survival in and indicators of hypoxic and anoxic environments, general biodiversity in remote and unexplored habitats, the molecular basis of adaptation.

Keywords: eutrophication, climate change, biodiversity loss, trophic interactions, benthos.

HORIZONTAL AND VERTICAL INTERACTIONS AND THE STRUCTURE AND FUNCTIONING OF MARINE NEMATODE ASSEMBLAGES

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Direct predator-prey (= vertical) interactions are crucial in determining the structure of communities and the energy flows from primary to higher trophic levels. In nematode assemblages, resource availability (= bottom up effects) is often considered key to the abundance, but less so to the diversity of assemblages. The impact of predation on prey nematode population dynamics and assemblage structure is less well studied. There is evidence from mostly intertidal habitats for such top-down controls by macrobenthos on nematode abundances, and more recently, similar top-down effects have been suggested for predatory nematodes. The importance of bottom-up and top-down effects, particularly on assemblage structure and diversity, nevertheless remains poorly understood. One important reason is that the impact of these vertical interactions on horizontal interactions, i.e. between species belonging to the same trophic level or guild, has not been properly studied. Recent evidence demonstrates that inhibitory and facilitative interactions between taxonomically (and supposedly also functionally) highly similar species are crucial in determining assemblage structure and functioning. These horizontal interactions, while not necessarily driven by competition, are strongly affected by resource availability and diversity, but also by predation. In microcosm experiments with predacious and bacterial-feeding marine nematodes, the top-down effects on prey populations and assemblages depended as much on the modification of horizontal interactions as on direct predator-induced prey mortality. This undoubtedly translates into ecosystem functioning, but according to patterns which are difficult to predict. We will illustrate the interplay between vertical and horizontal interactions using model experiments with estuarine nematodes, and then expand on this to incorporate other indirect (i.e. 'non-trophic') interactions between meiofauna and organisms from different trophic levels.

Keywords: horizontal interactions, vertical interactions, nematodes, assemblage structure, ecosystem functioning, macrobenthos.

ON THE RELEVANCE OF MEIOBENTHIC RESEARCH FOR POLICY MAKERS

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Worldwide, there are increasing pressures on marine ecosystems. Humans have reduced and restructured most habitats, changed the distribution and abundance of species to support economic production and altered biogeochemical cycles and the chemical composition of the water column and sediments. The need for scientific advice to manage the marine environment in an ecosystem context to ensure sustainability has never been greater. This advice will require a stronger and more comprehensive scientific foundation than ever before. Consequently, there is an increasing emphasis on the need for new scientific knowledge to inform policy and management decisions. The majority of recent meiofauna studies focusing on environmental challenges point (a) to the urgent need for improved understanding of the functioning of marine systems and (b) to more effective communication of scientific findings to the public and policy arenas. But how good are we as meiobenthologists, both individually and collectively, in converting our science into sound environmental policy advice? I will reflect briefly on the role of (meiobenthic) research in meeting the challenges created by a changing world before moving on to illustrate how discrete pools of scientific and contextual knowledge of meiofauna can be used to inform policy and, at the same time, contribute to the fundamental understanding of man-made impacts on marine ecosystems.

Keywords: environmental management, science-policy interface, 'nice-to-know' versus 'need-to-know' approach.

RECENT ADVANCES IN MOLECULAR AND MORPHOLOGICAL RESEARCH IN MEIOBENTHIC TAXONOMY

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Taxonomy is the science of discovering, naming, describing and classifying organisms. It enables us to distinguish between species of closely related organisms, and provides information about biodiversity. When the numerous species are classified into a hierarchical system of taxonomic units, we are enabled to operate with large amounts of species, and since modern classification reflects the putative phylogeny of the grouped entities, we also obtain information about their shared evolutionary background. Hence, taxonomy plays an important role at all levels in the natural system. Within the last 15 years, advances in molecular and morphological research have had a tremendous impact on our understanding of animal evolution and phylogeny, and these advances are reflected in the taxonomy as well. In the beginning of the 1990s, the majority of the meiofaunal organisms was still believed to have a shared evolutionary origin, and they were accommodated in a clade named Aschelminthes or Nemathelminthes. Today, improved phylogenetic inference of molecular and morphological data has demonstrated that these organisms evolved along independent lineages, and form at least two clades. These recent advances have also had great impact on the taxonomy of specific, previously well-established phyla, and affected that some have been split into several, separate clades, whereas others have been merged. The last decade also provided the first phylogenetic studies on the interrelationships within phyla of exclusively meiofaunal organisms, and these studies have resulted in emended taxonomies for the investigated groups. At the species level, especially advances in molecular research have enabled us to recover complexes of cryptic speciation among populations of otherwise identical animals. However, also new or improved morphological methods, such as CLSM and SEM have helped us to reveal previously unnoticed variation that subsequently has prompted description of new species.

Keywords: cryptic speciation, evolution, phylogeny, taxonomy.

ORAL PRESENTATIONS

ROLE OF ESTUARINE NEMATODE ASSEMBLAGES IN ECOLOGICAL ASSESSMENT IN A SOUTHERN EUROPEAN ESTUARY (MONDEGO ESTUARY, PORTUGAL): TEMPORAL AND SPATIAL PATTERNS

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To improve the knowledge on nematodes in the Mondego Estuary (Portugal), the temporal and spatial variations of subtidal free-living marine nematode communities (density, diversity and trophic structure) along the entire estuarine gradient (freshwater to euhaline areas) were seasonally studied (2006 to 2009).
Since 1980, the hydromorphological, physicochemical and ecological responses of the system to both natural and human induced pressures have been studied, providing a long-term database on macrobenthic communities. Even though studies on meiobenthic communities in this system are still scarce, the meiobenthic communities can be valuable in marine pollution monitoring programs.
The present study intends to answer two main questions: 1) Do responses in the density, composition and trophic structure of free-living nematodes allow an effective evaluation of the systems ecological conditions; 2) Can free-living nematodes and macrofauna assemblages provide comparable ecological status assessment?
A marked estuarine gradient was detected, with salinity, sediment grain size and nutrients as the most important factors structuring the meiofauna community. The community was dominated by nematodes in all seasons (between 88 and 96% of total meiofauna community). Temporal differences in nematodes density were detected (maximum in summer 2006 – 4,275 ind.10cm^{-2}; minimum in spring 2007 – 1,277 ind.10cm^{-2}) and a separation of salinity stretches based on nematodes diversity and density was possible: the downstream areas were mainly composed by the genera *Daptonema*, *Sabatieria* and *Sphaerolaimus* and the upstream area by the freshwater nematodes *Mesodorylaimus* and *Mononchus*. The response of nematode feeding guilds is able to reflect anthropogenic-induced stress and can be useful in assessing biological quality in transitional waters ecosystems. This study indicates that nematodes can be an important tool in assessing the ecological status of transitional waters.

Keywords: marine nematodes, estuarine gradient, subtidal meiofauna, ecological status.

WORMS WITHOUT BORDERS: POPULATION GENETIC TRENDS IN SOUTH AMERICAN *OTOTYPHLONEMERTES* (DIESING, 1863)

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Disentangling the relative role of the evolutionary processes underlying the demographic history and genetic variation in natural populations remains a challenge, especially in groups where the natural history is poorly known. This is particularly true for interstitial organisms, with populations distributed discontinuously due to ecological factors that might impose limit range. In this study, we evaluated the genetic variation and populational history of three species of *Ototyphlonemertes* (Hoplonemertea): (1) *O. lactea* and (2) *O. erneba*, along eight locations at the Brazilian coast; (3) and the Lactea morph *Ototyphlonemertes* sp. collected in eight locations between regions V and XV from the Chilean coast. To assess the genetic variation we analyzed the mitochondrial region cytochrome c oxidase 3 for the Brazilian samples and the cytochrome c oxidase 1 and 3 regions for the Chilean samples. Our data showed that the level of differentiation between populations within each species is moderate to high (F_{ST} =0.059, 0.582 and 0.098, respectively for *O. erneba, O. lactea* and *Ototyphlonemertes* sp.), there are shared haplotypes among locations, and most of the variation is found within populations, except for *O. lactea*. The demographic history analysis showed that most populations from the three species may be in expansion, and that the populations of the Chilean *Ototyphlonemertes* sp. have more variation in the population divergence time (τ varies between 0.32 and 107, with an average of 34.1) than the Brazilian species (τ averages for *O. erneba* and *O. lactea* are 4.24 and 24, respectively). These results suggest that Brazilian populations have a more recent establishment compared to the Chilean species. Both Brazilian and Chilean populations showed signs of populational expansion with high diversity of haplotypes and asymmetrical gene flow among populations. These results seem to contradict the expected low variation due to the ecological constriction and habitat discontinuity faced by these organisms, which reinforces the need of further studies in order to obtain a comprehensive evolutionary picture of interstitial organisms.

Keywords: Nemertea, phylogeography, mesopsammon.

A HYPOTHESIS TO EXPLAIN THE MEIOFAUNAL COMMUNITY CHANGES IN THE HUMBOLDT CURRENT SYSTEM OFF PERU

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Oceanographic conditions determine eventually the sediment biogeochemistry and this last one factor controls the meiofaunal structure. Interannual events such as El Niño-Southern Oscillation (ENSO) modulate this response and generate communitary changes. An explanation to understand the meiofauna-environment relationships in the Peruvian coast is proposed based on oxygen regime (OR) and organic matter sedimentation (OMS). Combinations of the parameters mentioned above will determine the nematode-dominated meiofaunal assemblages. Five possible different phases of the meiofaunal community are hypothesized. Diversity, dominance and density vary in each of these phases. There are metabolic transition periods of benthic system fluctuating among cold and warm ENSO periods. During cold periods (high OMS and hypoxia/anoxia on the bottom), the nematodes (bacteria-feeders/detritivorous-feeders, etc.) are dominant, and the total phyletic diversity is poorest in the meiofauna; the densities, however, are the highest. Intermediate periods correspond to improved diversity (with appearance of more nemerteans, ciliates, gastrotrichans and copepods, among the more important). Vertical penetration is permanently fluctuant in both periods above. Periods with low OMS and high concentration of oxygen on the bottom (warm periods), determines both an improved diversity within nematodes (appearance of carnivorous nematodes) as an increase of phyletic diversity in the total meiofauna. Because the total number of nematodes decreases, the total meiofauna density has a significant decrease in these last cases. Arguments of this hypothesis and its possible implications are discussed.

Keywords: hypothesis, meiofaunal community, Humboldt Current System, Peruvian coast.

TAXONOMY AND ECOLOGY OF FREE-LIVING MARINE NEMATODES IN CIENFUEGOS BAY, CARIBBEAN SEA

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Spatial and temporal biodiversity patterns of free-living marine nematodes were studied in Cienfuegos Bay. Biological trait approach added relevant information to species pattern regarding relationships between diversity patterns and the abiotic environment. Chemical pollution and hydrodynamic regime possibly drove the biodiversity patterns. A comparison of spatial-temporal patterns of biodiversity with other semi-enclosed bays in temperate regions suggests several similarities. Marine nematodes from the same bay were subjected to additions of phyto-detritus in a microcosm experiment. Observed effects on the nematodes were a decrease in abundance and diversity, and changes in the taxonomic and trophic structure due to the organic enrichment. The main factor affecting the nematodes was probably the byproducts due to enhanced bacterial development in microcosms. Hypoxic conditions occurred in all experimental units, as well in the field suggesting a nematode assemblage adapted to naturally enriched sediments. The cosmopolitan and ecologically dominant genus *Terschellingia* (Nematoda: Linhomoeidae) was reviewed based on morphological and morphometric data. The diagnosis of the genus is amended. Sixteen species are considered as valid; and tabular and pictorial keys were provided. Three sympatric species were redescribed based on recently collected specimens. The notable taxonomic inflation within the genus can lead to an overestimation of the alpha-diversity. Four new free-living marine nematode genera and species are described: *Cienfuegia cachoi* gen. nov., sp. nov., *Guitartia tridentata* gen. nov., sp. nov., *Macrodontium gaspari* gen. nov., sp. nov., and *Pseudoterschellingia ibarrae* gen. nov., sp. nov. For each species, detailed morphological descriptions, drawings and photos are provided, tabular keys were built and relationships with other genera within each family are discussed.

Keywords: nematodes, ecology, biodiversity, taxonomy, new species.

GLOBAL PATTERNS OF LOCAL DIVERSITY: CASE STUDY OF MARINE HARPACTICOIDS

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Latitudinal diversity gradients (LDG) are believed to be general ecological pattern. However, most data relate to macroorganisms, and little is known about LDS for meiofauna. We used the data from 81 datasets on marine benthic harpacticoids all over the world to calculate the alpha- and beta-diversity and estimate the main factors influencing those diversity components.
Beta-diversity (estimated as the slope of species accumulation curve) was negatively correlated with latitude, and positively – with spatial extent of a survey and range of studied depths. The effect of the first two variables was mainly pronounced for the littoral, whereas the depth range was the most significant factor in the deeper sites. Also, beta-diversity was higher on sands and mixed sediments than on silt or mud.
Both alpha-diversity estimates (mean number of species per 10cm^2 and expected number of species per 100 individuals) were correlated with total abundance, depth and sediment properties. Alpha-diversity decreased with duration of study and mesh size of the sieve. It also was influenced by the longitude, being higher at western coasts of either Pacific or Atlantic Oceans, but showed no latitudinal trends.
In sum, latitude explained 33% of beta-diversity variations in the littoral zone, 15% – in the upper sublittoral and less than 4% in deeper zones. All variables that could be treated as proxies for productivity affected only the alpha-diversity (which was latitude-uncorrelated), whereas the beta-diversity depended on the proxies of environmental heterogeneity. Thus, LDG for harpacticoids is slightly pronounced and more likely determined by environmental heterogeneity than by productivity as the primary factor.

Keywords: Harpacticoida, alpha-diversity, beta-diversity, latitude, depth.

DIVERSITY, DISPERSAL AND SUCCESSION OF WHALE-FALL FAUNA IN THE DEEP SEA

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Habitat heterogeneity in the deep sea contributes significantly to nematode diversity, yet meiofaunal assemblages at chemosynthetic habitats have been understudied owing to limited sampling effort and available species-level data. Recently it has been found that at both hydrothermal vents and cold seeps nematode diversity is low, that dominance is high and that even over significant distances nematode species and genera assemblages are similar (Flint *et al.*, 2006; Zekely *et al.*, 2006; Copley *et al.*, 2007; Gollner *et al.*, 2007). Similarly, macrofaunal assemblages are similar between widely distributed chemosynthetic habitats, including whale carcasses (Smith and Baco, 1998; Dahlgren *et al.*, 2004) and clear phylogenetic relationships have been found within taxa occurring at a number of chemosythetic habitats types; molluscs and polychaetes for example (Distel *et al.*, 2000; Glover *et al.*, 2005).
Consequently, it has been postulated that deposited whale-fall carcasses represent habitat islands on the sea floor, intermediate between chemosynthetic environments, and that they have significant evolutionary and ecological importance with regard to dispersal and speciation (Smith *et al.*, 2002; Glover *et al.*, 2005). New data presented here, however, suggests that nematode assemblages at whale-fall sites may not be similar to those recorded at hydrothermal vents or seeps genera shown to particularly characterise these habitats not being present or present in low numbers. Equally, although the nematode fauna was diverse, with high rates of species turnover identified as the carcass degraded, common deep sea genera such as *Acantholaimus* and *Halalaimus* were also relatively under-represented.

Keywords: whale-fall, chemosynthetic, deep-sea, Nematoda.

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INFLUENCE OF MACROBENTHOS ON NEMATODE DYNAMICS AFTER A PHYTOPLANKTON BLOOM

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Macrofauna-induced particle mixing (bioturbation) and solute transfer (bio-irrigation) contribute intensively to ecosystem functioning in areas where physical disturbance is low. Oxygen and organic matter are transported deeper into the sediment, thereby probably providing favorable niches to the lower parts of the food web and thus stimulating mineralisation. Whether macrobenhtos facilitates uptake of fresh organic matter by bacteria and nematodes or rather deprives the latter from food sources, is so far not clear. In this in vitro experiment, we investigated the influence of the ecosystem engineers *Lanice conchilega* (bio-irrigator) and *Abra alba* (bioturbator) compared to a regular physical disturbance event on nematode dynamics after a simulated phytoplankton bloom. The uptake of ^{13}C labeled diatoms by nematodes was significantly enhanced in the treatments with regular physical disturbance compared to macrobenthos-free controls. In this disturbance treatment, nematodes also seemed to migrate to the surface to feed on the fresh material. When macrobenthos was present, they consumed most of the fresh food, hence a significantly lower uptake of diatoms by the nematode community. This could be one of the explanations of low food uptake by nematodes in tracer experiments.

Keywords: macrobenthos, nematodes, phytoplankton, bloom.

EPIZOOIC METAZOAN MEIOBENTHOS ASSOCIATED WITH TUBEWORM AND MUSSEL AGGREGATIONS AT DEEP-SEA COLD SEEPS IN THE GULF OF MEXICO

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Cold seeps are chemosynthetic-based ecosystems on active and passive continental margins throughout the world's oceans. While epizooic macrofauna associated with prominent foundation species at hydrocarbon seeps in the Gulf of Mexico are one of the best studied, the epizooic meiofauna is virtually unknown. To study the abundance, diversity, and community structure of metazoan meiobenthos associated with vestimentiferan tubeworms and bathymodiolin mussels, a total of 13 quantitative samples was collected at three sites, Alaminos Canyon, Atwater Valley, and Green Canyon between 550 and 2,750m depth. Abundances were highly variable but overall very low (7-1,839 ind.10cm^{-2}) and similar to epizooic communities at vents but much lower than those of infaunal seep communities. A total of 171 genera was identified, dominated by nematodes and copepods. Ostracods, halacarids, tanaids, kinorhynchs and isopods were rare. Estimated genera richness and Shannon diversity were more variable and slightly higher in tubeworm bushes (EG(300) 41.7±18.1, H' log e 2.93±0.50) than in mussel beds (EG(300) 26.3±8.0, H' log e 2.28±0.42), a trend also found in the associated macrofauna communities corresponding well to environmental conditions. While seep epifauna hosted by mussels experience higher levels of toxic sulfide than those at tubeworms, overall both habitats harbour relatively diverse meiobenthic communities, which thrive in little disturbed and stressed habitats due to amelioration of the environmental conditions by foundation species. This is in contrast to a low diverse seep infauna and vent epifauna, both exposed to high levels of toxic sulfide and low oxygen. Interestingly, seep epifauna fuelled directly by chemosynthetic primary production is much more similar to deep-sea infauna dependent on photosynthetic production from the surface waters although the underlying causes for these similar diversity patterns are most likely different.

Keywords: cold seeps, deep sea, community ecology, foundation species, diversity.

STRUCTURE OF HARPACTICOID COPEPODS COMMUNITIES IN INTERTIDAL AND SHALLOW WATERS OF TROPICAL REGIONS

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Most papers on tropical harpacticoids only take into account a taxonomical survey, but not the community structure. In this work we make a comparative analysis of the harpacticoids taxocene structure from similar biotopes in different parts of the tropical zone of the world. This work is based partially on our own data, partially on literature surveys. For our research we took 12 regions: the seasides of Mozambique, Tanzania, India and Vietnam in the eastern hemisphere, Tuamotu Islands, Easter Island, Bermuda, Virgin Islands and Atlantic coast of Mexico in the western hemisphere. The considered locations cover a wide range of habitats, from coral sand to mangrove muds.
Harpacticoids diversity and quantity are lowest on the mud sediment, where aleuropelites contribute more than 70% (average species number 16.7, average density 2.7 specimens.cm^{-2}). Most diverse and numerous seascapes are coarse sand (10% aleuropelite) and medium sand (11-70% aleuropelite), where the rate of organics is higher (average species number 39, average density 8 specimens.cm^{-2}).
Similarity of the taxocene structure on the species level from different geographical regions is close to zero, due to the high diversity of tropical communities. Similarity on the genus level is higher (Chekanovsky index 0.4-0.5). Therefore, to search for principal patterns of association structure we take into account genus level. It is evident, that associations with *Stenhelia* and *Halectinosoma* are typical for shallow water muds and mangrove muds of India and Mexico. Same genera are abundant in estuaries of the White Sea. In general, the structure of mud bottom communities is most homogeneous throughout the tropics. It seems that mangrove plants have no significant influence on taxocene structure. Harpacticoids associations of coarse and medium sand demonstrate greater diversity and are regional-specific. In these localities parallel communities (composed of related genera and sometimes species) prevail on local and world scales.

Keywords: Copepoda, Harpacticoida, structure of taxocenes, tropics.

GRAZING OF THE HARPACTICOID *PARAMPHIASCELLA FULVOFASCIATA* ON FREEZE-DRIED DIATOMS

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In natural ecosystems, copepods are involved in the efficient energy transfer of primary production to higher trophic levels. Copepods graze intensively upon diatoms, an interaction which has been profoundly studied. Diatoms are considered to be a nutritive food source and are commonly used as main food for *ex situ* copepod cultures. Preserving diatoms by freeze-drying can facilitate the copepod culturing process as the maintenance of fresh diatom stocks is not longer required.
During a laboratory experiment, *P. fulvofasciata* was offered a freeze-dried diatom *Seminavis robusta*. Grazing upon freeze-dried cells was compared to grazing upon fresh diatom cells, in a monotonous diet and in a mixed diet. The low uptake of freeze-dried cells indicates that freeze-drying decreases the food quality of a diatom. However, in the mixed diet, this negative selective behaviour of *P. fulvofasciata* towards freeze-dried cells was almost not notable. Solely a complete absence of fresh diatoms induced an aberrant grazing behaviour.
Copepods are capable of distinguishing between low and high qualitative substrates, based on the associated microorganisms. Bacterial community analysis (DGGE) pointed out that the freeze-drying process did not alter the bacterial diversity on the diatom, suggesting that the microorganisms are not responsible for the difference in food quality between the two diatoms. Remarkably bacterial communities on the egested faecal pellets were different among the food source treatments. These bacteria likely originated from the copepod. As harpacticoids are able to switch between food sources (e.g. during food limitation), a hypothesis is that in the absence of a high qualitative food source, *P. fulvofasciata* obtains supplementary nutrients from the faecal pellet bacteria.

Keywords: harpacticoid, freeze-dried diatoms, faecal pellets, food quality, bacteria.

SECOND-GENERATION ENVIRONMENTAL SEQUENCING OF THE MEIOFAUNAL BIOSPHERE: AN OVERVIEW

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Taxon assessment is the key to understanding the relationship between biodiversity and ecosystem processes, but meiofaunal identification is impeded by a number of factors. For example, the small size of taxa, different life history stages, morphological convergence and intraspecific variation create logistical and taxonomic problems. However, the most important restricting factor in meiofaunal ecological research is the mismatch between diversity and the number of taxonomists that are able to simultaneously identify and catalogue inter-phylum community diversity. Accordingly, a molecular operational taxonomic unit (MOTU)-based approach has been advocated for en masse meiofaunal biodiversity assessment, but it has been hitherto restricted by the lack of throughput afforded by chain termination sequencing. Contemporary pyrosequencing offers a solution to this problem in the form of environmental metagenetic analyses (i.e. the large-scale analysis of taxon richness via the analysis of homologous genes), but this represents a novel field of biodiversity assessment. Here, we cover some of the pros and cons of 454 Roche environmental metagenetic sequencing analyses via reference to example datasets derived from novel bioinformatic analyses of over 1 million nuclear small subunit 18S (nSSU) sequence reads. The data provide quantitative, objective and revealing insights into the relative magnitude, composition and identity of the meiobenthic biosphere. Moreover, we examine the possible links between morphology and second generation environmental sequencing approaches that will facilitate a rapid increase in the throughput and scalability in meiobenthic research.

Keywords: biodiversity, metagenetics, metagenomics, 454 Roche sequencing.

MEIOFAUNA OF DEEP-SEA COLD SEEPS IN THE EASTERN MEDITERRANEAN AREA, WITH SPECIAL EMPHASIS ON NEMATODE BIODIVERSITY AND CONNECTIVITY

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Most deep-sea cold seeps support, compared to common bathyal environments, highly productive ecosystems characterised by an impoverished species richness and an elevated dominance by a few adapted taxa able to survive in high concentrations of the toxic H_2S, which provides an unlimited energy source. Mega- and microfauna seep communities are relatively well described. However meiofauna studies from deep-sea cold seeps are scarse.
Several reduced environments at the Egyptian margin and on the Calabrian Arc were sampled during the MEDECO (2007, HERMES) and the Merian cruise (2009, HERMIONE). These samples allow us to get insight in the nematode community structure and biodiversity of the different areas. By sampling both reduced and hemipelagic sediments, it is possible to test if the seep fauna is closer related to the local non-seep fauna than to the taxa found at other seeps from different geographical areas. Molecular studies give insights in the phylogenetic and phylogeographic relationships of seep nematodes, not only in the Eastern Mediterranean area, but also with more distant seep communities.
A significant difference in genus composition exists between the reduced and hemipelagic sediments. Hemipelagic samples are characterised by a high genus diversity and were dominated by typical deep-sea genera. The reduced sediments of all seep sites are genus-poor, and strongly dominated by *Sabatieria* (*mortenseni*), which is also the dominant genus in the REGAB cold seep (Gulf of Guinea, Equatorial West-Arica).
Seep sediments generate a habitat which is difficult to colonize by most of the typical deep-sea nematode species. The dominance of *Sabatieria mortenseni* in different remote seeps can indicate a possible interconnection. It was already possible to sequence parts of the nuclear DNA. After sequence comparison the DNA appeared to be from *Sabatieria* sp.. Further molecular investigations and comparison with *Sabatieria* specimens from REGAB can give more answers concerning this topic.

Keywords: cold seep, nematodes, biodiversity, interconnectivity, *Sabatieria*.

SALINITY EFFECTS ON COMPETITION BETWEEN CRYPTIC SPECIES OF THE NEMATODE *RHABDITIS (PELLIODITIS) MARINA*

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Behind the morphological similarity of many species, a substantial hidden genetic diversity can be found. This cryptic diversity has been well documented in the marine nematode, *Rhabditis (Pellioditis) marina,* where several cryptic species occur sympatrically. Despite the growing knowledge about its cryptic diversity, little is known about potential differences in the ecology and functional roles of the different species.
In this experiment four cryptic species of *Rhabditis (Pellioditis) marina* were reared together, starting from identical initial abundances at two different salinity concentrations to investigate differences in their environmental preferences and how they may affect the outcome of their competitive interactions. Every fifth day of the experiment one third of the adults was removed from the population for analyzing the genetic composition of the population; adult and juvenile population dynamics were also examined. The first results show a difference in population dynamics dependent on the salinity. At low salinity, a population crash occurred after 15 days in all the populations. Only half of the populations recovered from this bottleneck and reached higher abundances than before. Genetic analyses revealed that the composition of these populations consists solely of individuals of one cryptic species. This effect was totally absent in the populations reared at higher salinity. Two explanations are possible: (1) the different cryptic species have different survival rates at different salinities and (2) the competitive interactions between them differ at different salinities.
We are currently identifying the sampled adults using a restriction fragment analysis to assess these explanations and to elucidate the effect of salinity on the coexistence of cryptic species of *Rhabditis (Pellioditis) marina*.

Keywords: cryptic diversity, competition, marine nematodes, population dynamics.

AMPLIFICATION AND SEQUENCING SUCCESS OF THE MITOCHONDRIAL COI GENE IN MARINE NEMATODES: A NEW MOLECULAR MARKER TO IDENTIFY CLOSELY RELATED SPECIES?

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Population genetic studies in marine nematodes have revealed the presence of substantial cryptic diversity in morphospecies from different major clades of the nematode phylogenetic tree. As a result, DNA based delineation may play an important role for understanding species diversity and biogeographic patterns within the phylum. The 18S rDNA gene has been widely used in nematode phylogenetic studies, but is unable to distinguish cryptic species and even morphospecies for some nematode groups. Therefore, we investigated the amplification and sequencing success of two partitions of the mitochondrial COI gene in 41 marine nematode taxa from different clades across the nematode phylogenetic tree. The Folmer partition is the standard barcoding fragment for animals, while the I3M11 partition is situated just next to the Folmer partition. Our results show that the I3M11 partition was more easily amplified than the Folmer region (97.5 and 71%, respectively). Sequencing success was comparable between the two fragments, and resulted in 35 (85%) and 22 (53%) clean sequences. After quality control, five sequences were likely to be nuclear mitochondrial pseudogenes because of the presence of indels or a large number of amino acid substitutions. Removing these sequences resulted in a final sequencing success of 63 and 46% for the I3M11 and Folmer partitions, respectively. Analysing intra- and interspecific variability indicated that COI can accurately delineate nematode species using a threshold level of 5%. Our results suggest that combining 18S with COI may considerably increase the resolution of molecular tools to assess nematode species diversity in environmental samples.

Keywords: identification, COI, nematodes, barcoding.

BIOCONVERSION BY HARPACTICOIDS AT THE BASIS OF MARINE FOOD WEBS: EVIDENCE FROM FATTY ACID-SPECIFIC ISOTOPE ANALYSIS

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In both freshwater and marine environments polyunsaturated fatty acids (PUFAs) are essential compounds that can limit zooplankton productivity. The influence of PUFAs on benthic productivity is less clear although there are indications that this influence is extended to benthic trophic webs. Efficiency in energy transfer in aquatic food webs has been related to differences in food quality in terms of fatty acids (FA) at the plant-animal interface where copepods play a crucial role both as consumers of primary production and as food for higher trophic levels.
In the laboratory, the harpacticoid copepod *Microarthridion littorale* grazed during 9 days on ^{13}C prelabelled diatoms and bacteria to inspect its ability to bioconvert short chain FA into long chain PUFAs. The FA composition of the diatoms was dominated by 16:1ω7, 16:0, 20:5ω3 (EPA), and 22:6ω3 (DHA). In bacteria, however, DHA was absent and EPA was only present in small amount. The FA composition of copepods feeding on either diet was different from that of the field suggesting the use of additional food sources in the field. Dietary FA were generally incorporated by the copepod, however, the incorporation was higher when the copepod was feeding on diatoms. Additionally, PUFAs like EPA and DHA were selectively accumulated in the body of the copepod. The screening for ^{13}C enrichment of individual FA showed that this harpacticoid copepod was able to bioconvert EPA to the longer chain DHA, especially when feeding on bacteria. Copepods survived on bacteria but showed a high mortality and were generally in a poorer condition than when feeding on diatoms.
These data suggest that the ability of harpacticoids to elongate fatty acids enables them to live on poor quality food which may present an advantage in niche competition. In contrast to planktonic Cladocera and Calanoida that are very inefficient in bioconversion, it seems that benthic copepods developed this ability to strive on poor quality food.

Keywords: fatty acids, harpacticoids, feeding ecology, bioconversion.

BENTHIC MICROBIAL COMMUNITY AND ACTIVITY RESPONSE TO NEMATODE ASSEMBLAGES OF DIFFERENT DIVERSITY

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Prokaryotes (Bacteria and Archaea) are the most abundant organisms of marine sediments and have major roles in ecosystem functioning. Moreover, prokaryotic diversity is often considered an indication of ecosystem reliability. Knowing that these prokaryotes are influenced by meiobenthos, we can wonder if and how meiobenthos could affect ecosystem functioning and resilience. Hence, we performed an experiment to assess (a) whether nematodes would directly affect microbial abundance, diversity, community structure and/or activity, and if so, (b) whether this would be related to (1) nematode species diversity, (2) nematode trophic ecology or (3) both. Nematodes affected microbial abundances, biomass, community structure and activity. Whether this is mainly a result of grazing, or also involves other interactions, is unclear. Nematode species richness had a more pronounced effect on microbial community structure than nematode functional structure and diversity. Bacterial-feeding nematodes did not exert a stronger effect than did other nematodes. Nematode effects on microbial abundance, community structure and carbon production showed a clear tendency to increase with increasing nematode species richness. Furthermore, our most species-rich nematode assemblage had an increased bacterial diversity. Interestingly, the temporal behaviour of Bacteria and Archaea during this experiment showed opposite patterns. The reasons for this intriguing observation remain to be established.

Keywords: ecosystem functioning, trophic interactions, nematodes diversity, microbial assemblage, meiobenthos.

EXTREME CONDITIONS STRUCTURE MEIOFAUNA COMMUNITIES IN THE ARID TROPICS OF AUSTRALIA

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This study examined meiofauna populations in an estuary of the Gulf of Carpentaria (Australia), a remote and largely unmodified region of the arid tropics. It also presents the first insights into the long and short-term effects of a major flood on meiofauna populations in this region. For most of the year the Norman River estuary receives no freshwater flow, followed by extensive flooding in the wet season (December–March). High salinity (~35 or higher) in the dry season as well as freshwater conditions during flooding both appear to have detrimental effects on meiofaunal abundance, with optimal salinities around 25. Flooding of the river in January 2009 was the second largest on record, resulting in freshwater conditions (salinity 0-1) in the estuary that lasted for three months. Meiofauna abundance dropped to zero at the peak of the flood but recovery was rapid after the flood and exceeded pre-flood numbers. It is proposed that the more tolerable salinity (25) and the input of nutrients and organic matter to the estuary post-flood are the reason why meiofauna abundance and taxa richness is greatest at this time of year. This study found a density of 0-78 ind.10cm^{-2} for all meiofauna taxa in the Norman River estuary throughout the study, which is far lower than other estuarine studies. We propose that the extreme highs and lows in salinity of the Norman River Estuary have resulted in substantially lower meiofauna abundance and taxa richness compared with other tropical estuaries. This has implications for the productivity of the whole estuary, and other estuaries in the arid tropics.

Keywords: meiofauna, arid tropics, estuary, flood.

BIODIVERSITY PATTERNS OF SANDY BEACH MEIOFAUNA FROM TROPICAL AND TEMPERATE REGIONS

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Meiofaunal samples from 11 tropical (Galapagos Islands) and 10 subtropical (Crete, Eastern Mediterranean) beaches were collected at the mid water mark of the eulittoral zone. The sampled beaches in both areas were subjected to a different regime of exposure, displaying different profiles and having different physico-chemical characteristics. The highest average meiofaunal density was found in the temperate zone (7,166 ind.10cm^{-2}), which in general showed much higher densities compared to the tropical area. However, in both areas, samples with similar low densities were collected: i.e. 32 ind.10cm^{-2} in the tropical and 57 ind.10cm^{-2} in the temperate area, respectively. Nematodes dominated in the samples from the tropical area representing on average 59% of the community (highest dominance 94%), whereas, copepods predominated in the temperate area (>30) more pronouncedly in exposed conditions where in some cases they exceeded 90%. A comparison of the higher taxa community structure of the two areas revealed no latitudinal trends since both areas were equally rich with 16 groups being recorded in the tropical and 19 groups in the temperate area. Differences and contrasts in the biodiversity patterns in the nematode and copepod communities in both areas are discussed in connection with the framework of the environmental settings.

Keywords: meiofauna, sandy beaches, Nematoda, Copepoda, biodiversity.

A REGIONAL SCALE, SEASONAL STUDY OF THE INTERTIDAL AND SUBTIDAL MEIOFAUNAL MAJOR TAXA AND NEMATODE AND COPEPOD BIODIVERSITY AND SPECIES ASSEMBLAGES OF KUWAIT, ARABIAN GULF

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Following the widespread environmental perturbations associated with the Gulf war (1990/91) the meiofauna was included in a long-term monitoring programme for intertidal and subtidal habitats in Kuwait in order to investigate their potential as bioindicators. A significant advantage of their use in this objective being their abundance in habitats such as the upper shore on sandy beaches where macrofauna may be scarce or even absent.
In this study, all major taxa and nematode and copepod species were identified from over 500 intertidal and subtidal sediment samples. Over 900 nematode species were found, together with more than 300 copepod species: some 90% of species were new to science and included not only new genera, but also new families. Both diversity and abundance of meiofauna in Kuwait were within, or exceeded, the ranges reported for similar habitats elsewhere in tropical and temperate regions. Diversity and abundance showed significant differences linked to both regional variation and sediment grain size, with highest numbers occurring at southern stations on Kuwait's coast and lowest diversity and abundance of both nematodes and copepods occurring in anoxic subtidal muds. The study also revealed profound seasonality of abundance for many taxa.
This study represents one approach to meiofaunal monitoring in a region where the fauna is essentially unknown, and in this respect has similarity with deep sea studies. The survey forms a major contribution to marine science in Kuwait, and provides an essential first database for future pollution and ecological research. The study also poses questions in relation to the completeness of biological surveys and species lists and can be related to emerging molecular methodologies.

Keywords: Kuwait, meiofauna, biodiversity, Nematoda, Copepoda.

MEIOFAUNAL RESPONSE TO NUTRIENT ADDITION IN A MEDITERRANEAN STREAM

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The effects of a moderate nutrient addition were examined during a 2-year period for its response on a meiofaunal community inhabiting sandy patches in a Mediterranean stream. The pattern of meiofaunal assemblages reflects a high intra- and inter-annual variability that alternates between periods of hydrological stability and disturbances such as floods and droughts, a characteristic of Mediterranean systems. For that reason, a before-after-control-impact (BACI) design was used to determine the outcome of the addition by comparing three upstream non-enriched reaches with an enriched one downstream. Results were analyzed using a non-parametric procedure (Permanova) which showed us that small differences in geomorphology in the three different control reaches may have concealed the effects of the nutrient addition. However, these effects were evident when we compared the impacted reach and its closer control reach. Differences in density and biomass were significant in the most abundant meiofaunal groups, like microcrustaceans, oligochaetes and chironomids. Microcrustaceans were the foremost contributor of the permanent meiofauna and we also examined differences in the secondary production in both reaches. Ostracods and cyclopoid copepods increased their secondary production in the impacted reach as a result of the nutrient addition. In our stream, the meiofaunal compartment does not seem to be directly affected by the nutrient release in water but its effect on the enrichment of the detritus in which they feed and live seems to be the right pathway.

Keywords: secondary production, microcrustaceans, freshwater, eutrophication.

STAGGERING SPECIES DIVERSITY OF HARPACTICOIDA (CRUSTACEA, COPEPODA) IN THE DEEP SEA OF THE ANGOLA BASIN (SOUTHEAST ATLANTIC)

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DIVA 1 was the first of three cruises realized so far within the CeDAMar deep-sea project DIVA (Latitudinal Gradients of Deep-Sea Bio**DIV**ersity in the **A**tlantic). It took place in July/August 2000, sampling several locations in the Angola deep-sea basin off Namibia. Investigations on the alpha-diversity of the harpacticoid fauna (Crustacea, Copepoda) of two repeatedly sampled stations using the Multicorer (MUC) (southern station #325 and northern station #346) revealed for the first time a significant diversity difference between two abyssal sites (Rose *et al.*, 2005). While studies on alpha-diversity do not necessarily require explicit over-all taxonomic species determination, detailed community analyses of benthic associations certainly do. Recently, the Harpacticoida sampled at the above mentioned stations have been determined completely. In total, 16,350 specimens were collected. For further multivariate analyses, 75 MUC cores were randomly selected. They yielded 7,082 Harpacticoida, 4,860 (68.6%) of which being copepodids and 2,222 (31.4%) being adults. More than ¾ of the adult specimens are females. Due to damages, 67 individuals had to be excluded. Thus, a number of 2,155 adult Harpacticoida were analysed at species level. They distribute over 683 species, being only five (0.73%) known from other localities. More than half of the species (385, i.e. 56.4%) are represented by singletons, whereas few species like e.g. *Argestes angolaensis* George, 2009 (Argestidae) show remarkably high individual numbers. The results of a detailed community analysis are presented. They confirm a significant difference between the two Angola-basin stations.

Keywords: Copepoda Harpacticoida, deep sea, faunistics, diversity, Atlantic Ocean.

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IS HIGH DIVERSITY AN INSURANCE AGAINST THERMAL STRESS? ASSESSING THE RESPONSE OF A MEIOFAUNAL COMMUNITY IN A MICROCOSM EXPERIMENT

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Biodiversity has diminished dramatically over the past decades with climate change being among the main responsible factors. Increasing sea surface temperature is one of its consequences, and may put ecological services at risk due to changes of community patterns and the loss of species. Several associations between biotic diversity and ecosystem function have been proposed, among them the model based on functional redundancy where species' functions overlap, allowing high diversity communities to maintain the functioning of the system in the case of species loss (Insurance Hypothesis, IH). In order to test the hypothesis, whether functional overlap existed in intertidal marine nematodes, and whether this could act as an insurance against stressful conditions, we assessed the response to thermal stress of two marine nematode assemblages exhibiting contrasting levels of taxonomic diversity in a microcosm experiment. Both communities stemmed from a beach of the northern Gulf of California, a marine biodiversity hotspot exceptionally prone to sea temperature increase (8 °C over the past century). Our results do not support the IH but rather suggest that each species contributes to the functioning according to the Rivets model. Although both assemblages lost species due to the high temperature, the high diversity assemblage suffered a larger impact on the functioning by loosing the trophic group of large predators and omnivores. The low diversity assemblage consisted of an original species pool of stress-resistant species, presumably due to the fact that it stemmed from a more exposed part of the beach. Our results show that species identity rather than diversity may play an important role for stress resistance, and that environmental stress may have important consequences for the benthic food web. We suggest that microcosm experiments with meiofaunal communities provide a promising tool for further studies on this highly relevant subject.

Keywords: free-living marine nematodes, microcosm experiment, temperature rise, diversity, ecosystem functioning.

SUCCESSION OF DEEP-SEA HYDROTHERMAL VENT MEIOBENTHOS AFTER A VOLCANIC ERUPTION AT THE 9°50'N EAST PACIFIC RISE REGION

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Catastrophic volcanic eruptions and toxic hydrothermal fluid emissions make the chemosynthetic based, deep-sea hydrothermal vents one of the most extreme habitats on earth. Well studied vents are known from the 9°50'N region at the East Pacific Rise where megafauna such as vestimentiferan tubeworms or bathymodiolin mussels create as foundation species niches for a highly abundant epizooic macrofauna, but low abundant meiofauna community, both being low in diversity. In 2006, a major volcanic eruption destroyed most of the living beings in this area. This allowed us to study the so far unknown successional patterns of vent meiofauna. We sampled in a variety of benthic locations with and without vent flux to investigate the temporal and spatial patterns of hydrothermal vent communities over a time course of about 5 months to 4 years post eruption. Meiofauna abundances were similar low (usually <100 ind.10cm^{-2}) at sites of different age and different vent flux regimes, and similar to numbers reported for meiobenthos from older hydrothermal vent fields prior eruption. Measurements of particulate organic matter and bacterial abundances revealed higher values at sites with influence of vent flux than those on bare basalt and in dead megafauna aggregations without vent flux. These findings show that bottom-up regulation is unlikely for the primary consumer meiofauna community at active vents. Interestingly, macrofauna abundances were higher than meiofauna abundances at active sites, suggesting that top-down control might play a crucial role. The first colonizers were copepods, present already five months post eruption. They dominated the early succession stages of the communities. In later succession stages, nematodes became more abundant. First identifications showed that species found post-eruption were already known from well developed communities prior eruption. Further investigations will give insight into detailed diversity patterns during all stages of succession.

Keywords: succession, deep-sea hydrothermal vents, community ecology.

FISH FARM IMPACT ON MEIOFAUNA; HARPACTICOID COPEPOD SPECIES COMPOSITION AND 13C ISOTOPE SIGNALS

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Throughout the world fish farming activities have been rapidly increasing over the last decades and along with that the need for monitoring organic pollution. The structural and functional diversity of meiofauna (especially harpacticoids) was studied around a finfish farm in the shallow Bay of Piran (North Adriatic), characterised by muddy bottom. The harpacticoid family Miraciidae was dominant throughout the study area. Under the fish cage one species, *Bulbamphiascus* n.sp.1, largely dominated the harpacticoid assemblage. Already at 6m away from the cage this dominance drops markedly. The harpacticoid diversity increases from 3-7 species per 10cm^2 in cage samples to 17-25 species per 10cm^2 in the reference samples (100m away). The individual harpacticoid biomass was higher under the cage in comparison to the reference site. The presence of the fish farm is reflected also in more depleted δ^{13}C values under the fish cage compared to the reference site, as observed for (1) the sedimentary organic matter (-24.4‰ vs-21.8‰) and (2) the meiofauna (nematodes: -22.5‰ vs-17.7‰, and harpacticoids: -25.3‰ vs-20.8‰). The δ^{13}C depleted isotope signals points to microbially mediated processes. A pulse-chase experiment with ^{13}C prelabelled diatoms revealed similar feeding preferences of nematodes and harpacticoids (similar uptake of prelabelled diatoms) at the reference site. Under the fish cage however, the harpacticoids fed intensively, but the nematodes showed very limited ingestion of prelabelled diatoms.

Keywords: fish farm, harpacticoids, ^{13}C.

THE EFFECT OF *OSTREOPSIS* CF. *OVATA*, A TOXIC BENTHIC DINOFLAGELLATE, ON PHYTAL MEIOFAUNA FROM THE COASTAL NW MEDITERRANEAN

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Ostreopsis cf. *ovata* is a tropical toxic benthic dinoflagellate that recently occurred in the shallow coastal NW Mediterranean where its blooms have caused health problems on humans in contact with the cells whether epiphytic, planktonic or in sea spray. As part of the MediOs 2 project within the French research program Liteau III, we investigated the possible effects of this toxic microalga on the metazoan meiofauna inhabiting the brown macroalga *Stypocaulon scoparium* where *Ostreopsis* develops preferentially. The macroalga was sampled in triplicates at 0.5m depth in six stations along the French and Italian coasts on seven occasions in 2008. Toxic cells bloomed in summer in three out of the six stations with concentrations ranging between 250,000 and 660,000 cells.g^{-1} macroalgal wet weight. Metazoan meiofauna densities ranged between 1,274 and 8,646 ind.g^{-1} macroalgal spin-wet weight. First statistical analyses revealed that changes in the community structure were associated with high concentrations of *Ostreopsis*. The most affected taxon was the nauplii suggesting a negative impact of *Ostreopsis* on harpacticoid copepod reproduction.

Keywords: phytal meiofauna, *Ostreopsis*, harmful algal blooms.

ANDEEP-SYSTCO (ANTARCTIC BENTHIC DEEP-SEA BIODIVERSITY: COLONISATION HISTORY AND RECENT COMMUNITY PATTERNS – SYSTEM COUPLING), FROM CENSUS TO ECOSYSTEM FUNCTIONING

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Vast areas of the Southern Ocean surrounding the Antarctic continental shelf are deep sea. In contrast to our knowledge of the benthos in Southern Ocean shelf areas, corresponding data from the deep sea are still scarce. While the pioneering investigations of ANDEEP I-III have revealed benthic biogeography patterns and a remarkable biodiversity in the Southern Ocean deep sea, there is still very little known about the ecology and role of deep-sea fauna in trophodynamic coupling and nutrient cycling in this ecosystem. To address these issues a successor to the ANDEEP project, called ANDEEP-SYSTCO, was conducted in the Atlantic sector of the Southern Ocean during the RV *Polarstern* expedition ANT XXIV-2 (28.11.2007-04.02.2008). With the support of the International Polar Year this became an international, multi-disciplinary project that has the potential to add a novel, innovative aspect to polar biological research by shedding light on atmospheric-pelagic-benthic coupling processes in the deep sea.
Within the scientific scope of ANDEEP-SYSTCO, the Marine Biology group of Ghent University participates in investigating the structural and functional biodiversity of benthic key organisms by focusing specifically on the dominant metazoan taxon: Nematoda. Therefore sediment samples collected from 49°S to 70°S between 1900m and 5300m water depth are currently being analysed for the nematode community composition and biochemical lipid and stable isotope ($\delta^{13}C$ and $\delta^{15}N$) signatures. The results will be compared and combined with the findings of research groups examining other aspects of the Southern Ocean foodweb and will lead to a better understanding of the trophodynamic role of deep-sea fauna in the ecology of the Atlantic sector of the Southern Ocean.

Keywords: deep sea, nematodes, Southern Ocean, $\delta^{13}C$ and $\delta^{15}N$, fatty acids.

NEMATODE SPECIES AT RISK – A NEW INDEX TO ASSESS POLLUTION IN SOFT SEDIMENT OF RIVERS

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Pollution of aquatic ecosystems with anthropogenic chemicals poses a serious risk to the inhabiting biota. Direct and indirect effects of toxic chemicals can cause alterations in the structure of communities of all trophic levels and, thus, disturb the functioning of the whole ecosystem. Taking care of this risk, the EU water framework directive (EU WFD) aims at a good chemical and ecological status of European water bodies until the year of 2015. However, to assess the impact of anthropogenic pollution on the ecological status, suitable tools are required that indicate pollution induced changes in aquatic communities. For macro-invertebrates, the SPEAR (SPEcies At Risk)-index has shown to be a promising tool for distinguishing effects of anthropogenic pollution from effects of other sources of stress. However, in soft sediments that are particularly of interest due to their ability to accumulate chemicals, macrobenthic communities often show a low diversity, delimiting their suitability for bio-indication. In soft sediments, meiobenthic invertebrates, such as nematodes, are more abundant and species rich and play an important role for the benthic food web.
Thus, in this study, an index for nematodes, based on the SPEAR concept, was developed to assess the impact of chemicals on benthic communities in soft sediments. For this purpose, a large data set of nematode assemblages from unpolluted and polluted German river and lake sediments was analyzed using multivariate methods, in order to correlate the occurrence of nematode species with the toxic potential of the sediments (expressed as toxic units). On the basis of this analysis, nematodes were then classified in sensitive and insensitive species. Applying the new index (NemaSPEAR) to the investigated sediments and nematode communities, as well as to data from studies with microcosms that were spiked with chemicals, the NemaSPEAR appeared to be suitable for indicating chemical pollution in freshwater sediments.

Keywords: nematodes, pollution, sediment, NemaSPEAR, index.

PATTERN OF BENTHIC BIOMASS SIZE SPECTRA FROM SHALLOW WATERS IN THE EAST CHINA SEA

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Benthic biomass size spectra (BSS) and normalized biomass size spectra (NBSS) were constructed in the shallow waters in the East China Sea, including shallow waters of Bohai Sea, Yellow Sea and the Yangtze River estuary adjacent waters, which represent a latitudinal variation from 40°N to 30°N. Environmental variables including water depth, sediment median grain size (MD), sediment Chl-a and Pheo-a concentration, sediment organic matter content, varied among different Sea areas. BSS displayed the characteristic meiofauna-macrofauna trough in most of the studied stations and also showed bimodality within meiofauna size ranges, which was usually due to free living marine nematode and other meiofauna groups, in some Bohai Sea stations.

The distribution of normalized biomass by size was linear (log_2-log_2 scale) at all stations. The slope of the NBSS ranged from -0.596 to -0.956, the intercept ranged from 13.202 to 16.924. The slopes did not differ significantly among Bohai Sea, Yangtze River estuary adjacent waters and southern Yellow Sea ($p>0.05$), indicating the similar trophic conditions of these areas. There were significant differences ($p<0.05$) among the intercepts of the NBSS from the stations located in different Sea area, indicating the different ecosystem with different biomass level. The results we observed were consistent with the actual benthic total biomass level. A biomass ranking of Yangtze River estuary adjacent waters > Bohai Sea > Yellow Sea over space was suggested. In fact we also observed that there was a tendency towards a decrease in the intercept of NBSS with water depth increase.

Secondary production of benthos was predicted by NBSS model in Bohai Sea stations. The secondary production of macrofauna and meiofauna was 4.509 g DW m^{-2} a^{-1} and 2.208 g DW m^{-2} a^{-1}, respectively. A comparison based on the NBSS model with other empirical models computation suggested that the results were much the same. The NBSS model might be another choice for benthic secondary production estimate.

Keywords: biomass size spectra, macrofauna, meiofauna, the East China Sea.

THE IMPACT OF DEEP-SEA CANYON CONDITIONS ON MEIOBENTHIC STRUCTURE AND FUNCTION

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For this study five deep-sea submarine canyons and one slope area in the NE Atlantic were investigated within the framework of the EU FP6 HERMES project. Nematodes were used as a key group within the deep-sea meiobenthos. This study provides previously unavailable data on nematode structural and ecological diversity in canyon and referential slope sites, the intricate relationship between both, and their relation with local environmental conditions. The results suggest that community differences are mainly attributed to biogeochemical gradients along the vertical sediment profile rather than any other spatial scale. The link between trophic and structural diversity varied between different canyon ecosystems and suggests that the answer to the question 'what maintains diversity in canyon ecosystems?' cannot be answered unilaterally. Enhanced hydrodynamic regimes characteristic for canyons have a profound influence on nematode structure and ecology, the link between trophic and structural diversity, and may – when attaining destructive proportions preclude the establishment of meiobenthic communities. The quality and quantity of the sedimentary organic matter dictates the characteristics of the nematode community, which seems to be adapted to the prevailing conditions. Interestingly, the hydrodynamic activity influenced the meiobenthic relation with available food: the more intense the disturbance, the tighter the relation between the nematode community and the quality and quantity of organic matter seemed to be.

Keywords: deep sea, nematodes, submarine canyons, structural diversity, functional diversity.

ACOELA THE MOST NEGLECTED MEIOFAUNA?

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Acoela (formerly classified as a subgroup within the flatworms) are abundant in many marine habitats such as mud or sandy sediments. Acoels must be identified alive and they are destroyed by conventional sampling and preservation techniques. Hence they are grossly underrepresented in most accounts of the composition of the meiofauna. Here a few examples of new acoel species are presented as illustrations to a phylogenetic analysis of the group. The phylogenetic hypothesis for Acoela is based on nuclear and mitochondrial genes and morphological characters from 120 acoel species. Our results necessitate a reclassification of the acoel family level taxa.

Keywords: Acoela, phylogeny.

MICROMETAZOAN ABUNDANCE AND TAXA CHANGES ON DIFFERENT AGED STEMS OF *SPARTINA ALTERNIFLORA*

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Age and resultant changes in smooth cordgrass stems likely affects resident micrometazoan communities. In southeastern USA salt marshes, >50% of all marsh micrometazoans reside on stems. To assess the effects of stem age on density and composition, both static and cohort studies were conducted at a South Carolina mid-marsh site. In the static study stems were collected throughout the growing season and categorized as either juvenile (<30cm live), mature (~1m live), or senescent stems (standing-dead). Prior to the growing season, the cohort study tagged >200 tillers and a subsample of the tagged stems were collected monthly. All fauna on the bottom 10 cm of stem were extracted and identified to lowest possible taxon. Stem fauna were predominated by nematodes (55%) followed by harpacticoid copepods (15%) and halacarid mites (12%). Static study faunal densities were significantly greater on either standing-dead (# / 10 cm^2) or early tillers (# / 100 mg). The relationship among area and dry mass suggest fauna are using stems primarily as a habitat and not directly as a food source. Similar nematode and copepod numbers resided between stem leaf sheaths or inside stem tissue as on the exterior of the stem. Faunal densities on cohort stems varied but were not significantly different throughout the season. Actual stem age did not appear to influence the numbers of micrometazoans residing on stems. Contrary to expectations, faunal densities were greater on standing-dead or early tillers depending on the method of standardization. Micrometazoans appear to colonize stems rapidly and utilize stem surfaces primarily as a habitat and not directly as a food source. The consistent predominance within marsh systems, ubiquity across all stem ages, and possible indirect roles in organic matter recycling suggest stem-associated fauna are a critical if understudied component within one of the most productive marine habitats.

Keywords: *Spartina alterniflora*, stem fauna, cohort study, stem age.

HOLOCENE POPULATION HISTORY OF TWO COMMON MARINE GASTROTRICH SPECIES IN THE NORTH SEA / BALTIC SEA AREA INFERRED FROM MTDNA SEQUENCE VARIABILITY

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Phylogeographic patterns of small aquatic animals (i.e. meiofauna) have been studied in several systematic groups. In the majority of cases a clear geographic structure at the level of DNA sequences was discovered, sometimes indicating the existence of cryptic species complexes. While deep phylogeographic patterns in meiofauna organisms are recognized at a global spatial scale, in some groups such as rotifers or nematodes those patterns were even apparent at a remarkably regional spatial scale.
Mitochondrial DNA variation has been studied in the amphi-atlantic species *Xenotrichula intermedia* (Gastrotricha) by RFLP indicating the existence of two cryptic sibling species. However, the present study is the first approach to discover phylogeographic patterns of a marine gastrotrich. For this purpose, DNA sequences of a fragment of the mitochondrial cytochrome oxidase subunit I gene (CO I) of two common and closely related species, *Turbanella cornuta* and *T. hyalina*, have been analyzed. Specimens were collected from different geographic populations of the eastern North Sea and the western Baltic Sea. The preliminary results of this wider project indicate a clear phylogeographic structure of *T. cornuta* even at a rather regional spatial scale. The revealed patterns can be explained by the holocene history of the whole North Sea Baltic Sea region, i.e. populations were sundered historically by geographic barriers and evolved independently for a certain time period before habitat connectivity was recovered again. More general outcomes of this pilot study are 1) that the used marker (CO I) is suitable to resolve phylogeographic patterns within marine gastrotrich species and 2) that sequence distance among species indicates the use of CO I for DNA barcoding in Gastrotricha.

Keywords: Gastrotricha, phylogeograpy, CO I gene.

PRACTICAL CONSIDERATIONS FOR THE STUDY OF DEEP-SEA NEMATODES: IMPLICATIONS FOR ENVIRONMENTAL MONITORING AND UNDERSTANDING OF ECOLOGICAL PROCESSES

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Increasing threats to deep-sea communities from anthropogenic disturbance, such as bottom-trawling and seabed mining, raise concerns about potential impacts on the continued provision of ecosystem services by such environments. Nematodes may provide a useful tool for monitoring deep-sea sediment communities, but our ability to determine the magnitude and rate of environmental change depends on a thorough assessment of the methods employed in their study.
We studied the effect of mesh size (32, 45, and 63µm) on estimates of nematode abundance and community structure at bathyal sites (240-1240m water depth) on the Challenger Plateau and Chatham Rise, south-west Pacific Ocean. Variation in the proportion of nematodes retained by each mesh size was assessed in relation to environmental parameters (water depth, % silt/clay, and pigments). Surface (0-1cm sediment depth) and subsurface (1-5cm) nematode communities were analysed separately.
The 63µm mesh retained a relatively low proportion of total nematode abundance (ca. 55%), but most of nematode biomass (ca. 90%). The proportion of nematode abundance retained on the 32µm mesh in surface (0-1cm) and subsurface (1-5cm) sediment was significantly correlated with % silt/clay and pigments, respectively, which suggest that different environmental factors affect the size distribution of surface and subsurface nematodes. The 63µm mesh yielded significantly lower diversity estimates than the finer mesh sizes, and failed to detect differences in community structure observed using the 45 and 32µm mesh sizes. Greater core penetration into the sediments (i.e., 0-5 versus 0-1cm) led to significantly higher diversity estimates due to vertical gradients in nematode community structure. Power analysis showed that using a 32µm mesh and deepest core penetration (down to 5cm) led to relatively few (3-8) samples being required to detect significant changes in nematode diversity indices relative to coarser mesh sizes. These findings suggest that characterization of nematode diversity and community structure, using appropriate and robust methods of sampling, is a sensitive and efficient tool for the assessment of anthropogenic impacts on deep-sea ecosystems.

Keywords: sample processing methods, environmental monitoring, power analysis, biodiversity, continental slope.

LATITUDINAL VARIATION IN THE SPECIES RICHNESS OF FREE-LIVING LITTORAL MARINE NEMATODES ALONG THE COAST OF CHILE

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Free-living nematodes are one of the most important phyla present in the marine benthos, in terms of both their diversity and abundance. Within the Chilean benthos 320 species have been documented to date. However, the macroecology of this group in the southern hemisphere remains unexplored. In the present study the species richness of the free-living nematodes along the entire coast of Chile was investigated using the information currently available in the literature. This data was analysed in relation to the complexity of the coastline, measured as a fractal dimension for each degree of latitude along the coast. Chao estimator analysis of the data predicts that there should be at least 835 species of nematodes within the Chilean benthic fauna. Nematode species richness increases with increasing latitude, a pattern that is contrary to that predicted by standard macroecological theory. This pattern was positively associated with coastline complexity, the fractal dimension per degree of latitude increases with latitude. The distribution of nematode species along the coast of Chile was compared to the currently recognised bioregions. The nematodes are divided into northern (Peruvian) and southern (Magallenic) faunas, partially supporting the bio-regions described in the literature. However, a considerable proportion of the fauna (30%) was cosmopolitan, and there was no clear support for the transition zone between the two bio regions. The problems and biases in the currently available data, and the strategies currently being employed to address them, will be discussed. Acknowledgement: Proyecto Fondecyt 1080033.

Keywords: Nematoda, macroecology, Chile, species richness, bioregions.

MORPHOLOGICAL ABNORMALITY OF COPEPODS AND ITS APPLICATION

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Morphological abnormality is frequently observed from planktonic copepods and also benthic harpacticoids. Information on morphological abnormality was usually ignored in the taxonomical descriptions, but some authors recorded abnormality as variability in copepods in their papers. Those abnormal structures include all the level of unusual features in seta number, segmentation, and body forms and inter-sexual characteristics as well. Our research group has observed morphological abnormalities in the natural populations of several copepod species including *Pseudodiaptomus inopinus*, *Sinocalanus tenellus*, and *Acanthocyclops robustus* sensu lato. Those copepods revealed a high frequency of abnormality in the natural population. A batch of *Tigriopus japonicus* sensu lato was cultured and observed its induced abnormality by various stressors including UV, endocrine disruptors, and antibiotics. The results clearly indicated that stressors can induce morphological abnormality of copepods and in turn, morphological abnormality can indicate affection of stressors. This relationship can be a useful tool to monitor pollution and safeties of environment. Morphological abnormalities are meaningless as taxonomical characters to identify copepod species; however they can be useful and meaningful in ecology, especially in environmental monitoring and toxicological studies.

Keywords: morphological abnormality, harpacticoids, UV, environmental monitoring.

NEMATODES BIOMASS AND MORPHOTYPES AS ECOLOGICAL INDICATORS

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Nematodes allometric attributes (size spectra, body width, morphotypes) and metabolic rates were measured and related to the environmental quality of different sediments located in the Tyrrhenian Sea to investigate their possible use as ecological indicators. The sediment quality of the investigated areas was defined by measuring some physico-chemical and environmental variables, such as Eh and the quantity and biochemical composition of organic matter.
The NBS spectra proved to be extremely valuable in determining differences in the environmental quality of the sediments both on a spatial and a temporal scale. A general reduction in number of peaks and in the number of size classes, shown by the NBS, was observed in organic-rich sites compared to control sites. These findings were related to a lower diversity of the nematode communities in these sites, with the predominance of tolerant genera such as *Daptonema*, *Paracomesoma*, *Sabatieria*, *Setosabatieria* and *Terschellingia*. Among the allometric variables measured, the morphotype length:width ratio (L/W) proved highly informative and sensitive to assess changes in environmental quality of marine sediments. In particular, L/W values were found to be negatively correlated with oxygen concentrations and organic matter quality (protein:carbohydrate ratio), suggesting that this morphotype is an indicator of the functional adaptation of nematodes to the changing environmental conditions.

Keywords: nematodes, biomass, morphotypes, size spectra, organic enrichment.

TEST OF A SELECTIVE FEEDING MODEL FOR MEIOFAUNA IN A RIVER EPILITHIC BIOFILM

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The calanoid copepod species complex *Eurytemora affinis* is a typical and dominant inhabitant of temperate estuaries. Tackx *et al.* (2003) showed that *E. affinis* in the Scheldt Estuary selects phytoplankton over suspended particulate matter. They fitted a model of gut fluorescence to field observations which shows that the success of phytoplankton selection as a function of the ratio chlorophyll a / suspended particular matter concentration follows a Monod-type function. As in the Scheldt Estuary, the epilithon (phototrophic epilithic biofilm) of the Garonne River (France) also provides temporal variations of the ratio microalgal biomass / biomass of the other potential feeding sources (detritus, bacteria, etc.). Gut pigments contents of meiobenthic organisms (nematodes and rotifers) were measured by HPLC to study their potential selective behaviour on the epilithic algae community. We focused on the two dominant rotifers taxa (*Proales sigmoidea* and Bdelloids) and on the nematode community (dominated by *Chromadorina bioculata*). Our long-term objective is to test if this model can be generalized to several consumers in aquatic systems which provide a preferred prey / other potential preys gradient.

Keywords: epilithon, nematodes, rotifers, selectivity, streams.

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PHYSICAL AND BIOTIC FACTORS INFLUENCING NEMATODE COMMUNITIES IN SANDY BEACHES

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Sandy beach ecosystems are known to be driven by physical factors that exhibit large fluctuations due to the presence of tides. Tides induce changes in interstitial water content, temperature, salinity and food availability in the benthic ecosystem. So far most research on the ecology of sandy beaches was performed on the larger macrobenthos, while the effect of the changing interstitial environment on the ecology of the meiofauna was largely neglected. In addition, recent sandy beach research stressed the importance of biotic interactions as structuring factors for the distribution patterns of sandy beach species. Therefore, two aspects are studied here: (1) to what extent is vertical distribution of the nematodes in the sediments driven by tidal regimes and (2) does bioturbation by macrobenthic species influence the nematode communities in the sediment? A dual approach, including field and lab experiments was applied. We show that the tidal regime is very important for structuring the vertical distribution of nematode communities as a species-specific migration of nematodes during different phases of the tidal cycles was observed. Upward movements of a predator, *Sigmophoranema rufum*, and some smaller deposit feeding nematodes during submersion were observed while the predator *Enoplolaimus littoralis* migrated upward during emersion. Experimental results showed that the presence of *Scolelepis squamata* (a polychaete) did not influence the horizontal distribution patterns of the nematode communities, but one nematode species, *Enoplolaimus littoralis*, was a rapid colonizer comparing to the other species. The results suggest that physical forcing induced by the tides and biotic interactions within the nematode communities are driving forces of the vertical distribution patterns of nematode communities, while there is no clear evidence that *Scolelepis* structures the horizontal distribution of nematode communities of sandy beaches.

Keywords: tides, migration, horizontal distribution, disturbance.

ARE GEOGRAPHIC BARRIERS INSURMOUNTABLE OBSTACLES FOR DEEP-SEA MEIOBENTHOS? INVESTIGATIONS ON THE BIOGEOGRAPHY OF DEEP-SEA ORGANISMS IN THE CASE OF THE *MESOCLETODES ABYSSICOLA* GROUP (COPEPODA: HARPACTICOIDA: ARGESTIDAE)

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The family of Argestidae Por, 1986 belongs to the benthic living harpacticoid copepods. They are primarily found in deep-sea samples and show a worldwide distribution. 50% of all Argestidae detected in deep-sea material belong to *Mesocletodes* Sars, 1909. Within this genus, members of the *Mesocletodes abyssicola* group are distinctly separated from the remaining congeners of *Mesocletodes*: strong cuticular processes on cephalothorax and/or telson and extremely elongated furcal rami are interpreted as apomorphic to the *M. abyssicola* group. The combination of their conspicuous morphological features, their comparatively large body size (ca. 1mm) and their cylindrical formed body allows fast recognition in samples of metazoan meiobenthos. Moreover, compared with other harpacticoid species, a fairly high number of specimens per species is found for the *M. abyssicola* group in sampled material from remote deep-sea regions. For these reasons, they are considered as an ideal taxon to investigate distribution patterns for deep-sea Harpacticoida at species level. For instance, *Mesocletodes robustus* Por, 1964, which was described from a fjord in Norway, was found in deep-sea samples of the Southeast Atlantic (campaign DIVA), Southern Ocean (campaign ANDEEP), the equatorial Pacific (campaign NODINAUT) and even in the eastern Mediterranean Sea in depths of 180m only. In conjunction with data on benthic deep-sea organisms, collated during the Workshop on Cosmopolitan Deep-Sea Species in December 2008 (Wilhelmshaven, Germany), these findings lead to the assumption that geographic barriers like undersea ridges or continental masses do not prevent the dispersal of meiobenthic deep-sea organisms.

Keywords: deep sea, distribution, Harpacticoida, meiofauna, *Mesocletodes abyssicola* group.

WHEN IS A HABITAT SUITABILITY MODEL A RELIABLE MODEL? RANDOMIZATION TECHNIQUES IN HABITAT SUITABILITY MODELLING

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Biodiversity and the conservation of species is a major concern in ecology nowadays.
Species are driven to extinction at a high rate due to the loss of suitable habitats. The natural habitats in the oceans are endangered, especially the sea bottom is under peril due to bottom trawling, aggregate extraction, dredging and dumping. These habitat disturbances may threaten species to disappear. Habitat suitability models can therefore be an important tool in protecting and conserving species. However, it is of major importance that the models are beyond discussion. Thus models need to be tested profoundly before they can be considered for conservation. Several potential pitfalls need to be circumvented during modelling: spatial autocorrelation, preferential sampling and overfitting.
In this study several validation techniques were applied to an extensive dataset of marine nematodes of the Southern Bight of the North Sea. The modelling software is MaxEnt. First, null-models help in identifying models significantly different from random (Raes and ter Steege, 2007). These null models can be considered as 'random species', which can be selected from the complete area or from the actual sampling stations. In this way the influence of preferential sampling can be estimated. Second, this approach is combined with a 5-fold-cross-validation, which deals with overfitting of the model algorithm. And finally, in order to detect the influence of spatial autocorrelation, this method is further improved by selecting datasets which are spatially independent.
Initially, about 85% of the 223 nematode species result in different from random models. However, if preferential sampling is taken into account only 60% of the species seem to be different from random. This number reduces even further when spatial autocorrelation is considered; independent datasets with a minimum distance of 5 or 10 km can be created for respectively 68% and 62% of the 223 species. From these remaining species only 44% result in non-random models.
Therefore, in order to create trustworthy non-random models, preferential sampling and spatial autocorrelation should always be considered.

Keywords: Nematoda, habitat suitability models, null models, preferential sampling, spatial autocorrelation.

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A RECOVERY OF THE NEMATODE ASSEMBLAGE FROM THE DEEP-SEA NODULE FIELD (CLARION-CLIPPERTON NODULE PROVINCE, PACIFIC) IN 26 YEARS AFTER THE EXPERIMENTAL DREDGING

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To date, deep-sea polymetallic nodule fields are considered as a potential resource for some commercially important metals. In 1978, the American consortium OMCO conducted an experimental deep-sea dredging in the area of French mining claim (Clarion-Clipperton Nodule Province, Tropical Eastern Pacific). In 2004, during the NODUNAT research cruise (RV 'L'Atalante'), samples were collected within the 26 years-old dredging track and in the surrounding undisturbed area. Because of the very low sedimentation in this region (3–8mm per 1000 years), the sediment structure of the track was not recovered in 26 years, and it looks fresh. The taxonomic composition, the diversity, and the density of nematofauna within and outside the track were compared. In total, 2243 nematode specimens from 24 samples were examined. The analysis of similarity revealed, that the track nematode assemblage significantly differed from the 'undisturbed' nematode assemblages at species, genus, and family levels. Among species, the single assemblage with dominating *Theristus discolensis* and *Thalassomonhystera* sp. 3 occurred at the undisturbed area. At the track, *Theristus discolensis* also was the most abundant species, however *Thalassomonhystera* sp. 3 was only at the fifth position, and the second place belonged to *Oncholaimus* sp. 3, which was very rare at the undisturbed area. Both at species and at genus and at family levels, the biodiversity indices (evenness, Shannon's index, number of taxa expected in a sample of 51 individuals) for the track nematode assemblage were significantly lower than for 'undisturbed' nematode assemblages. The average nematode density in the samples from the track was also significantly lower than in surrounding undisturbed areas (42.8 ind.10cm^{-2} versus 103.5 ind.10cm^{-2}). These results indicate that, at least in some deep-sea regions of the World Ocean, the abyssal nematofauna can recover very slowly after an anthropogenic disturbance.

Keywords: deep sea, disturbance, Nematoda, Pacific.

BIODIVERSITY OF DEEP-SEA TANTULOCARIDA FROM THE SOUTHEASTERN ATLANTIC OCEAN – FIRST RESULTS OF DIVA 2

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Tantulocaridans are highly specialized ectoparasitic crustaceans that use exclusively other marine crustaceans as hosts. 33 species and 23 genera are currently known, but their true diversity has yet to be revealed. Since new species are continuously being discovered, it is assumed that the present number of described species greatly underestimates their actual diversity.
Multicorer samples for meiofaunal study were taken at five locations during the DIVA 2 expedition to the southeastern Atlantic Ocean in 2005. A total of 386 Tantulocaridans were extracted from 157 cores obtained during 32 deployments of the corer at depths between 5025 and 5655m. All tantulus larvae were determined to species level based on morphological characteristics. Extensive examination of the larvae revealed a high diversity of tantulocaridans in the Atlantic deep sea. Proportion of species represented by single individuals is high and indicates that much more sampling is needed to adequately represent the species richness.
This talk presents first insights into the large-scale biogeography of deep-sea Tantulocarida and indicates that distribution ranges may extend across South Atlantic and Southern Ocean Abyssal Plains.

Keywords: Tantulocarida, deep sea, DIVA 2.

ON THE ECOLOGICAL FUNCTIONING OF MEIOFAUNA IN INTERTIDAL SEDIMENT

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Nematodes are a common and often dominant meiofauna component but are rarely found to play a key role in the initial stages of organic matter (OM) transformation as documented in deliberate ^{13}C-enriched OM tracer addition experiments on the benthic fate of OM. However, elucidating their ecological significance and functioning calls for a better understanding of the factors governing and sustaining co-existing meiofauna taxa. Here we report on a series of isotope pulse-chase experiments demonstrating strong resource selectivity among the common taxa and that metazoan meiofauna versus Foraminifera contribution to fresh organic matter recycling varies depending on bottom water oxygenation. Finally, utilising fatty acid composition patterns and fatty acid biomarker carbon isotope signatures we demonstrate trophic niche segregation among the common taxa and show that the intertidal meiofauna were sustained by both photosynthetically and chemosynthetically derived carbon.

Keywords: intertidal nematodes and foraminifera, stable carbon isotopes, pulse-chase experiments, hypoxia, trophic niche segregation, fatty acids.

DISTRIBUTION OF HARPACTICOID COPEPODS IN THE HYPORHEIC ZONE OF A GRAVEL STREAM: THE ROLE OF ENVIRONMENTAL FACTORS OR BIOTIC INTERACTIONS?

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Relatively little is known about how environmental factors and biotic interactions influence the distribution of harpacticoids within the vertical profile of bed sediments in running waters. The harpacticoid assemblage was studied in the hyporheic zone of a 4th order gravel stream with natural discharge fluctuations during 2002-2004. Freeze-core samples of sediment were taken at three sites with different hydraulic conditions down to the depth of 70cm. Important environmental factors (i.e. surface water temperature, discharge, flow velocity, sediment structure and organic carbon content) were measured and used to explain the variation in the harpacticoid distribution. To indicate biotic interactions the degree of overlap in the distributions of (1) harpacticoids and other hyporheic invertebrates and (2) individual harpacticoid species was tested. The harpacticoid density ranged between 0 and 280 ind.dm^{-3} and proved to be significantly affected by environmental factors, especially by the flow velocity and water temperature. No evidence for a competition between harpacticoids and other invertebrates was found; their densities rather co-varied, showing similar responses to the environment. Seven harpacticoid species were identified but only two of them dominated (nearly equally) the assemblage. The distributions of the two species overlapped for most of the season but tended to diverge when the surface water temperatures dropped close to zero. This suggests a possible inter-species competition under the condition of limited food resources.

Keywords: harpacticoids, hyporheic zone, freeze-core, flow velocity, water temperature, competition.

SMALL-SCALE SPATIAL HETEROGENEITY IN STRUCTURAL AND TROPHIC DIVERSITY OF MEIOFAUNA ASSOCIATED WITH METHANE SEEPAGE AT THE DARWIN MUD VOLCANO (GULF OF CÁDIZ)

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The Darwin mud volcano (MV) in the Gulf of Cádiz (1100m) was sampled for meiofauna and pore-water geochemistry along a 10-m transect from a seep site on the rim of the crater (referred to as 'black spot' or 'BS') towards the slope. We wanted to know (1) what the small-scale influence is of pore-water composition on meiofaunal distribution (2) if BS sediments are colonized by a specialized community compared to the control sediments (3) the dietary composition of the nematodes as inferred by stable isotope analyses and the change in trophic diversity along the transect, and finally (4) whether higher structural diversity is associated with higher trophic diversity. Both the BS (> 2cm) and the site 2m (> 10cm) from the BS showed signs of anaerobic oxidation of methane, associated with considerable microbial production, which can be fed upon by the meiofauna. Overall, meiofaunal densities and biomass in BS sediments exceeded those in control sediments. Highest meiofaunal densities and nematode biomass were observed at 2m from the BS. This can be attributed to the absence of sulfide in the upper sediment layers in conjunction with the high microbial biomass in the deeper sediment layers. The lower densities in BS sediments are likely due to the high sulfide levels (up to 20 mM), creating a harsh environment for the infaunal community. BS sediments were dominated by *Sabatieria* (44%) and *Desmodora* (20%). *S. vasicola* and *S. punctata* were the dominant species at the BS and were never found at the other sites. Genus diversity increased with increasing distance from the BS, with an MDS analysis revealing a gradual transition in genus composition. Stable isotope analyses revealed nematodes were feeding mainly on free-living sulfur-oxidizing bacteria. However, with increasing distance from the BS, the contribution of photosynthetic carbon to the nematode diet increased, leading to an increase in trophic diversity. Finally, trophic diversity tended to increase with structural diversity.

Keywords: nematodes, mud volcano, stable isotopes.

THE TOXICOLOGICAL INTERACTION BETWEEN OCEAN ACIDITY AND METALS IN COASTAL MEIOBENTHIC COPEPODS

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Increased atmospheric CO_2 concentrations result in greater dissolution of CO_2 in seawater and ultimately to ocean acidification. This work is first to examine the sensitivity of coastal harpacticoid copepods to acidity. We manipulated sea water acidity by addition of HCl and by increasing CO_2 concentration and observed that both *Amphiascoides atopus* and *Schizopera knabeni* were more sensitive to acidity that was generated by elevated CO_2 concentrations. Thus, the use of HCl to mimic ocean acidification may lead to underestimate toxicity. The mud dwelling species *S. knabeni* was more tolerant to CO_2 than *A. atopus* associated with cobble. As mud is a more hypercapnic environment than cobble, this result suggests that animals dwelling in naturally hypercapnic environments would be relatively less sensitive to CO_2. However, overall, the present study indicates that coastal harpacticoid copepods may be relatively insensitive to acidification. Ocean acidification can influence metal speciation and thereby increase toxicity by generating a higher concentration of the free ion. However, acidification does not affect all metals in the same way, strongest speciation changes concern metals binding with carbonate. In the present study, CO_2 did not affect free ion concentration of Cd but did increase the free ion concentration of Cu. Antagonist toxicity between CO_2 and Cu was strongest taking Cu free ion than total Cu. Competition for H^+ and metals for binding sites may explain the antagonist effect observed between CO_2 with Cd and CO_2 with free-ion Cu.

Keywords: ocean acidification, metal, cadmium, copper, harpacticoid.

INVESTIGATING THE RESPONSES OF MEIOFAUNA IN POTTER COVE (KING GEORGE ISLAND, WEST ANTARCTIC PENINSULA) FROM A CLIMATE CHANGE PERSPECTIVE: AN EXPERIMENTAL APPROACH

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In this study we report results from a feeding experiment performed on Potter Cove shallow water meiofauna. In controlled laboratory conditions we added ^{13}C-labeled bacteria and phytoplanktonic diatoms (*Thalassiosira weissflogii*) on top of soft sediment cores retrieved at 15m depth in front of the Fourcade glacier. We investigated the uptake of the given food sources by nematodes, copepods and cumaceans after 5 days and 10 days of incubation time. A preference for the phytoplanktonic food source ($p<0.05$) compared to bacteria was detected for all taxa. Cumacea showed the fastest response (higher individual uptake values at 5 days) in providing with the food source probably because being good swimmers are free to access the food while it is still settling through the water column. Once the food had settled completely (5-10 days) on the sediment surface, copepods and nematodes, which are morphologically adapted for moving in between the sediment particles, could reach the food dispersed within the sediment more easily and proved to be more efficient in taking up the food than Cumacea. In this experiment, copepods are the more important meiofaunal group in terms of uptake efficacy relative to their community biomass. Global warming is known to affect the phytoplanktonic communities and may lead to enhanced bacterial degradation rates. If the microbiota becomes more important in the sediments, the freshly settled phytoplankton could be degraded more rapidly and hence, become less available for the meiofauna. This would lead to unpredictable changes in the benthic compartment functioning.

Keywords: Antarctic meiofauna, feeding ecology, climate change.

EPILITHIC NEMATODES ALONG A DEPTH GRADIENT: WHAT CAUSES CHANGES IN NEMATODE COMMUNITY COMPOSITION?

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The shallow littoral zones in lakes are often characterised by stony substrate areas that are nearly always covered by a thick periphyton layer (epilithon) – a complex community of algae, bacteria, fungi and protozoans. The epilithon is inhabited by diverse meiofaunal communities, nearly always dominated by nematodes, which, in turn, use parts of the epilithon (mainly algae and bacteria) as food resource. Epilithic communities in lake littoral zones are heavily influenced by physical disturbance (wave action), changes in light availability and are used by many macroorganisms as habitat and food source. However, these factors are known to change dramatically with increasing depth and, therefore, changing impacts on epilithic meiofauna along a depth gradient are very likely to appear. In two field studies, we investigated the distribution of epilithic nematodes along a depth gradient and tested for depth-depending herbivore effects on the vertical distribution of nematode species and other meiofauna in the littoral zone of Lake Erken, Sweden.
We hypothesised, that nematode species composition will change from a dominance of algal-feeding species in shallow parts towards a dominance of bacterial-feeding species in deeper parts of the littoral zone because of changes in conditions along a depth gradient.

Keywords: nematodes, periphyton, lakes, herbivores, feeding-types, depth distribution.

TWO NEW SPECIES OF TANTULOCARIDA AND NEW DATA ON MORPHOLOGY AND ANATOMY OF DIFFERENT LIFE STAGES OF THESE PARASITIC CRUSTACEANS

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Tantulocaridans are known to be the smallest parasitic crustaceans of copepods, ostracods, cumaceans, tanaidaceans, isopods and amphipods from all over the world. The class Tantulocarida was proposed in 1983. Since then about 30 species belonging to five families have been described. Yet information on their ultrastructure and anatomy is still scarce.

Two new species of Tantulocarida from different families were described. One individual (tantulus larva) of *Serratotantulus chertoprudae* Savchenko and Kolbasov, 2009 (Basipodellidae) was found attached to harpacticoid host from the abyssal depth of the Indian Ocean. Its tantulus is only 76µm long and represents the smallest of the described species of Tantulocarida. *Microdajus tchesunovi* Kolbasov and Savchenko, 2009 (Microdajidae) parasitic on a tanaid *Thyphlotanais* sp. is the second tantulocaridan species from the Russian Seas.

New data on tantulocarid ultrastructure and morphology were obtained. Cephalothorax of a tantulus larva contains unpaired stylet hollow in its proximal part but with a solid tip, so it cannot be used for injection of any substances into a host. A funnel-shaped organ (or proboscis) has four glandular ducts which are used putatively to excrete an adhesive cement under the oral disk. A parasite produces a rootlet system which penetrates into host tissues right under the attachment site (the mouth) and is probably used for nutrition.

For the first time several free swimming males of Tantulocarida (*Arcticotantulus pertzovi* and *Microdajus tchesunovi*) from the White Sea were reared. The specimens were studied thoroughly with SEM and TEM.

The internal anatomy of tantulocaridan male was studied for the first time. The cephalothorax of male contains a very specific comb-shaped tissue which probably accumulates nutrients provided that adult males do not feed.

Keywords: Tantulocarida, new species, SEM, TEM.

MEIOBENTHIC CNIDARIANS PROTOHYDRA LEUCKARTI GREEFF, 1870 AND BOREOHYDRA SIMPLEX WESTBLAD, 1937 (CNIDARIA: HYDROZOA): INTEGRATED APPROACH BASED ON FINE MORPHOLOGY AND MOLECULAR ANALYSIS

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Until recently meiobenthic cnidarians have been one of the most neglected groups of meiofauna. The number of meiobenthic cnidarian species is small, both in proportion to other Cnidaria and when compared with the number of meiofaunal species of many other invertebrate phyla. Despite this small number, the group shows many interesting features, some of which exhibit remarkable adaptations to the habitat. Cnidarians have an ancient origin and are among the simplest in structural organization of multicellular animals. The cnidarian's soft body is basically a double-layer sac with a single opening – the mouth, surrounded by tentacles. Their body wall consists of two epithelial layers (the outer epidermis and the inner gastrodermis) separated by gelatinous mesoglea. Cnidarians are equipped with cnidocytes – stinging cells that mainly have the function of catching prey, defence or attaching to substrate. Here we describe findings of two species of meiobenthic cnidarians (hydrozoans *Protohydra leuckarti* and *Boreohydra simplex*) from sandy beach and muddy sublittoral zones, respectively, in the vicinity of N.A. Pertsov White Sea Biological Station (Russia). The first SEM, TEM and histological analyses of the species are presented. The study reveals the presence of cnidocysts not only in the epidermis, but in the gastrodermis of these species, a condition that had only been previously known for larval stages of other hydrozoans. Hence, we propose a hypothesis of paedomorphic origin through progenesis for these meiofaunal species. The phylogenetic positions of *P. leuckarti* and *B. simplex* were assessed using sequence information from partial mitochondrial 16S rDNA aligned to a large data set representing diverse hydrozoans. The resulting tree shows that both species group with other hydrozoans of Aplanulata, a clade supported by previous molecular phylogenetic analyses and characterized by the lack of a flagellated planula-larva stage.

Keywords: Cnidaria, Hydrozoa, meiofauna, *Protohydra*, *Boreohydra*, progenesis.

MEIOBENTHIC COMMUNITIES AROUND A COASTAL TOURIST INFRASTRUCTURE ON THE SOUTHERN BALTIC COAST: SPATIAL AND TEMPORAL VARIABILITY

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Many of the southern Baltic holiday resorts feature jetties, particular components of tourist infrastructure that serve various functions (e.g., local landmarks, viewing platforms, mooring quays). Pilings supporting the jetty platform function as elements of an artificial reef of a kind, colonized by dense fouling communities dominated by *Mytilus edulis and Balanus improvisus*. Recently, concerns have been expressed that intensive human activities around such jetties may contribute substantially to the anthropogenic pressure on the coastal environment, already stressed by multiple uses. As the meiofauna is considered a good indicator of environmental stress, we studied meiobenthic communities in the near-shore, shallow (5-10m depth) area around a 395m long jetty at the holiday resort of Miedzyzdroje (southern Baltic coast, NW Poland). The aim of the study was to find out if, and how, the presence of the jetty reflected on the temporal and spatial variability of meiobenthic community structure and the sedimentary environment (grain size, organic matter content, plant pigment retention) itself. Water and sediment samples were collected synoptically at 10 stations located within the radius of 500m of the jetty terminus in April, June, July, September, and November 2009. The predominantly sandy sediment was found to contain variable amounts of organic matter. The organic enrichment showed a distinct temporal pattern and a weaker spatial one, the sediment at stations located farther away from the jetty being generally more enriched than those in the closest vicinity of the structure. This pattern was broadly followed by the nematode-dominated meiobenthic communities the structure of which changed in time and with distance from the jetty.

Keywords: meiobenthos, anthropogenic pressure, coastal zone, Baltic Sea.

RELATIONS BETWEEN NUTRIENT STATE AND FRESHWATER NEMATODE COMMUNITIES

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Among all meiobenthic groups nematodes are by far the most abundant and diverse taxon. Nematode species occupy different trophic levels and take part in many important benthic food web interactions. Nevertheless, most studies just provided results concerning their biology and ecology, e.g. seasonal patterns, bathymetric distributions or energetic aspects. To date there exist only a small number of studies from which basic conclusions about freshwater nematode community patterns could be deduced. One crucial point is the influence of bottom up effects, e.g. lake trophic state or nutrient levels. Our attempt to overcome these shortcomings was to investigate the response of nematode communities in relation to nutrient state in natural (lake) as well as model ecosystems (microcosms). In this context we analysed the characteristics of littoral nematode assemblages in eight Swedish lakes along a trophic gradient. In addition we carried out a microcosm experiment containing natural nematode communities to observe their direct response to predefined nutrient concentrations.
Both studies revealed a significant decline of species richness with increasing nutrient concentrations, whereas nematode biomass was less affected. Nematode species composition changed greatly at the threshold of mesotrophic to eutrophic conditions in lakes. In the microcosms, a gradual change of nematode species with respect to nutrient state was observed. Contrasting results were obtained for the composition of functional guilds. In lakes the proportion of predatory nematodes was significantly higher under oligotrophic/mesotrophic conditions, whereas in the model ecosystems this was found for high nutrient enriched treatments.

Keywords: lake trophic state, Swedish lakes, microcosms, diversity, feeding types.

HARPACTICOIDA UNDER COLLAPSED ICESHELVES NEAR THE ANTARCTIC PENINSULA: A MULTISCALE APPROACH ON FAMILY LEVEL

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Regional climate warming caused break-ups of the large Antarctic Larsen A and B ice shelves during the last two decades. Harpacticoid copepods were investigated on family level with respect to abundance, diversity, and compositional similarity between stations sampled in these areas during the ANT XXIII/8 expedition of RV „Polarstern' (PS 69) in 2007. In total, 3,944 adult harpacticoid copepod specimens out of 23 families were collected. All stations (mostly five MUC replicates) differed significantly to each other regarding Harpacticoida family composition (ANOSIM, alpha = 5%). The station positioned innermost relative to the former Larsen B iceshelf, 'B West', showed a much lower diversity in terms of family density on core scale than station 'B South' close to the former iceshelf edge. This difference was mainly due to different densities in terms of abundance as shown by rarefaction analysis. Differing productivity and slow colonization speed might have been reasons for this pattern. The deepest station 'B Seep' was least diverse on core scale.
A multiscale analysis uncovered high heterogeneity of Harpacticoida family composition and diversity on regional scale (10s to 100s of km), lower heterogeneity on site scale (10s to 100s of m) with often more or less homogeneous patches of at least 10s of metres, and again higher heterogeneity on haul scale (10s of cm) and below, with patches probably in the range of centimetres.
Regarding families occurrences, most abundant were Ectinosomatidae, Argestidae, Ameiridae, and Pseudotachidiidae. Interestingly, some Rometidae were found in most cores from the innermost station 'B West', but at no other station at all. Most probably this family was already present under the iceshelf before its disintegration. Since Rometidae were only reported for the often low-productive deep sea until now, our findings give some evidence for a formerly low-productive deep-sea character of the innermost parts of the former Larsen B iceshelf.

Keywords: Harpacticoida, Antarctic, Larsen iceshelf, scale, climate change.

EFFECTS OF LOW DISSOLVED OXYGEN CONCENTRATIONS AND AMMONIUM ON REPRODUCTION IN HARPACTICOID COPEPOD POPULATIONS

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Hypoxic events are disturbances that alter the structure and function of biological communities. Areas of hypoxia, where dissolved oxygen concentrations less than 2 $mg.l^{-1}$ are present, may cover up to 245,000 square kilometers worldwide. The lethal effects of low dissolved oxygen are well documented, but the effects of exposure to hypoxia may also be observed as sub-lethal effects on marine organisms through the alteration of reproductive traits. Meiobenthic harpacticoid copepods are a group often used as indicators of pollution, and have been observed to have both lethal and sub-lethal responses to hypoxia. In laboratory experiments harpacticoid copepods had reduced survival and reproductive rates when exposed to low dissolved oxygen. Effects of hypoxia on reproduction and survival were found in 96 hour laboratory experiments. The formation of an egg mass was reduced in the near anoxia treatment, but egg masses did not form at all in the treatment that combined near anoxia and an ammonium concentration of 0.18 $mg.l^{-1}$. The results of the laboratory experiments were used as inputs into a model that estimates potential population growth in harpacticoid copepods. Estimates of population size were dramatically reduced due to increased mortality and decreased proportions egg bearing females in the population. The consequences of hypoxia on harpacticoid reproduction vary depending on of the duration of exposure, the concentration of dissolved oxygen and associated chemical fluxes present such as ammonium released from anoxic sediment. Reductions in harpacticoid copepod population size related to hypoxic exposure greatly decrease the potential population of the group, and may affect the copepod population's ability to recover from hypoxic events.

Keywords: hypoxia, Harpacticoida, ammonium, reproduction.

THE COMMUNITY OF COPEPODA HARPACTICOIDA FROM A ROCKY SHORE UNDER THE INFLUENCE OF UPWELLING (ARRAIAL DO CABO, SOUTHEAST BRAZIL)

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Studies of the meiofauna community in areas of upwelling are scarce and, to our knowledge, do not include analysis at the species level for Harpacticoida. This study describes the composition of Harpacticoida in a region under the influence of coastal upwelling (Arraial do Cabo, Rio de Janeiro). We tested the hypothesis that temporal differences in the fauna will be larger in the rocky shore most affected by the upwelling. Samples were collected in the sublittoral of Sonar rocky shore, coast most exposed to upwelling, in January (upwelling - U) and June 2004 (upwelling rarely occurs - W) and of Pedra Vermelha (PV), sheltered shore, in March (U) and in September 2002 (W). Each sample consisted of four replicates collected by scraping epilithic algae along with the associated sediment. Weekly data of surface water temperature and nitrate collected during two months before samplings were used to characterize upwelling in both years. Fourteen families, 36 genera and 56 species of Harpacticoida were registered. Ten genera are reported for the first time to Brazil. Species with higher relative abundance in PV were *Amonardia* sp, *Orthopsyllus linearis*, *Paralaophonte c. congenera*, *Parastenhelia spinosa*, *Ectinosoma* sp1, *Esola* (aff) *vervoorti* and *Harpacticus* sp1. In Sonar three species dominated the assemblage: *P. spinosa*, *Ameira* sp2 and *O. linearis*. The diversity is among the highest values for phytal Harpacticoida (H'> 4.04), with high values of equitability (J> 0.78) and species richness (S> 32). Univariate indices have failed to identify differences between rocky shores or periods whereas multivariate analysis indicated significant differences between shores (R_{global} = 0.818, p <0.001) and periods (R_{global} = 0.734, p <0.001). The strong variation of physicochemical conditions associated with upwelling favored opportunistic species such as *P. spinosa*. Temporal differences were significantly stronger in Sonar confirming the initial hypothesis.

Keywords: meiofauna diversity, phytal, seasonality.

SEASONAL DYNAMICS OF EPILITHIC NEMATODES AND OTHER MEIOFAUNA IN LAKES OF DIFFERENT PRODUCTIVITY

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Periphyton of stony hard substrates (epilithon) consists of algae, bacteria, fungi and protozoa and serves as habitat and food source for an abundant and diverse meiofauna community. These epilithic communities are affected by abiotic (e.g. temperature, light, hydrodynamics, nutrients) and biotic factors (e.g. resource competition, herbivory) which, in turn, will undergo strong seasonal changes. In the present study, the temporal dynamics of epilithic nematode and meiofauna communities of three Swedish lakes, which differ in trophic status, were investigated over one year. We found the highest meiofaunal densities to appear in spring whereas in winter, during the period of ice cover, the lowest densities were observed. In all three lakes, nematodes were the most abundant meiofaunal group at nearly any time of the year but the species composition differed significantly between lakes and seasons. Moreover, we observed changes in the dominance structure of nematode feeding types from bacterial feeders to algal feeders with increasing eutrophication level. Our results revealed strong temporal dynamics in epilithic meiofauna communities and community structures that largely depend on lake trophic status.

Keywords: fresh-water nematodes, lakes, temporal dynamics, trophic status, periphyton.

METABOLIC RATES OF AN AQUATIC TARDIGRADE, DACTYLOBIOTUS NUOVO SPECIES

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Tardigrades include one of the most elusive groups of microscopic animals on earth. Tardigrades have been observed to form cysts and enter a suspended state of animation during changing environmental conditions. It has been hypothesized that metabolic rates must change dramatically in these animals as environmental conditions change. Methods of accurately measuring metabolic rates (i.e. oxygen consumption rates) in microscopic animals have been limited by the ability to monitor low rates of consumption as well as miniscule changes in oxygen tensions. Previous studies on microscopic animals have used 'Cartesian Diver' techniques and modern polarographic oxygen sensors; however, the ability to accurately monitor rates is still debated. We report here the use of a fiber optic probe micro-respirometry system used to monitor oxygen consumption rates in aquatic tardigrades. Oxygen consumption rates were determined for individual tardigrades. We report here the benefits of this system and the effects of various temperatures on metabolic rates. Oxygen consumption of individual adults, eggs, and cysts of *Dactylobiotus* n. sp. were measured at 17°C and 22°C. Individual adults acclimated to 17°C averaged 238.12+7.2mg $O_2.kg^{-1}.hr^{-1}$ and increased to 601.33+9.8mg $O_2.kg^{-1}.hr^{-1}$ when acclimated to 22°C. Individual eggs at 17°C averaged 545.13+14.1mg $O_2.kg^{-1}.hr^{-1}$ and increased to 1478.47+23.6mg $O_2.kg^{-1}.hr^{-1}$ at 22°C. Cysts acclimated at 17°C averaged 104.1+8.1mg $O_2.kg^{-1}.hr^{-1}$ and increased to 446.15 + mg $O_2.kg^{-1}.hr^{-1}$ at 22°C. These results indicate that oxygen consumption rates in tardigrades follow previous trends demonstrated by other invertebrate species where environmental temperatures greatly influence oxygen consumption and overall metabolism. Higher oxygen consumption rates in eggs may be reflective of higher energy demands due to developmental processes. Lower oxygen consumption rates for cysts indicate a reduction in metabolism as previously suggested.

Keywords: tardigrade, metabolic rate.

A COMPARISON OF NEMATODES FROM MEIOBENTHOS AND MACROBENTHOS OF THE GULF OF MEXICO AND ARCTIC DEEP-SEA CANADA BASIN

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Nematodes are generally considered in meiofauna studies that use a 63µm sieve to isolate them. Our study compares the nematode composition in macrobenthic (>250µm) samples from the Arctic deep sea and the meiofauna and macrofauna nematodes in the Gulf of Mexico (GOM). The diversity and abundance of macrofauna nematodes was lower than that of meiofauna nematodes. A very different assemblage of nematodes was found in both macrofauna samples than typically found in meiofauna with a considerable difference in the generic composition. The Comesomatidae was the dominant family, followed by the Sphaerolaimida and Oncholaimidae in the macrofauna samples. The dominant genus in the Arctic macrofauna was *Sabatieria* followed by *Viscosia* while the GOM macrofauna samples were dominated by *Sabatieria, Sphaerolaimus, and Filioncholaimus*. Other studies from the deep sea have also found the Comesomatids and *Sabatieria*, a deposit feeder, as the dominant taxa but the *Sabatieria* in the Arctic macrofauna was much larger than other species of this genus. The abundance of the Oncholaimidae and Enchelididae which consist of predatory and omnivorous genera in both the Arctic and GOM macrofauna is unlike the observations in deep sea meiofauna nematodes where small deposit feeding nematodes predominate. The comparatively high abundance of the Oncholaimidae, Leptosomatidae, Phanodermatidae and Thoracostomopsidae in the current study suggests that this group may be missed in meiofauna surveys because these families include nematodes larger than 1.0mm that occur in low densities. The dominant feeding group, selective deposit feeders was represented by *Sabatieria* but also contained larger genera such as *Micoletzkyia* and *Phanoderma*. The epigrowth feeders that are known to feed on diatoms were least represented in this study, both in the meiofauna and macrofauna. The dominance of large detrivores and deposit feeding nematodes as well as carnivores and omnivores indicates they play an important role in the benthic deep sea food web.

Keywords: nematodes, Arctic, Gulf of Mexico.

LIFE IN A LOW-OXYGEN ENVIRONMENT: A STUDY OF NEMATODE METABOLISM BY COMBINING OBSERVATIONS AND MODELS

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Free-living nematodes are amongst the most abundant small organisms in marine sediments. They are generally considered to be aerobic organisms, requiring oxygen for their metabolism. Yet, their habitat, the sediment, is a low-oxygen environment. Not surprisingly, oxygen has an important structural role on several nematode characteristics, such as community structure, or their size and shape. In this talk we will combine observations and mathematical models and discuss how and to what extent oxygen affects nematode life. We will assess the importance of nematodes to total benthic metabolism, and will shed some light on their presumed trophic position in the benthic food web.

Keywords: oxygen, nematodes, metabolism, models.

PECULIARITIES OF DEEP-SEA NEMATODE FAUNA BY THE EXAMPLE OF ANGOLA BASIN

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Taxonomic investigation of 1,340 nematode specimens from two stations in the Atlantic Angola Basin, depth over 5000m (DIVA I Expedition) reveals 147 species. The most important families are Chromadoridae (mostly Acantholaimus, 26.1% of specimens), Xyalidae (23.9%), Monhysteridae (10.3%), Oxystominidae (15.3%), Desmoscolecidae (3.4%), Microlaimidae (2.8%). Taxonomic treatment of nematodes from the Angola Basin provides some general conclusions about the deep-sea nematofauna. Deep-sea nematode communities differ from those of shallow waters in some structural, taxonomical, morphological and biological characters: 1) Species assemblages from deep-sea sites are characterized by high species diversity accompanied by low concentration of dominance; 2) Very few specialized predator species occurs within the deep-sea communities; 3) Specimens with empty intestine predominate; 4) Deep-sea nematodes are smaller in average body size; 5) There are very few species with sculpturally complicated cuticle and no species with long cephalic and body setae among deep-sea nematodes; 6) Proportion of species with stoma armature is relatively low; 7) Species with very tiny stoma constitute majority in deep-sea communities; 8) Species with one or two relatively large eggs in uteri of females predominate; 9) Proportion of species with large amphids is relatively high.

Keywords: deep sea, diversity, free-living marine nematodes, taxonomy.

EFFECTS OF MACROFAUNAL BURROWERS ON MEIOFAUNA AND ECOSYSTEM PROCESSES IN SHALLOW SANDY LITTORAL (SOUTHERN BALTIC SEA)

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Laboratory experiment was performed to study the impact of macrofaunal species composition and diversity on biogeochemical processes (O_2 uptake, nutrient excretion, porewater chemistry) and meiofaunal vertical distribution, diversity and community structure with special emphasis on free-living nematodes. Three macrofaunal species differing in terms of burrowing activity, typical for the sandy shallow littoral of the Gulf of Gdansk (southern Baltic Sea) (*Nereis diversicolor*, *Cerastoderma glaucum* and *Mya arenaria*) were selected for the study. Macrofauna significantly affected vertical distribution and densities of meiofauna, nematode generic and functional (trophic) diversity and community structure. While shallow burrower *C. glaucum* had minor effects on meiofauna distribution and community structure, the impact of deep burrower *N. diversicolor* was the most pronounced both in monoculture and in mixtures with other species. All treatments with *N. diversicolor* had similar effect on sediment processes such as O_2 consumption and nutrients release suggesting a prominent role of this species in ecosystem functioning. The observed effects of macrofauna on meiofauna, in general, and nematodes, in particular, are related to porewater chemistry and biogeochemical processes rates in order to better understand mechanisms responsible for the effect of diversity on ecosystem functioning.

Keywords: macrobenthos, nematodes, bioturbation, ecosystem processes.

SEDIMENT-RELATED DISTRIBUTION PATTERNS OF NEMATODES AND MACROFAUNA: TWO SIDES OF THE BENTHIC COIN?

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We investigated the sediment-related distribution of both nematodes and macrofauna in the Belgian part of the North Sea (Southern Bight of the North Sea). Composition and diversity of nematode communities was significantly affected by median grain size as fine-grained sediments (median grain size <200µm) were inhabited by nematode communities characterised by a low diversity and dominated by non-selective deposit feeding nematodes. Nematode communities from coarser sediments were significantly different in terms of community composition and diversity. Moreover, all nematode feeding types were present in coarser sediments. These differences were explained by the contrasting biogeochemical processes prevailing in both sediment types, rather than granulometry and food availability per se. Patterns in macrofaunal distribution were not similar and seems to be related to water column processes (SPM loading, food availability, hydrodynamic stress) preventing survival in the finest sediments and establishment of diverse communities in the coarse sediments. This suggests that data on nematodes and macrofauna reveal different, complementary aspects of the factors structuring the benthic ecosystem that can be of importance in assessing the ecological status of the seafloor.

Keywords: nematodes, macrobenthos, granulometry, biogeochemistry.

EVOLUTIONARY HISTORY OF THE DALYTYPHLOPLANIDA (RHABDOCOELA, PLATYHELMINTHES): SINGLE COLONIZATION OF THE LIMNIC ENVIRONMENT?

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Being one of the most species-rich taxa of free-living flatworms (1500 species described), Rhabdocoela is an important faunistic component in marine, freshwater and even limnoterrestrial habitats. The taxon has a cosmopolitan distribution and consists of two monophyletic groups: Kalyptorhynchia (530 species) and Dalytyphloplanida (970 species). Within Dalytyphloplanida, a recent phylogenetic analysis based on molecular data contradicts older hypotheses based on morphology. It suggests the existence of a monophyletic 'freshwater' clade (including the limnoterrestrial taxa), indicating a single escape from the marine environment. However, the monophyly of this freshwater clade was very poorly supported, and the analyses are based on datamatrices including very few freshwater dalytyphloplanids (16 taxa), using one molecular marker (18S rDNA) only.
In a new study, which includes much more dalytyphloplanid taxa (60 species, freshwater as well as marine), we present the results of a phylogenetic analysis based on new molecular data from 18S rDNA and 28S rDNA sequences. The existence of a monophyletic freshwater clade is clearly supported in the resulting cladograms. As the analysis includes new representatives of freshwater taxa from different continents, this group was probably already well-established before the break up of Pangea, although long-distance dispersal cannot entirely be discarded.

Keywords: 'turbellaria', taxonomy, cladistics, biodiversity, systematics.

GEOGRAPHICAL AND OCEANOGRAPHICAL PATTERNS OF MEIOFAUNA STABLE ISOTOPE SIGNATURES IN THE DEEP SOUTHERN OCEAN

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During a FS 'Polarstern' cruise to the Southern Ocean and the Weddell Sea in 2007/2008 sediment samples were taken from 49°S to 70°S between 1900 and 5300m water depth. Deep-sea meiofauna were extracted from the sediment and analyzed for their community composition and stable isotope signatures. The observed patterns of δ13C and δ15N for the two dominant taxa Nematoda and Copepoda did not reflect water depth as might be assumed for deep-sea communities which rely on the input of organic material from the water column. Patterns of δ13C and δ15N were more related to the geographical position and the oceanographical situation at the sea surface. Meiofauna organisms showed gradually declining δ13C (-22 to -28‰) and δ15N values (12 to 6‰) along a gradient from the northern sampling stations towards the South. An exception to this relationship was encountered for the communities of the southernmost station at 70°S where δ13C (-25‰) and δ15N (7.5 to 9.5‰) had more enriched values.
The world's oceans show regional differences in surface water dissolved inorganic carbon (DIC) δ13C. South of the Subantarctic Front the values of surface water DIC δ13C sharply decrease. This already depleted DIC available for microalgal primary production partly explains our findings of lower δ13C at the deep-sea floor towards the southern stations. Carbon fixation by ice algae (more enriched δ13C) seemed to play a significant role for the benthic food web at the southernmost station of our study.
Among other factors, a northward transport of surface water is known to be responsible for differences in nitrate concentration and nitrate δ15N between the high Antarctic and the Subantarctic. This situation was reflected in our findings where we observed clearly enriched δ15N values in meiofauna organisms from the northern stations. Here we present for the first time δ15N values for deep-sea meiofauna from the Antarctic.

Keywords: deep-sea meiofauna, stable isotopes, Antarctica.

CUES NOT A CLOCK CONTROL THE WATER-COLUMN ENTRY OF BENTHIC COPEPODS IN INTERTIDAL AND SUBTIDAL HABITATS

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For some benthic species, a portion of the population is constantly being swept away from the sediment surface by near-bottom flows, a phenomenon termed suspension. In addition, some individuals actively swim out of or away from the sediment surface and up into the water column daily, a phenomenon termed emergence. Both phenomena are of interest for many reasons, e.g. for their role in benthopelagic coupling and recruitment, but the factors that control them are not well understood. We did experiments with benthic copepods from two contrasting environments, wave-swept subtidal sand in the Gulf of Mexico and still-water mud in Gullmars Fjord, southwestern Sweden. Our results suggest that in these environments, some correlate of darkness rather than an endogenous clock controls the emergence of benthic copepods. We also found evidence that light-induced changes in the oxygenation of the uppermost sediment pore water can affect the suspension and emergence flux of benthic copepods.

Keywords: Harpacticoida, Cyclopoida, emergence, behavior.

POSTER PRESENTATIONS

SPATIAL PATTERNS OF SUBTIDAL NEMATODES AND MACROFAUNA ASSEMBLAGES ALONG THE ESTUARINE GRADIENT TO ASSESS BENTHIC CONDITION: DEFINITION OF HOMOGENOUS SECTORS ALONG A NATURALLY STRESSED ESTUARY (PORTUGAL)

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In transitional waters the definition of reference conditions must take into account the natural variability. Therefore, prior to the use of environmental quality assessment tools the estuarine stretches reflecting different physical-chemical and biological conditions should be defined in order to correctly establish the benthic specific reference conditions.
The main goal of this study is the definition of homogeneous sectors along a naturally stressed estuary by: analysis of the structure and composition and diversity of nematodes and macrobenthos spatial distribution patterns along the estuarine gradients; and comparison of the environmental patterns change with the biodiversity trends.
The subtidal assemblages (meio- and macrofauna) of the Mira Estuary (considered an undisturbed system) were sampled in the summer of 2006 and several environmental factors were determined.
The environmental factors salinity and the particle size reflect an estuarine gradient. The nematode and macrobenthos densities and assemblages composition change along the gradient, establishing homogenous sections: (i) the tidal and oligohaline sections are characterised by the presence of freshwater nematodes, the total densities and diversity reach the minimum values; macrobenthos is dominated by *Gammarus*, Chironomidae and *Corbicula fluminae*; (ii) in the mesohaline sections the nematode densities are lower and the diversity is poor, the dominant genera are *Terschellingia* and *Sabatieria*, *Daptonema* and *Anoplostoma*; macrobenthos is dominated by *Corophium orientale*, *Leptocheirus pilosus* and *Ciathura carinata*; (iii) in the polyhaline and euhaline sections the total densities and the diversity are higher, and the Nematode dominant genera are *Paracomesoma* and *Synonchiella*; the macrobenthic *Heteromastus filiformes*, *C. orientale* and *Hediste diversicole* are present in the polyhaline section while in the euhaline section the species *Nephtys hombergii* and Maldanidae are exclusive.

Keywords: nematodes, macrofauna, estuarine gradient, ecological status, Portugal.

MEIOFAUNA AND NEMATOFAUNA OF SANDY BEACHES IN SALVADOR (BAHIA – BRAZIL)

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Although meiofauna is an important component of benthic environments, in Brazil few groups have been developing research along this line. We characterized the meiofauna and their vertical and horizontal distribution patterns, with emphasis on Nematoda, in the intertidal zone of three beaches of Salvador: Armação, Itapuã, and Ribeira. Samples were collected at low tide, at three points on a transect perpendicular to the beach. At each point, three cores, 30cm deep by 3.5cm in diameter, were obtained with a PVC corer. The sediment was divided into three strata: (A) 0-10cm, (B) 10-20cm, and (C) 20-30cm deep. Each sample was fixed in 10% neutral saline formalin. The specimens were extracted through two processes, in water and magnesium sulfate, with meshes of 500 and 45µm. The major groups of meiofauna and the Nematoda were counted and sorted in a Dolffus chamber, and the nematodes were cleared and mounted on standard glass slides. Washing with water proved sufficient for the extraction; very low numbers of organisms were found in the sulfate process. The residue observed after the washes contained almost no organisms. The meiofauna was composed of Turbellaria, Nematoda, Oligochaeta, Polychaeta, Ostracoda, Copepoda, nauplius larvae, and Acari, with a strong dominance of Copepoda Harpacticoida, followed by Nematoda. The abundance was greater in sections 2 (swash zone) and 3 (near the low-tide line), and also greater in depths B and C. However, methodological tests at greater depths (30-40cm) showed higher abundances. Initial results for Nematofauna record the occurrence of the genera *Endeolophos, Epsilonema, Mesacanthoides, Oncholaimus, Perepsilonema, Tricoma, Trileptium, Theristus*, and *Trissonchulus*. This study is part of the Thematic Network of Marine Environmental Monitoring (Petrobras) - Project: Marine Biodiversity in Brazil: Development of Taxonomy of Marine Nematodes.

Keywords: Salvador, Brazil, beaches, meiofauna, Nematoda.

MEIOFAUNA IN THE HUMBOLDT CURRENT SYSTEM OFF PERU: THE IMPORTANCE OF THE NEMATODES IN THE PRODUCTIVITY OF THIS LARGE MARINE ECOSYSTEM

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Within the meiobenthos, nematodes are the most abundant metazoans along continental margins and its importance in the fractionig of sedimentary organic material is essential. Based on estimates carried out in the Humboldt Current System off Peru, I propose to the nematodes as a key component in the recycling of organic matter and contributing significantly to make this large ecosystem highly productive. Along the Peruvian coast it has been observed that the activity of the nematodes stimulates the growth of bacteria, and it indirectly promotes the increase in the rate of re-mineralization. It has been preliminarily estimated that about 30% of available carbon in the benthic environment off the Peruvian coast, is generated from the secondary production of nematodes inhabiting sediments of the area. During the presence of El Niño (EN), significant declines in total abundance of meiofauna and an improvement in the phyletic diversity is observed, nematodes remain numerically dominant. The analysis of the nematodes (by species) shows, however a slight tendency to increase diversity. It is proposed here that the nematodes in the presence of EN events: (1) are diversified, (2) tend to change in feeding habits (increased presence of nematodes carnivores). Analysis of warm and cold periods of the EN-Southern Oscillation have shown a pattern of community-shifts driven by the nematodes, therefore, as a result (3), it could be inferred that there is a shift in the community in relation to the availability of organic material and dissolved oxygen on the bottom.

Keywords: meiofaunal nematodes, Humboldt Current System, Peruvian coast.

FREE-LIVING MARINE NEMATODE COMMUNITIES IN TRANSPLANTED MANGROVE AREAS ALONG THE INNER GULF OF THAILAND

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The spatial variations of free-living marine nematodes in two areas with different transplanted species and ages of mangrove along the Inner Gulf of Thailand were examined. One area was a mud flat with *Avicennia marina* and *Sonneratia caeseolaris* cover in Samut Songkram Province and the other area was a sand flat with *Avicennia marina* and *Rhizophora apiculata* cover in Petchaburi Province. Sediment samples for analyses of fauna, granulometric properties and content of organic matter were collected from under 7-year old and 4-year old *Avicennia alba* and 4-year old *Sonneratia caeseolaris* stands in Samut Songkram site and from 7-years and 1-year old *Rhizophora apiculata* and 7-year old *Avicennia alba* stands in Petchaburi site. Average nematode densities (ind.10cm^{-2}) varied, ranging from 413±23 - 607±55 in the muddy site and 355±44 - 593±54 in the sandy site. There were significant differences in their densities among samples. Higher densities occurred in samples under older transplanted tree stands in both sites. Also, within stands of the same age of transplanted trees, their average densities were different between mangrove species. In the muddy site, average density in *Avicennia alba* samples (508±42) was higher than that in *Sonneratia caeseolaris* samples (413±23). Also, this value in *Avicennia alba* samples (593±54) was higher than that in *Rhizophora apiculata* samples (547±44) in the sandy site. A total of 59 species of nematodes belonging to 56 genera and 19 families were recorded. Of these, 56 species belonging to 56 genera and 18 families were recorded from the muddy site and 46 species belonging to 43 genera and 17 families from the sandy site. Analysis of nematode assemblages, based on their relative species abundance, using non-parametric multi-dimensional scaling, showed differences between two sampling sites and among transplanted mangrove species. Selective deposit feeders were the most abundant nematodes in areas of muddy transplanted mangrove and epigrowth feeders in areas of sandy site. The study shows that nematode communities are useful organisms to monitor the mangrove recovery.

Keywords: meiobenthos, marine nematodes, community, tranplanted mangrove forest.

REPORT ON THE MEIOFAUNA FROM THE SAND BOTTOM OF THE SUBTIDAL ZONE AT TAEAN IN THE COAST OF THE YELLOW SEA (NORTHWESTERN PACIFIC) INCLUDING THE DESCRIPTION OF TWO NEW SPECIES OF *PARAMESOCHRA* T. SCOTT, 1892 (HARPACTICOIDA: PARAMESOCHRIDAE)

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Even if nematodes are dominant in mud sediments and very fine sand sediments, harpacticoids are dominant organisms such as in coarse sandy sediments. Meiofauna samples were collected from the sandy sediments of the subtidal zone at Taean on the coast of the Yellow Sea on 25 July 2006, and were analyzed to address: 1) major taxa composition and diversity of meiofauna from sand sediments, 2) species diversity of family Paramesochridae which is a dominant family of harpacticoids from the sand sediments in this study area.
Sediment temperatures ranged from 17.5°C (station 1) to 18.0°C (station 4, 6, 7). The mean salinity was 32.3 psu, with lowest salinity of 31.6psu in station 1 and highest values of 32.6psu in station 2, 6, 7.
Meiofauna community from Taean consists of Nematodes, Copepods, Foraminiferans, Polychaetes, Amphipods, Halacaloideans, Kinorhynchs, Ostracods, Bivalves and Cumaceans. The mean density of meiofauna was 237 ind.10cm^{-2} and nematodes predominated over the other taxonomic groups at all stations except for station 9.
We found several new species of Paramesochridae including two new species of *Paramesochra*. The first new species has superficial resemblance with *Paramesochra similis* in the structure of antenna, the seta formula of P1-P4. However, the new species can clearly be distinguished from *P. similis* by 8-segmented of antennule, the well-developed pseudoperculum and the shape of seta IV of caudal rami.
The second new species superficially resembles to *P. mielkei* in structure of the antenna, seta formulae of thoracopods P1-P4, and shape of P5 of female. This species differs from its congeners mainly by shape of P6 and pseudoperculum, length of caudal rami about 3 times as long as width and modified seta V.

Keywords: Yellow Sea, Paramesochridae, *Paramesochra*, Harpacticoida.

REGENERATING THE NEMATODE COLLECTIONS AT THE NATURAL HISTORY MUSEUM, LONDON: AN HISTORIC COLLECTION JOINING YOU IN THE 21ST CENTURY

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The Nematode Collections Regeneration Project has two aims, 1) the renewal of the Free-living Nematode Collection at the Natural History Museum by the restorative conservation of the current taxonomic collection and the accessioning of recent and historical ecological collections and; 2) to maximise use of the collection by providing remote access via an electronic database of materials, basic photographs of slides, video images of key specimens, unpublished diagrams from ecological research and published literature.
The nematode taxonomic collection contains approximately 2,000 slides, of which about 36% are types, a very high percentage making the collection one of world wide importance. The inclusion of material from Platt and Warwick, the principal authors of the Linnean Society Synopses of the British Fauna: Free-Living Marine Nematodes, who established the internationally established pictoral keys to marine nematode genera, makes it of particular interest to researchers. Conservation work will be undertaken by NHM experts in Nematology and Curation.
The nematode ecological collection comprises material from both research and consultancy projects from numerous localities, including the deep seas in the Pacific, Atlantic and Indian Oceans, hydrothermal vents, whale falls and cold seeps, and intertidal, subtidal and estuarine sites from around the world, all of which are rare or unique collections. Whilst associated ecological data are published or in preparation for publication, the majority of specimens are 'new' to science, so, to disseminate this information more widely and to encourage its taxonomic study, the working figures of this novel fauna will be placed in a new Scratchpad hosted at the NHM London.
Databasing of the collections, photographs of taxonomic slides, and scanning of figures is on going and we hope these will start to go on-line from late 2010. Slide restoration will commence summer/autumn 2010, with slide material becoming available to visitors from late 2011.

Keywords: curation, taxonomy, systematics, collections, Open-Access.

NAIDIDAE (ANNELIDAE: OLIGOCHAETA) IN THE MIDDLE TAIGA SMALL WATER BODIES

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The small forest rivers and the stagnant water bodies (reservoirs, small lakes and pools) of the Severnaya Dvina River basin were studied. The lengths of the rivers are 20-50km, the widths are 3-5m wide, the depths are 0.2-1.5m and flow velocity is 0.1-0.4km.s^{-1}. The stagnant water bodies have areas up to 1km^2 and depths up to 3m. In the rivers soft sediments (sand, silt) prevail. Gravel on riffles is overgrown with algae and mosses. Silt, sand and clay substrates are spread in the stagnant water bodies.
In these water bodies the shares of meiobenthos were from 45 to 60% of total abundance and from 20 to 35% of total biomass of zoobenthos. Oligochaetes were frequent in the benthos samples. A total of 42 species of Oligochaeta was found, 16 belonged to Naididae (9 species in the stagnant reservoirs and 13 in the small rivers). This family formed from 4.4 to 23.9% of total abundance of oligochaete in the small rivers and the stagnant water bodies. *Nais pseudobtusa* and *Uncinais uncinata* were the most frequent. Hard substrates were inhabited by Naididae (approximately 30%). Dominant species were *N. pseudobtusa, N. behningi*. Naididae formed less than 10% oligochaetes abundance on soft substrates. The species: *N. barbata, N. behningi* were detected only on this substrates. Distribution of Naididae can depend from the presence of covering by algae and moss on the hard substrates. Positive correlation was noted between bottom texture and abundances of *N. pseudobtusa, Chaetogaster diastrophus* and *Stylaria lacustris*. *Ch. diaphanus, U. uncinata* were positively correlated with flow velocity. The numbers of *Arcteonais lomondi, N. pseudobtusa, N. behningi, N. alpina* were positively correlated with moss or algae covering.
This project partly was supported by grant of UrD of the RAS for young scientists and post-graduate students 'Community of water organisms in small reservoirs of the Vychegda river basin at long-term changes of environment'.

Keywords: Oligochaeta, zoobenthos, ecology of northern fresh water.

NEW GENUS OF THE FAMILY ETHMOLAIMIDAE (NEMATODA: CHROMADORIDA), FOUND AT GULF OF CADIZ AND ANTARCTICA

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A new genus of the family Ethmolaimidae is described here, based on specimens from two reduced environments in the deep sea. Up until now, the family Ethmolaimidae contained eight genera: *Comesa, Ethmolaimus, Filithonchus, Gomphionchus, Gomphionema, Nannolaimus, Neothonchus* and *Trichethmolaimus*. The family characteristics are identified as: annulated cuticle bearing transverse rows of dots, cephalic sensilla arrangement 6+6+4, spiral amphid and oesophagus with muscular posterior bulb. The new genus resembles *Comesa*, but is typified by: a subterminal buccal cavity; three very small teeth easily overlooked: two ventrosublateral, one at the cheilostom pointing forward, one at the pharyngostom pointing laterally, and one small dorsal tooth at the pharyngostom pointing forward. Males have outstretched testes and conspicuous cup-shaped precloacal supplements. Females possess two antidromously reflexed ovaries. Both males and females have a conical tail with a rounded tip. This new genus was first identified in samples of the Gulf of Cadiz at the Darwin mud volcano (1100m deep) and afterwards also found in chemosynthetic sediments from the Larsen area (Weddell Sea) at 800m depth.

Keywords: Ethmolaimidae, new genus, reduced environments, deep sea.

DYNAMICS OF PREDACIOUS NEMATODES AND THEIR PREY POPULATIONS IN INTERTIDAL SEDIMENTS

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Over the last 10 years, several – mainly microcosm – studies have highlighted the potential importance of top-down control by predacious nematodes on the abundance, dynamics and structure of their prey nematode assemblages. Direct field evidence for such top-down control is, however, scant. It is also unclear whether effects of predatory nematodes are constant or fluctuate over time. This depends both on the population dynamics and on the feeding behaviour of the predatory nematodes. Based on recent evidence from field samples, natural carbon and nitrogen isotope ratios, and lab experiments, we hypothesized that the abundant predator *Enoploides longispiculosus* at the Paulina tidal flat (Schelde Estuary, the Netherlands) has a strongly seasonal reproduction and shows seasonal changes in feeding behaviour and even trophic level. We expect that this species hibernates as juveniles exhibiting only limited predatory activity, and rapidly proliferates during spring and summer in one or two generations. We also expect that this is reflected in the top-down effect of this predator on its prey. We are currently performing an intensive temporal sampling to follow the in situ population development of *Enoploides* and of other nematodes in relation to seasonal environmental fluctuations at the Paulina tidal flat. We used the opportunity of a harsher and longer than usual winter season allowing a clear delineation of the onset of spring conditions. This sampling is accompanied by laboratory experiments looking at the predation rate and metabolic activity of the predatory nematodes, and by analysis of their natural isotope ratios to assess resource utilization. Our first data indeed indicate a fairly rapid growth and maturation of *Enoploides* in the first weeks of spring, along with an increase in predation rate. We will present a complete picture of the dynamics of this predator in relation to its prey for the period March-May.

Keywords: top-down control, predacious nematodes, nematode assemblages, tidal flat, *Enoploides.*

ISTHMIOCARIS LAURAE SP. NOV. (COPEPODA, HARPACTICOIDA) FROM THE ANGOLA BASIN – FIRST DEEP-SEA SPECIES OF THE GENUS

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The new species presented here contributes to the description of the community of Harpacticoida in the Angola Basin and adds a new member to the few known deep-sea Canthocamptidae. *Isthmiocaris laurae* sp. nov. represents the closest and only relative to *Istmiocaris longitelson* George and Schminke, 2003. In spite of the missing isthmion the new species is placed in the genus *Isthmiocaris* because of its characteristic body shape with the elongated telson, the modification of the male endopod in P3 and P4 and the reduced female endopods. The highly sexually dimorphic male and female of the new species were matched following the development of the swimming legs through the different copepodid stages.

Keywords: deep-sea meiofauna, Copepoda Harpacticoida, taxonomy, developmental stages, sexual dimorphism.

MEIOFAUNAL COLONISATION PATTERNS IN MOUNTAIN STREAMS

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Meiofaunal research traditionally focused on marine systems, while scarce attention has been paid to lotic meiofauna, in spite of its fundamental role in freshwater food webs. In lotic environments, artificial substrates are useful tools for the study of invertebrate colonisation dynamics, although only in few studies they were predisposed to assess directional movement patterns. Aim of this research was to investigate three main meiofaunal movement patterns in the riverbed: (1) vertical downwards within the interstitial habitat, which is well known as a refuge for benthic invertebrates (which tend to penetrate into the interstitial zone during increased disturbance intensity, and emerge from the sediment after favourable superficial conditions are re-established), and as a nursery habitat for early life stages of several benthic invertebrates; (2) downstream: in lotic systems, negative rheotaxis (i.e. drift and downstream crawling) represents the main source of new colonists; (3) upstream: positive rheotaxis is common for several benthic taxa, such behaviour being interpreted as a compensatory mechanism for downstream displacement caused by drift and as a behavioural response to local biotic and abiotic conditions. The study was conducted on the Parma River catchment, in the Northern Apennines (Italy), during summer 2008 in five sites, three on the main channel and two each on one main tributary. Nine traps were placed in each sampling site, in groups of three composed by one vertical trap opened upwards, and two horizontal traps opening one upstream and one downstream in order to collect, respectively, organisms moving down into the sediment, and organisms with negative and positive rheotaxis. Meiofauna was abundant in all samples, and we detected distinct movement patterns: Harpacticoida, Nematoda, Oligochaeta, Tardigrada, Tricladida: vertical; Cyclopoida, Hydracarina: upstream; Ostracoda: downstream. Temporary meiofauna (i.e. insect larvae) displayed predominantly vertical movements, indicating the use of interstitial habitat as a refugium from harsh environmental conditions.

Keywords: meiofauna, colonization patterns, artificial substrates, mountain streams.

VERTICAL DISTRIBUTION OF NEMATODE POPULATIONS DURING A TIDAL CYCLE IN A SUBTROPICAL TIDAL FLAT

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We tested the hypothesis that the vertical distribution of nematode populations at a subtropical tidal flat (Paranaguá Bay, S Brazil) is determined by their prevailing feeding strategies. Samples were collected in four replicate cores (diameter 2.5cm), down to a depth of 5cm (sectioned into 0.5cm sediment layers) in each of three randomized sites of 1m^2. Variations in vertical distribution of nematode abundance and chlorophyll-a contents were related to exposure changes during a semidiurnal mixed tidal cycle (T1, tidal period just after exposure; T2, three hours after T1, still exposed; T3, six hours after T1, at the beginning of flood tide). Despite significant differences in nematode numbers, species responses were rather similar among sites. There was a general trend towards downward migration between T1 and T2, with nematode population sizes increasing with increasing depth in the sediment, probably as a response to high desiccation and temperature. Vertical distribution patterns did not change significantly between T2 and T3, suggesting a slow response to inundation. Feeding strategies were determinant of the relative vertical distribution of the epistrate-feeder *Metachromadora* sp., known for its lethargic behavior, which migrated downward ($p<0.006$), probably following the microphytobenthos. However, the numerically dominant, selective-deposit feeders *Terschellingia longicaudata* and *Spirinia parasitifera* responded differently to exposure. The first was more active and migrated to deeper layers ($p<0.002$), while the second was less active and showed no vertical movements, remaining in subsurface sediment layers ($p=0.228$). Our results provided only partial support for the tested hypothesis. Migration patterns heavily depend on feeding modes, but are modulated by locomotion behavior.

Keywords: free-living marine nematodes, tidal cycle, vertical migration, feeding strategies, locomotion behaviour.

MEIOFAUNAL RESPONSES TO BEACH DYNAMICS: REVISITING MCLACHLAN & HESP'S HYPOTHESIS

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This study revisits McLachlan and Hesp's hypothesis (1984) that faunal distribution in sandy beaches is mainly regulated by morphodynamic differences between horns and bays at the scale of tens of meters. To test this hypothesis, we adopted a spatial hierarchical approach along the swash zone of Praia Mansa (Paraná, Southern Brazil) composed of three spatial levels: shapes (horns and bays, fixed), transects (three replicates nested in each shape, at the scale of tens of meters), and points (four replicates nested in each transect, at the scale of meters). Three replicates corers (diameter 2.5cm, depth 10cm) were taken at the scale of centimeters at each point. There were significant variations in densities of major meiofaunal groups and in the densities of the numerically dominant nematode genera *Microlaimus* and *Daptonema* at the scale of meters and tens of meters. However, large-scale processes at the level of horns and bays did not explain variation at much smaller scales. Meiofauna was always most variable at the scale of centimetres, probably matching the patchy distribution of sediment properties. Large macrofauna can introduce such patchiness by changing physicochemical properties, such as permeability, porosity, shear strength and redox potential. Though chlorophyll-a content was significantly lower in the bays than in the horns, the variance components showed that the replicates (centimetres) were also responsible for most of its spatial variability. Meiofauna responded to this spatial heterogeneity through active habitat selection. We conclude that centimeter and meter-scale processes are the main regulators of meiofauna occurrence and distribution in beach cusps, as a reflection of sediment patchiness.

Keywords: small-scale spatial variability, soft-bottom meiobenthos, marine nematodes, hierarchical design, sandy beach.

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COPEPODA HARPACTICOIDA FROM THE RÍA DE FERROL (NW IBERIAN PENINSULA): FAMILY CLETODIDAE SCOTT, 1904

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The *rías* are common geographical accidents of the Galician coast (NW Spain). The Ría de Ferrol has the largest biological diversity among the Galician *rías* because of its particular hydrodynamics and sedimentary conditions. Its benthic fauna is well-known but there is a lack of researches about meiofauna. This shortage of knowledge about meiofaunal taxa has given rise to a joint research project of the EBMG-USC (Galicia, Spain) and the DZMB (Germany) in order to study the subtidal soft-bottom meiofauna, paying special attention to Copepoda Harpacticoida.
Samples were collected during May and June 2006 by means of SCUBA diving. Eight stations were chosen along the Ría. Four stations were sandy and four muddy, and they covered a range of depths and different physicochemical conditions. Altogether, 24 points were sampled, three in each station. Moreover, samples of sediment and water were also collected in each sampling point for measurements of several physicochemical parameters.
Approximately 7,000 specimens of harpacticoids were found in all the stations, from which about 700 belonged to the family Cletodidae. They were found in almost all the stations, being more abundant in muddy sediments.
In this communication, the results on abundance and diversity of the family Cletodidae are presented. Moreover, faunal data are also related to physicochemical features of the sediment.

Keywords: Harpacticoida, Cletodidae, diversity, abundance, NW Iberian Peninsula.

COPEPODA HARPACTICOIDA FROM THE RÍA DE FERROL (NW IBERIAN PENINSULA): FAMILY LAOPHONTIDAE SCOTT, 1905

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The *rías* are common geographical accidents of the Galician coast (NW Spain). The Ría de Ferrol has the largest biological diversity among the Galician *rías* because of its particular hydrodynamics and sedimentary conditions. Its benthic fauna is well-known but there is a lack of researches about meiofauna. This shortage of knowledge about meiofaunal taxa has given rise to a joint research project of the EBMG-USC (Galicia, Spain) and the DZMB (Germany) in order to study the subtidal soft-bottom meiofauna, paying special attention to Copepoda Harpacticoida.
Samples were collected during May and June 2006 by means of SCUBA diving. Eight stations were chosen along the Ría. Four stations were sandy and four muddy, and they covered a range of depths and different physicochemical conditions. Altogether, 24 points were sampled, three in each station. Moreover, samples of sediment and water were also collected in each sampling point for measurements of several physicochemical parameters.
Approximately 7,000 specimens of harpacticoids were found in all the stations, from which about 300 belonged to the family Laophontidae. They were found in many of the stations, being more abundant in sandy sediments, above all in the most external sampling stations in the Ría.
In this communication, the results on abundance and diversity of the family Laophontidae are presented. Moreover, faunal data are also related to physicochemical features of the sediment.

Keywords: Harpacticoida, Laophontidae, diversity, abundance, NW Iberian Peninsula.

HARPACTICOID COPEPOD ASSEMBLAGES ASSOCIATED TO EPIBIOTA ON HARD COASTAL DEFENCE STRUCTURES IN THE NORTH ADRIATIC SEA

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Human-made structures are increasing in marine coastal habitats. They are colonized by organisms coming from natural rocky reefs as macroalgae and macrobenthic animals. These represent, in turn, biogenic substrata for smaller mobile invertebrates and influence local biodiversity by increasing complexity and heterogeneity of habitats. Investigations on the relationships between composition and structure of sessile rocky shore epibiota and settlement of mobile smaller invertebrate populations on both natural and artificial substrata could help understanding ecological implications of the presence of artificial structures. Generally, on hard substrata of the Northern Adriatic coast, *Mytilus galloprovincialis* is the dominant macrobenthic species forming patches interspersed with different species of macroalge. We investigated the assemblages of harpacticoid copepods, the most abundant meiofaunal taxon, associated with these kinds of biogenic habitats on both natural and artificial substrata at three different locations scattered across 400km of the Northern Adriatic coast. All stations were characterised by the presence of several artificial structures in close proximity to natural reefs. In particular, we investigated whether structure and diversity of harpacticoid communities differed between natural and artificial substrata, different degree of habitat complexity (mussels and mussels plus algae) and whether community patterns were consistent among different locations. Multi- and univariate analyses showed no differences between communities of natural or artificial rocky substrata, but only among those inhabiting epibiota at the different localities, depending on the different macroalgae complexity. Proliferation of artificial substrata along the coast can be a useful tool to facilitate spreading and increasing of marine biodiversity, provided that phytal communities are preserved and macroalgal species succeed in stably settling on artificial reefs.

Keywords: coastal zone, artificial habitats, habitat complexity, harpacticoid copepods, North Adriatic Sea.

MEIOBENTHIC COMMUNITY OF TWO OUTLET ZONES OF CENAIM EXPERIMENTAL STATIONS, PALMAR-ECUADOR COMPARED WITH A 'NATURAL' STATION AT PALMAR BEACH

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The community of two outlet zones of CENAIM Experimental Stations: Palmar-Ecuador and one natural environmental station were analyzed and compared. 163 monthly core samples of sediment were collected from March 2006 to October 2007 and some environmental variables were also considered. 5475 nematodes and 55 copepods were collected. No other organisms were captured. The average dissolved oxygen of upper water was 5.8 to the sampling period and the temperature was 25.7°C. The average pH was 8.5 and salinity was in a range of 34.2-48.8 $g.l^{-1}$.
Other variables as total bacteria were considered (1-5.10^{7}UFC.l^{-1}). Any relationship was observed among nematode density and environmental variables.

Keywords: Meiobentos, Nematoda, shrimp production, beach.

LIFE CYCLE EFFECTS OF BISPHENOL 'A' ON THE MARINE HARPACTICOID *TIGRIOPUS JAPONICUS*

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Since copepods have provided interesting insight into stress responses, they have been proposed as model organisms in ecotoxicological studies for invertebrates. Particularly, *Tigriopus japonicus* as a rock-pool-dwelling harpacticoid copepod inhabiting the upper intertidal splash zone is well suited for evaluating sublethal reproductive and developmental toxicity of sediment associated contaminants due to its benthic habitat, moderate acute sensitivity, high chronic sensitivity, ease of culturing in sediments or seawater, short life-cycle, and small size. Several studies have examined sublethal toxicant effects on *T. japonicus'* lifecycle and reproduction. But none have investigated toxicant effects on sexspecific or multigenerational reproductive success. A 96-well microplate-based lifecycle bioassay technique was used here for two-generation rearing and individually paired virgin male:female mating. A major stressor in aquatic systems are endocrine disruptors such as Bisphenol A (BPA), an organic compound otherwise of low acute toxicity, providing a building block of several important plastics and plastic additives. With an annual production of 2-3 million metric tonnes it is an important monomer in the production of polycarbonate. For an estimate of BPA sublethal effects on the reproductive success of *T. japonicus* we reared individual copepodid-I-stages in ELIZA trays to adulthood in as short as 6 days in only 200 µL of 0.1mg-bisphenol (BPA)/L or control (CON) seawater solution. Individual unmated male: female pairs were then cross-mated for all possible combinations within and across rearing treatments and allowed to mate for an additional 9 days in CON or 0.1mg-BPA/L solution. BPA at 0.1mg-BPA/L caused no significant lethality to any mating combination but evoked a significant inhibition of reproduction when BPA-reared males were mated with either a control- or BPA-reared female in BPA solution. When CON-reared males were mated with BPA-reared females in BPA solution, there was no difference in reproductive success compared to BPA-free controls.

Keywords: toxicity, life table, mortality, mating, Harpacticoida.

HV EFFLUENTS AFFECT LIFE STAGES OF THE COPEPODS *PARAMPHIASCELLA* SP. AND *TISBE* SP.

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We tested environmental effects of Hydrothermal Vent Effluents (HVEs) in different concentrations for their effects on growth and reproduction of the copepods *Paramphiascella* sp. and *Tisbe* sp. retrieved from localities nearby the vent. Developmental stages (nauplii and copepodids) were exposed in the laboratory to a range of concentrations of HVEs in a static renewal culture system. In a first set of two experiments we tested the survivorship of three distinct developmental phases in HV effluent dilutions from 50 to 1%. HVEs significantly reduced the survivorship of the naupliar stages at concentrations >5% for *Paramphiascella* sp. ($p<0.01$) and >1 for *Tisbe* ($p<0.05$) and all nauplii of both species died at concentrations of 25% and 50%. Copepodids were significantly lethally affected at concentrations >5% in *Paramphiascella* sp. ($p<0.01$) and >1% in *Tisbe* sp. ($p<0.05$) and in both species all copepodids died at 50% ($p<0.01$). Adult females all died at 50% concentration in *Tisbe* sp. Developmental duration was not significantly affected in the naupliar nor in the copepodid phase in *Paramphiascella*, but there was a trend of developmental delay present in both species. In *Tisbe* sp. the naupliar development was only significantly delayed at a concentration of 10% ($p<0.01$), whereas copepodids and adults only showed a trend of delayed development with increasing HVE concentration. Of the two traits, mortality showed a greater sensitivity to chemical exposure than development time. In both traits are early developmental stages of both copepod species, *Tisbe* sp. and *Paramphiascella* sp. more sensitive to HVEs than advanced stages. Mortality turned out to be a useful toxicologically endpoint, whereas developmental duration was less useful. We demonstrated that both, *Paramphiascella* sp. and *Tisbe* sp. could be used in the monitoring of acute and life cycle effects of natural marine pollution caused by HVEs.

Keywords: hydrothermal vents, natural toxicity, life table, mortality, Harpacticoida.

UVB RADIATION AFFECTS SURVIVAL AND DEVELOPMENT OF THE COPEPOD *TIGRIOPUS JAPONICUS*

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Ozone-related increase in solar ultraviolet radiation (UVR) reaching the earth's surface during the last decades provides an important ecological stressor. In nature, solar UVR may cause appreciable damage to the rocky shore and their biota due to high exposure. We examined the effects of the UVB partition of the UVR wave band on the survival of various naupliar and copepodid stages of the upper shore, splash-pool inhabiting harpacticoid copepod *Tigriopus japonicus* in the laboratory. Artificial UVB radiation resulted in an increased mortality of nauplii and copepodids with increasing UVB doses. UVB induced damage turned out to be stage-specific, with nauplii being most susceptible (LD50= 4.1 kJ m^2) and adult females being least susceptible (LD50=16.7 kJ m^2). Effects on developmental times were significantly evident at UVB doses higher than 7.0 kJ m^2. We also examined the photorepair response of various developmental stages in simultaneous irradiation with UVB and enhanced photosynthetic active radiation (PAR). With enhanced PAR there was a considerable recovery against UVB damage, being higher for younger than for advanced developmental stages. UVB induced influence was not a simple function of UVB dose but also of UVB exposure time. Relatively long exposure of low UVB radiation was more detrimental than short exposure of high UVB radiation for cumulative doses. In conclusion, UVB radiation affected the survivorship and growth of *T. japonicus* negatively at environmentally realistic simulation.

Keywords: UV-B, survival, developmental time, photoreactivation, Harpacticoida, *Tigriopus japonicus.*

PROBING GASTROTRICHA TAXONOMY WITH DNA BARCODING

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Gastrotricha is a phylum of meiobenthic, basal metazoans, living both in marine and freshwater ecosystems. Though taxonomic and biogeographic knowledge has been improved in the last few years, uncertainty remains concerning status and systematic relationships of many taxa, particularly of forms apparently distributed across a wide geographic distance.
We used DNA barcode sequences from mitochondrial cytochrome c oxidase I (COI) gene to probe the taxonomy of two of such species belonging to the marine family Turbanellidae. It's important to notice that no gastrotrich COI sequence has been deposited in GenBank so far (April 2010).
Putative populations of *Turbanella cornuta* and *Paraturbanella teissieri* were sampled from the Mediterranean (Italy, Adriatic and Ligurian seas), Baltic Sea (Sweden), Atlantic Ocean (Canary Islands) and Arabian Gulf (Kuwait). Other species involved were *T. bocqueti*, *T. lutheri*, *P. pallida* and *Macrodasys* sp. DNA was extracted from single specimens, the 'Folmer' region amplified through PCR and the product purified and sequenced. The final alignment included 40 sequences of 583 unambiguously aligned positions; of these, 238 resulted constant and 345 parsimony informative. Neighbour-Joining, Maximum Parsimony and Bayesian analyses agreed in showing on separated clades species/populations from different sea basins. In general, sequence divergence intra-population (<3%) was much lower than between-population (>15%) highlighting several possible misidentification from previous published work. The combination of these results along with a wider taxon sampling and some refinement of the technique will enable significant progresses in our understanding of taxonomy and biogeography of the Gastrotricha, ubiquitous component of the meiobenthic communities the world over.

Keywords: taxonomy, DNA barcoding, phylogeography, cryptic species.

FISH FARMING EFFECTS ON MEIOFAUNA: FOCUS ON COPEPODS AND KINORHYNCHS

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The expansion of intensive marine aquaculture caused a general concern about possible adverse effects on the ecosystem health. Meiofauna has been proposed as bioindicator to monitor the impact of such activities on benthic biota; however, results appear contrasting, so far. The present research analyzed a fish farm located in Sicily (Southern Italy), producing ca 450 tons of Bluefin tuna (*Thunnus thynnus*) per year. Samples were collected over two farming cycles at different distances from the cages, following the direction of the dominant sea current. Effects on meiofauna community structure were investigated by means univariate and multivariate analyses. In the area, meiobenthic community was constituted by more than 20 major groups, the most abundant being the Nematoda, Harpacticoida and Kinorhyncha. Fish farm activity caused a significant increase of nematodes density beneath the cages along with a sharp increase in abundance of two species of Cletodidae (Harpacticoida) and the noticeable decrease of kinorhynchs under and in the proximity of the cages (0-25m). SIMPER analysis pointed out that the main contribution to the dissimilarity among samples, grouped according to the distance from the cages, was due to kinorhynchs and nauplii. ANOSIM showed a clear distinction between the community below the cages and those of other investigated sites. Finally, BIOENV analysis found a significant correlation among meiofauna, total organic matter and sulphide content in bottom sediment. The high kinorhynch diversity allowed the use of taxonomic biodiversity indexes for this group in this research and initiates a larger inventory of species of this group along the Italian coastline. The study indicates an impact of fish farming on meiofauna even though restricted to a limited area and encourages to further research on copepods and kinorhynchs species as indicators of organic enrichment.

Keywords: fish farming, meiobenthos, Harpacticoida, Kinorhyncha, organic pollution.

ABUNDANCE OF SACCOCIRRIDS CAN BE PREDICTED BY CRITICAL GRAIN-SIZE SEDIMENT PARAMETERS

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Based on the assumption that meiofaunal parameters are a function of sedimentary environments, we explored the relationship between the abundance of Saccocirridae (interstitial annelids) and sediment variables along a gradient of morphodynamic beach types in southern Brazil. Three as yet undescribed species of *Saccocirrus* represented up to 60% of the total meiofauna in the swash zone of reflective beaches. B-spline smoothing with polynomial regression was used to determine the optimum values of average grain size (AGS), median, sorting, skewness (SKW) and kurtosis to maximum saccocirrid abundance. The appropriate model was determined using the small-sample-correction version of Akaike's information criterion AIC_c. The abundance of saccocirrids showed a non-linear asymmetric unimodal relationship to AGS, with optimum values between 1 and 2 phi and a peak at 1.4 phi. Grains are coarser at the studied beaches due to the proximity of source areas (crystalline basement complex) and to wave energy dynamics. There was an exponential relationship between abundance and SKW, with optimum values between 0 and 0.1 and a peak at 0.1. The transport competence of currents and waves is lower at the swash zone, allowing for the deposition of fine grains and thus generating slightly positive or symmetric grain distributions. As such, AGS and SKW may be used as proxies or reliable indicators of optimum interstitial habitats for saccocirrids and other meiofaunal groups with similar life strategies.

Keywords: interstitial annelids, sediment parameters, smoothing, reflective beaches, swash zone.

EFFECTS OF 17-α-ESTRADIOL ON A FREE-LIVING MARINE NEMATODE COMMUNITY: RESULTS FROM MICROCOSM EXPERIMENTS

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A microcosm experiment was used to examine the effects of 17-α-Estradiol contamination on a free-living nematode community of a Tunisian lagoon. Sediments were contaminated with four Estradiol doses (0.15mg 17-α-Estradiol kg^{-1}DW, 0.31mg 17-α-Estradiol kgl^{-1}DW, 0.62mg 17-α-Estradiol kgl^{-1}DW, 1.24mg 17-α-Estradiol kgl^{-1}DW) and effects were examined after 60 days. Results from multiple comparisons tests showed significant differences between nematode assemblages from undisturbed control and those from Estradiol treatments. Most univariates measures decreased significantly with increasing level of Estradiol contamination. Results from multivariate analyses of the species abundance data demonstrated that responses of nematode species to Estradiol contamination were varied: The control microcosm (Mc) and the treatment M0.15 were mainly dominated by *Kraspedonema octogoniata*, *Paracomesoma dubium* and *Spirinia gerlachi*. The treatment M0.31 was dominated by *Spirinia gerlachi*, *Metalinhomoeus numidicus*, *Paracomesoma dubium*, *Microlaimus cyatholaimoides* and *Kraspedonema octogoniata*. The microcosms M0.62 and M1.24 were dominated by *Spirinia gerlachi*, *Paracomesoma dubium*, *Microlaimus cyatholaimoides* and *Kraspedonema octogoniata*.

Keywords: microcosm experiment, nematode communities, community structure, oestrogens, 17-α-Estradiol contamination.

THE INTERTIDAL: A NEW HABITAT FOR TWELVE MEIOFAUNAL SPECIES FROM THE RÍA DE FERROL (GALICIA, NW IBERIAN PENINSULA)

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In April 1990 we began a study about the intertidal meiofauna of the Ría de Ferrol; as a result of oil spills caused by tankers *Aegean Sea* (December 1992) and *Prestige* (November 2002) it was extended until October 2003.
The material collected comprises a total of 126,142 specimens, distributed among 26 taxa, from 1,044 samples collected at seven stations in the intertidal zone of the Ría de Ferrol.
The taxa represented and the number of individuals of each one of them are the next: Ciliates (4), Foraminifera (1,619), Cnidarians (17), Turbellarians (4,009), Nemertines (20), Gastrotrichs (447), Rotifers (4), Kynorhynchs (79), Nematodes (95,792), Polychaetes (2,736), Oligochaetes (870), Tardigrada (324), Cumaceans (2), Isopods (73), Amphipods (2), Harpacticoid Copepods (15,412), Ostracods (2,245), Halacarids (277), Insects (29), Gastropods (22) and Bivalves (28), also lays (14), larval forms (2,144) and other unidentified groups (8).
We identified a total of 63 species (excluded Nematodes, Harpacticoid Copepods and Mollusca). Between them, twelve species are mentioned for the first time in the intertidal zone: *Textularia agglutinans, Bolivina dilatata, Discorbis nitida, Glabratella opercularis* (Foraminifera), *Paromalostomum fusculum, Duplominona longicirrus, Parotoplana bicupa, Proxenetes fasciger* (Turbellarians), *Echinoderes dujardini* (Kynorhynch), *Parapionosyllis cabezali, Protodrilus purpureus, Polygordius lacteus* (Polychaetes) and *Chrysoarctus flabellatus* (Tardigrad). Also, *Halammohydra schulzi* (Cnidarian, Hydrozoan) was mentioned for the first time in the intertidal zone of the Iberian coasts and *Cestoplana nexa* (Turbellarian) was mentioned for the first time on soft bottoms. In relation to Foraminiferans, we note that we have taken into account only the species belonging to biocenosis, which were the individuals considered for our work.

Keywords: intertidal, meiofauna, Galician coast, Iberian Peninsula.

STUDY OF NEMATODES OF THE FAMILY THORACOSTOMOPSIDAE FROM THE FAR EASTERN SEAS

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Thoracostomopsidae are common predatory marine nematodes found in littoral and sublittoral sands over the world. The study of nematode distribution and biodiversity of the family Thoracostomopsidae is an important issue in biogeographical and ecological research, requiring a rapid and reliable method for their recognition. Three subfamilies (Thoracostomopsinae, Trileptinae, Enoplolaiminae) have been found in sublittoral habitats and previously have not been reported from the Sea of Okhotsk and the Sea Japan. The buccal cavity is characterised by a mandibular complex and onchia (teeth) forming grasping jaws, genera are distinguished by variations in the development of these structures. Morphological characters of diagnostic value of this family are discussed. At present, Thoracostomopsidae identification is not an easy task and it is often based on minor morphological characteristics, requiring time and resources consuming methods. Microscopic examination was performed using a light microscope Axio Imager A1 (Karl Zeiss) and a confocal microscope (Leica LSM SPE). The slides were imaged using confocal laser-scanning microscopy for autofluorescence. Fluorescence image stacks were registered in the 488-nm (green) channel. The scanning step size was usually about 0.5µm. The number of optical sections in a series ranged from 30 to 70, depending on the size of the specimen. Morphometric data were obtained from camera lucida drawings. We propose the use of a confocal microscope as a new technique for nematode characterisation and identification. The geographical distribution of all the described species is reviewed.

Keywords: taxonomy, nematodes, Thoracostomopsidae, Far Eastern Seas.

MEIOFAUNA AND MICROPHYTOBENTHOS DISTRIBUTION ALONG A GRADIENT OF SANDY BEACHES OF THE RUSSIAN COASTLINE OF THE NORTHWESTERN PART OF THE SEA OF JAPAN

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Spatial and temporal variations of the interstitial composition of benthic microalgae and meiobenthos were analyzed on several oligotrophic beaches of the Russian coastline of the northwestern part of the Sea of Japan along a gradient of morphodynamic beach types and exposure rate. Generally, 5 taxa (dinoflagellates, diatoms, chrysophytes, eugleophytes, cryptophytes) of microphytobenthos and 13 taxa (ciliata, foraminifera, nematodes, harpacticoid copepods, osracodes, turbellaria, nemertini, kinorhynchs, halacarides, amphipods, bivalvia, priapilida, polychaetes) of meiofauna represented the resident biota of this community throughout 2006-2009. Nematodes (60 species) were the only taxon occurring in all stations and represented between 75.8% - and 97.0% of the total meiobenthic composition. The microphytobenthos in the bottom sediments of this area was represented by 32 diatom species were recorded in the samples from investigated area, 65 dinoflagellate species, of these, 3 toxic species were recorded during the present study. Meiofaunal abundance increases exponentially with exposure rate; the number of major taxa increases exponentially with exposure rate and linearly with average grain size. Differences in the assemblages were found to be significantly different and related to the morphodynamic characteristics of the studied zones. The analysis indicated the diversity patterns were different among the investigated beach types. Sediment type, hydrodynamics and food availability are identified as the principal factors determining the observed patterns. The study deals with the possibility of trophic linkage between the microphytobenthos and meiobenthos in sandy sediments.

Keywords: meiofauna, microphytobenthos, sandy beaches, Russian coastline, the Sea of Japan.

TIGRIOPUS FULVUS (COPEPODA, HARPACTICOIDA): TOXICITY SCALES FOR ENVIRONMENTAL ASSESSMENT

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Tigriopus fulvus (Fisher, 1860) is widely distributed in shallow supratidal rock pools of Italy. This ambient has infrequent tidal inundation and the species is subjected to extreme environmental conditions including large temperature and salinity fluctuations. The biological features make this organism an appropriate target species in bioassays. Our long-term studies based on applying *T. fulvus* in marine environmental assays permits to determinate two toxicity scales. The first based on lethal endpoint-mortality and the second based on sublethal endpoint-natural variability in the moults release of naupliar stages. The comparison between the two endpoints shows that they are completely independent. Because natural variability of both endpoints is 10%, this can be used as sensibility threshold of this species. The evaluation of the assay should encompass two steps: the first to check the variability of lethal or sublethal endpoint in the negative control with respect to natural variability; the second, to evaluate toxicity of the sample – the sample is non toxic if both endpoints are equal to or lower than 10% with respect to control, regardless are statistical significances; the sample is toxic when it shows an increase in mortality or a reduction in release of moults greater than 10%, and are statistically significant. The sample has a biostimulation effect when it shows an increase in the moults release that is greater than 10%, and it is statistically significant. Both toxicity scales established on the natural variability of mortality and of moults release in *T. fulvus* nauplii permit to use objective criterions for the evaluation of bioassays to environmental sample.

Keywords: bioassays, sublethal endpoint, moults release.

SENSIBILITY OF *TIGRIOPUS FULVUS* NAUPLII TOWARDS MAIN PRODUCTS DISCHARGED FROM ADRIATIC GAS OFFSHORE PLATFORMS

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Special biological properties of *Tigriopus fulvus* (Fisher, 1860) consent to estimate potential toxicity of pollutants in environmental samples. Produced Formation Water (PFW) discharged from some offshore platforms often contains diethylene glycol (DEG). This is a chemical compound used as an additive for dehydration processes of natural gas during extraction. In relation to the authorisation procedures for PFW discharge at sea, Oil companies arbitrarily established a limit of $3.5 g.l^{-1}$, since no regulation is available in Italian law. The study focuses on the potential DEG's toxicity and establishes the warning threshold relative to the additive in PFW on the sensibility of *T. fulvus* nauplii. The single effect of DEG and the synergic effect of DEG plus PFW were evaluated at 96h test. To evaluate the bioassay, lethal and sublethal endpoints were used, therefore, mortality and moults release, respectively. Different concentration of DEG about arbitrary limit, were tested. The results showed single and synergic effects of DEG plus PFW on *T. fulvus*. Even when lethal effects were low, there were evident sublethal effects. These data substantiate the necessity of prudent use of DEG in the oil and gas offshore processes.

Keywords: diethylene glycol, bioassays, sinergic effect.

NEW HARPACTICOID COPEPOD SPECIES (HARPACTICOIDA) AND HARPACTICOID AND CALANOID (CALANOIDA) SUBSPECIES FROM THE NORTH-EAST OF EUROPE

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Two new copepod forms were found on the islands of the East part of Barents Sea. Males and females of the new harpacticoid copepod species, *Moraria insularis* E.Fefilova, 2008 were description from Dolgii Island (69°06'40"-69°23'20" N, 58°45'-59°17' E), and the new calanoid copepod subspecies – *Eurytemora gracilicauda occidentalis* E.Fefilova, 2008 – was description from Vaigach Island (69°53' N, 59°24' E) (Fefilova, 2008). The species specific features of *M. insularis* are relatively short caudal ramus with a row of spines on the inner margin, rote margins of abdominal somites with spines, long exopod and endopod of the fifth pair of legs with parallel margins. The habitat of *M. insularis* was small fresh lake. Males and females of *E. g. occidentalis* differ from *E. gracilicauda* Akatova 1949 in the presence of excrescences on abdominal somites, longer ramus, and the number of setae and spinules of legs 5. The calanoid subspecies appeared in the mouth of the river. New subspecies of *Maraenobiotus brusei* – *M. b. estonicus* E.Fefilova spp.n. – was found on the Northern Estonia on epiphytic plants under the waterfall on the Jägala River (59°27'21" N, 25°11'04" E) in May (in press). Its habitat is far from the basic areal of the typical form of *M. brucei* and five subspecies (Borutsky, 1952). *M. b. estonicus* E.Fefilova spp.n. has fallow diagnostic features: exopod of antenna 2-segmented with 4 setae, mandibular palp 1-segmented with 4 setae, the first segment of endopod of the second pair of legs with setae, abdominal somites with row of spines extending dorsally and discontinuous on ventral margins.
Estonian Academy of Science covered partly our living expenses in the network of agreement about scientific cooperation between Estonian and Russian Academy of Sciences by reciprocity-based exchange of scientists.

Keywords: freshwater harpacticoids, calanoids, nothern islands, new forms.

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MEIOFAUNA OF SOME LAKES OF BOL'SHEZEMEL'SKAYA TUNDRA (RUSSIA)

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Material for this research was hydrobiological samples obtained from tundra lakes in 1965-1969 (the first period), 1998, 1999 (the second period) and 2009 years. Kharbei Lakes are located in the eastern part of Bol'shezemel'skaya tundra on the North-East of Europe. Meiofauna of the lakes was presented by both pelagic and benthic crustacean and benthic worms, collembolan, hydras.
In plankton, bottom communities and amongst plants there were 35 cladoceran species and subspecies, 6 calanoid forms, 14 cyclopoid ones and 8 harpacticoid copepod species. In the first period of study 47 species were found. Crustacean plankton was dominated by *Holopedium gibberum* Zaddach, *Chydorus sphaericus* (O.F. Müller), *Bosmina obtusirostris* Sars and *Polyphemus pediculus* (Linne) and copepodites. In the second period 36 species of cladocerans and copepods were detected in the lakes. *H. gibberum, Daphnia cristata* Sars, *D. longispina* O.F.Müller, *Bosmina longispina* Leydig and copepodites prevailed in zooplankton in 1998, 1999. In 2009, 35 forms of crustaceans were presented in the pelagic and the bottom communities. Only *Bosmina longispina* Leydig was in the list of dominating forms in this year. The reduction of the number of dominant crustacean species in zooplankton of Kharbei Lakes suggests that eutrofication had started. Up to 66-95.5 percent of the zoobenthos abundance fall to share of meiobenthos. On all types of substrata meiobenthic crustaceans were dominant by harpacticoids: *Bryocamptus zschokkei komi*, Borutzky, *Arcticocamptus krochini* Borutzky and *Moraria duthiei* (Scott). About 30 species of oligochaetes were identified. Species from Tubificidae family: *Spirosperma ferox* Eisen, *Tubifex tubifex* (O.F. Müller), were numerous on all bottom biotopes.
The research was supported by grand No. 09-C-4-1017: 'Influence of global change of the temperature on plankton communities operation in different climatic zones'.

Keywords: tundra lakes, zooplankton, meiobenthos, crustaceans, oligochaeta.

AN ANALYSIS OF NEMATODE AND COPEPOD ABUNDANCE, SPECIES DIVERSITY AND TURNOVER AT SIX MEDITERRANEAN DEEP SEA LOCATIONS ON THE NORTH AFRICAN CONTINENTAL RISE

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This poster presents an analysis of nematode and copepod abundance, species diversity and turnover between 36 sediment samples at six sites located along a 50km transect at depths between 1700 - 2000m on the continental rise north of the Libyan coast. Initial results indicate relatively low abundance between 50-200 ind.10cm^{-2} and relatively high diversity with 40-70 species per sample identified based on the identification of a maximum of 150 specimens per sample. A univariate and multivariate analysis of the data is presented along with estimates of regional biodiversity and species turnover. Species-level data for these taxa is relatively limited from the central Mediterranean and these results represent the first records from the North African continental margin.

Keywords: meiofauna, deep-sea, biodiversity, Nematoda, Copepoda.

IS BENTHIC BIODIVERSITY IN THE DEEP ATLANTIC HIGHER THAN IN DEEP MEDITERRANEAN?

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While the Mediterranean basin is recognised as one of the most diverse on the planet, both in terms of terrestrial and coastal marine species, the deep Mediterranean Sea has been hypothesised to contain a much lower diversity than other deep-sea regions of the Atlantic and Pacific oceans. The reasons for such a low diversity are related with: a) the complex paleoecological history characterised by the Messinian salinity crisis and the almost complete desiccation of the basin and b) the high deep-sea temperatures (ca 10°C higher than in the Atlantic ocean at the same depth), which make the establishment of deep Atlantic fauna in the deep-Mediterranean basin difficult. These conclusions are based on the analysis of macrobenthos, characterised by life cycles with meroplanktonic larvae that spread by currents. Little information is available yet on meiofaunal diversity, which is characterised by direct development and therefore a more direct link with the local environmental conditions. Scant is also the information on the most abundant deep-sea phylum, the nematodes, whose diversity has been investigated so far only in few areas in the deep Mediterranean Sea (the slopes and canyons of the Gulf of Lions, Corsica, Southern Adriatic, Aegean Sea, western and eastern basin). During two oceanographic cruises (March-April 2006) and (June-July 2007), benthic biodiversity was investigated at depths comprised between 1000 and 4400m along a longitudinal gradient across the E-Atlantic Ocean and in five areas of the Mediterranean Sea to improve our knowledge on the spatial distribution of biodiversity along the longitudinal gradient Mediterranean Sea - Atlantic Ocean. Our results will be discussed to test if nematode diversity is higher in the Atlantic than in the Mediterranean at the same depth.

Keywords: biodiversity, nematodes, deep-sea, Mediterranean Sea, Atlantic Ocean.

LARGE-SCALE PATTERNS IN MARINE BENTHIC HARPACTICOID DIVERSITY AND DISTRIBUTION

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Using the database compiled from more than 350 sources, we analyze the zoogeographic distributions of the 1,747 species (from 370 genera and 51 families) of shallow-sea benthic Harpacticoida reported in the Northern Hemisphere (Atlantic and Arctic Oceans and the European seas). Six large regions can be distinguished by their species composition: Polar (central Arctic basin, Kara, Laptev, East Siberian, Chukchi and Beaufort seas), Boreal (North, Baltic, White, and Barents seas, N-E and N-W Atlantics), Mediterranean, Ponto-Caspian (Black, Azov, Caspian and Aral seas), Central West Atlantic (including Caribbean Sea and Gulf of Mexico), and Central East Atlantic. In particular, the Ponto-Caspian fauna is not an exact derivative of the Mediterranean one but instead has more atlanto-boreal features.
Faunal diversity analysis revealed that the Northeast Atlantic and the North and Mediterranean seas contain the richest faunas, while certain Arctic regions and internal seas (Caspian, Azov and Aral) are the poorest ones. The distribution of families and genera was also briefly analyzed. Most families, 55% of genera and over 15% of species are widely distributed (probably cosmopolitan), though others are restricted to boreo-subtropical or tropical zones, and no purely Arctic families are discovered. Many more genera are present in (or even restricted to) the tropics/subtropics compared to the Arctic/Subarctic zone. Bento-pelagic forms are the most widely distributed, followed by phytal species, whereas benthic species, especially interstitial, have more restricted distribution. The percent of regional endemics, mean species occurrence and number of families correlate with total species richness of a particular region, which presumably reflects the differences in sampling efforts and regional exploration. After removing this effect, the above-mentioned features show significant latitudinal trends, with a few endemics present in polar waters.

Keywords: Harpacticoida, benthos, diversity, distribution.

A NEW SPECIES OF LAOPHONTIDAE T. SCOTT, 1905 (COPEPODA, HARPACTICOIDA) THRIVING IN THE REDUCED SEDIMENTS OF THE MADONNA MUD VOLCANO (CENTRAL MEDITERRANEAN SEA)

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During the MEDECO leg 2 cruise (2007) in the central and eastern Mediterranean Sea, meiofauna samples were collected from reduced deep-sea sediments at a variety of topographic structures such as mud volcanoes, brine seeps and pockmarks. Harpacticoid copepods typically occurred with low abundances, except in the seep sediments of the Madonna Mud Volcano on the Calabrian Arc. In these reduced sediments (sampled at 1650m depth), harpacticoids reached a high density of 509 ind.10cm^{-2} (in the upper first cm) and were strongly dominated by one new species of the family Laophontidae T. Scott, 1905. This large, cosmopolitan family comprises about 300 species and representatives mainly dwell in a variety of shallow-water marine habitats, while there are only a limited number of records from the deep sea. The new, dominant species is closely related to the genera *Paronychocamptus* Lang, 1948 and *Bathylaophonte* Lee and Huys, 1999, the latter of which has been described from deep-sea hydrothermal vents. Stable isotope analysis will reveal whether the new species is thriving on chemosynthetically derived food sources in these sediments. The sample from reduced sediments at the Madonna Mud Volcano further contained some representatives of other families, such as Cletodidae, Ectinosomatidae, Miraciidae and Tegastidae, and another new species within the laophontid genus *Microlaophonte* Vervoort, 1964, which is remarkable as the two known species of this genus have been described from shallow-water, (sub)tropical environments. The strong proliferation of a single harpacticoid species in seep sediments has been reported before for a member of *Tisbe* Lilljeborg, 1853 from the centre of the Håkon Mosby mud volcano (SW Barents Sea) by Van Gaever *et al.* (2006) and is related to the trophic specialization of only selected meiobenthic species in these extreme habitats.

Keywords: cold seeps, mud volcano, Harpacticoida, Laophontidae, new species.

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MEIOFAUNA AND NEMATODES FROM THE DEEPEST ZONES AT ADMIRALTY BAY, MARITIME ANTARCTICA – PRELIMINARY RESULTS

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The Antarctic Peninsula region has been considered one of the most affected by environmental changes and ice retreat in Antarctica. As this was the last portion to separate from South America, it has been the focus of several studies related to the evolution and biogeography of a variety of organisms. Admiralty Bay at King George Island, one of the largest of the South Shetland's, is a fjord-like deep trough, 144m^2, and 550m at its deepest zone, strongly influenced by the water circulation from the Bransfield Strait. The meiofauna is not well known in this area, especially at depths greater than 60m, despite its importance for benthic communities. This is the first report on the meiofauna from 100, 300 and 500m, where three replicates were sampled at each depth within the bay using a 0.25m^2 box-corer in December 2008. The upper two centimeters of the sediment have been analyzed so far. Sediment phytodetritus, organic matter, and grain size distribution were used to correlate with the meiofauna and nematodes diversity, composition, and distribution. There was a tendency for a highest meiofaunal density at 300m (5,944±1,067 ind.10cm^{-2}) and lowest at 100m (3,875±2,653 ind.10cm^{-2}), but these were not statistically different. Nonetheless, these values were higher than those previously found at 50-60m. These first results did not suggest depth variation in the meiofauna community. Around 45 nematode genera distributed in 18 families were identified up to now. At 100m depth, many genera were equally important: *Leptolaimus* (13%), *Sabatieria* (11%), *Halalaimus* (10%), *Molgolaimus* (10%) and *Amphymonhystrella* (9%). At 300m, *Leptolaimus* represented 30% of the nematodes, followed by *Sabatieria* (13%) and *Daptonema* (12%). At 500m, *Molgolaimus* represented 26% of the nematodes, followed by *Microlaimus* (11%), *Leptolaimus* (9%) and *Amphymonhystrella* (7%). Specimens will be identified to species level.
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Keywords: Nematoda, continental shelf, depth distribution, King George Island.

NEMATODA RECORDS FROM TODOS OS SANTOS BAY (BAHIA, BRAZIL)

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During an ecological study of the meiofaunal diversity as part of the project 'Aquatic ecosystems in Todos os Santos Bay (BA), with emphasis on the area of Landulpho Alves refinery (RLAM)' conducted by the Oceanographic Institute from University of São Paulo (IOUSP), abundance, community structure and diversity of the nematodes were investigated.
Samples were collected along Todos os Santos Bay, in July 2003 (14 stations) and December 2003 (10 stations) in depths varying from 0 to 7.6 meters, in intertidal and subtidal sites. A total of 111 nematode genera distributed in 26 families were found, with densities varying from 126 to 3,394 ind.10 cm^{-2}. Nine genera are new records for the Brazilian coast: *Cephalanticoma, Comesomoides, Greeffiella, Metasphaerolaimus, Papillonema, Paranticoma, Pseudonchus, Triodontolaimus* and *Zalonema*. Dominant genera were identified to species level, revealing a total of 41 morphotypes, distributed in 24 genera and 13 families. Of these species, 27 are known, 2 are new, 7 are probably new but need to be checked and 5 were morphotypes. For the 27 known species, 15 had already been registered for Brazil, but not for Bahia state (*Oncholaimus cobbi, Oncholaimus gladius, Spilophorella paradoxa, Gomphionema compactum, Pseudochromadora cazca, Metachromadora chandleri, Metachromadora pneumatica, Spirinia parasitifera, Spirinia septentrionalis, Subsphaerolaimus lamasus, Terschellingia mora, Terschellingia longicaudata, Sabatieria pulchra, Comesoma arenae and Pseudolella intermedia*) and 12 are new records for Brazil (*Thalassironus cf. lynnae, Oncholaimellus cf. calvadosicus, Triodontolaimus acutus, Gomphionema typicum, Pseudochromadora incubans, Daptonema cf. articulatum, Daptonema cf. divertens, Daptonema cf. ecphygmaticus, Paramonhystera cf. biforma, Paracomesoma cf. heterosetosum, Paracomesoma cf. inequale, Dorylaimopsis punctata*), so this study contributes in widening these species distribution range.

Keywords: species distribution, species records.

MOLECULAR TAXONOMY CONFIRMS TRADITIONAL CLASSIFICATION OF DEEP-SEA HYDROTHERMAL VENT COPEPODS (DIRIVULTIDAE) AND SUGGESTS BROAD PHYSIOLOGICAL TOLERANCE OF SPECIES AND FREQUENT DISPERSAL ALONG RIDGES

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Dirivultidae are among the most successful organisms at deep-sea hydrothermal vents, which are characterized by extreme environmental conditions such as toxic and hot hydrothermal fluid fluxes. Vents are located along mid-ocean ridges and back-arc spreading centers around the world. Dirivultid copepods occur worldwide at deep-sea vents, but are unknown from the sedimented deep-sea plains. This family of siphonostomatoid copepods includes 50 traditionally described species. We studied their COI diversity in various geographical areas and vent flux regimes, in order to gain insight into true species diversity, dispersal strategies and evolution of this family. Interestingly, there was no evidence for cryptic species and DNA taxonomy revealed the same entities as already known from traditional taxonomy: the two approaches perfectly matched in describing taxonomic units, species as independently evolving entities and genera as monophyletic clusters. Molecular taxonomy could help identifying a new species, and was matching the dimorphic sexes of another species. The dispersal and evolution of vent fauna can be studied by analyzing genetic distances versus geographic distances and ecological attributes of sampling sites. In general, the geographical distance between vents, as well as the extreme physico-chemical environment are thought to affect geneflow of fauna. At least on relatively small geographical scales (up to 2000km) we could not detect any sequence differences within dirivultid species. Also, sequences of species collected from various vent flux regimes and different foundation species were highly similar. We suggest that Dirivultidae are able to disperse relatively easily along ridges, and that they have a broad physiological tolerance, not showing diversification caused by vent flux.

Keywords: taxonomy, COI, Copepoda, deep-sea hydrothermal vents.

CLETOCAMPTUS GOENCHIM SP. NOV., A NEW HARPACTICOID (COPEPODA: HARPACTICOIDA) FROM INDIA

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A new species of harpacticoid copepod, *Cletocamptus goenchim* sp. nov., was found in sediment samples taken at the mouth of the Mandovi Estuary, Goa, India. The new species is suspected to be the same reported in 1979 from Lake Kolleru (east coast of India) as *C. deitersi*, but until new specimens of the species from Lake Kolleru are reported and carefully studied, the 1979 record will remain as doubtful. *Cletocamptus goenchim* sp. nov. seems to be related to *C. stimpsoni* from Alabama (USA). These two species share some key features, but can be separated by the armature of the mandibular palp, the shape of the outer element of basis of P2, the ornamentation of the posterior margin of cephalothorax, pro-, and urosomites, and anal operculum of both male and female, the armature formula of male P5EXP, the armature formula of the male P2ENP2, and the relative length and shape of the inner apophysis of the male P3ENP2. Some comments on specimens of *Cletocamptus* from Korea and China are given.

Keywords: Harpacticoida, Canthocamptidae, *Cletocamptus*, new species, India.

SPATIAL AND TEMPORAL DISTRIBUTION OF HARPACTICOID COPEPODS IN A SOUTHERN EUROPEAN ESTUARY (MONDEGO ESTUARY, PORTUGAL)

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The harpacticoid species abundance and distribution patterns were studied in the Mondego Estuary (Western Portugal) in relation to hydrological parameters. Monthly sampling was carried out from February 2005 to January 2007 at five stations, in both arms of the estuary - north and south. These benthic harpacticoids were collected in the water column with subsurface 63µm mesh tows. This is the first study to provide a checklist of benthic harpacticoids from this estuary.
In total, 13 species plus 6 species not yet identified but known to belong to the genera *Canuella*, *Microsetella*, *Ectinosoma*, *Mesochra*, *Harpacticus* and *Parapseudoleptomesochra* were identified. Copepodites and adults of *Euterpina acutifrons* and *Paronychocamptus nanus* were most abundant in this harpacticoid community. *Paraleptastacus* cfr. *spinicauda* showed a relative occurrence (5-10%) in all stations, except at the mouth of the estuary. *Tachidius discipes* was found in low densities in Mondego Estuary in spite of the high numbers of copepodites of this species in the southern arm, characterised by a high level of total suspended solids.
Canuella sp., *Ectinosoma* sp. (copepodite), *Ectinosoma melaniceps*, *Leptocaris brevicornis*, *Phyllognathopus viguieri*, *Microsetella norvegica* (copepodite) and *Macrosetella gracilis* (copepodite) were considered as rare species. Nonetheless harpacticoid species were represented by higher densities of adults in the northern arm, and juveniles in the southern arm.
Especially in a changing environment like an estuary, it is essential to understand the natural degree of variance in these communities, constituting this order is an important food source for higher trophic levels.

Keywords: Harpacticoida, community structure, seasonal and spatial variability, estuary.

STATE OF KNOWLEDGE OF FRESHWATER GASTROTRICHA FROM FRANCE: TOWARDS A REGIONAL FAUNA

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Faunistic knowledge of freshwater Gastrotricha worldwide is still very scanty and quite heterogeneous since it is limited to few countries mainly corresponding to the nationality of the researchers. In France most research on freshwater Gastrotricha has been performed in the last decades, and has allowed to find only 27 species, in 8 genera and 3 families, all belonging to the order Chaetonotida. For this reason, a study on a large geographical scale has been started in 2005 with the aim to improve the knowledge of freshwater Gastrotricha species from France up to realize a French regional 'fauna'. Various geographical areas of the North (Nord-Pas de Calais), Center-West (Pays de Loire), South-East (Rôhne-Alpes; Languedoc Roussillon) and South-West (Aquitaine) France have been investigated. Thirty-one species of Chaetonotida of the genera *Chaetonotus* (13 species), *Heterolepidoderma* (6), *Aspidiophorus* (4), *Polymerurus* (3), *Ichthydium* (3), *Dasydytes* (1) were collected and identified: 24 species represent first records for France, and 2 are undescribed species still under taxonomic study. These findings allow to nearly double the number of freshwater species of Gastrotricha known for France, from 27 to 53. This number is close to that of the species known from other countries (Brazil, 59 species; United Kingdom, 58), but still far from that of the species found in areas object of special surveys, for which even regional 'faunas' have been realized (Poland, 98 species; Italy, 92; Germany, 91; Russia, 91; Romania, 90). The high number of new records confirms that observations should be widened to French regions not yet explored and deepened in those already considered in order to increase the knowledge basis useful to compile a 'fauna' of freshwater Gastrotricha of France.

Keywords: Gastrotricha, Chaetonotida, regional fauna, fresh waters, France.

INSIGHT ON MEIOFAUNA BEHAVIOUR IN THE DEEP SEA: A TIME-SERIES SURVEY OF THE BENTHIC BOUNDARY LAYER

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A temporal survey of the benthic boundary layer using bottom-moored sediment traps set 4m above the bottom at the DYFAMED-BENTHOS station (43° 24.61' N – 7° 51.67' E, 2347m depth) was carried out between January 1996 and April 1998. The identification of the 'swimmers' picked from the samples showed that ~90% were meiobenthic. Copepods dominated and were on the average 75% of total organisms. They were followed by nauplii (12%), annelids (7.8%), nematodes and bivalves (1.8% each), ostracods, isopods, and amphipods (1.2% altogether). Of the 3930 copepods examined, 4% were calanoids, 15% were harpacticoids, and 81% were cyclopoids. Temporal variations, both intra- and interannual, in swimmer fluxes were high (26 to 361 individuals $m^{-2}.d^{-1}$), but not all groups/taxa/species were equally affected. Statistical analyses showed that these variations were the result of the variability of both physical (near-bottom current) and trophic (particle flux) environmental factors. Organisms had both immediate and delayed responses, which involved passive (i.e. erosion, suspension) and active (i.e. emergence) reactions, as well as population growth (Guidi-Guilvard *et al.*, 2009).

Keywords: meiobenthos, hyperbenthos, benthic storm, suspension, emergence.

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THREE NEW SPECIES OF THORACOSTOMOPSIDAE FILIPJEV, 1927 (NEMATODA) FROM THE SOUTHWEST ATLANTIC

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The family Thoracostomopsidae from the Potiguar Basin (Rio Grande do Norte, Brazil) is composed by five genera: *Oxyonchus* Filipjev, 1927; *Trileptium* Cobb, 1933; *Fenestrolaimus* Filipjev, 1927; *Mesacanthion* Filipjev, 1927; and *Epacanthion* (Wieser, 1953). The aim of this study was to describe three new species of the family Thoracostomopsidae from Potiguar Basin (35°30' S and 35° 37° W), where 28 stations were prospected, covering depths from 1 to 71 meters. Depending on the depth, sediment samples were taken with a Van Veen grab or a box corer from the research vessel *Astro Garoupa*. Sub-samples were stored in plastic containers and fixed with 4% saline formaldehyde. In the laboratory, the samples were washed through 0.45mm mesh sieves and the nematodes were gently picked out with a stainless-steel stylet, fixed with 4% formaldehyde, and gradually transferred to glycerin. The last two genera contain new species, described here, one from *Epacanthion* (*Epacanthion canceriformis* sp. nov.) and two from *Mesacanthion* (*Mesacanthion henriques* sp. nov. and *Mesacanthion dentantuspiculum* sp. nov.). *Epacanthion canceriformis* is different to the others because it possesses a 'bottle-shaped' spicules with striations in the distal portion. The gubernaculum is connected to the spicules. *Mesacanthion henriquei* presents the testes in tanden and striated spicules. *Mesacanthion dentantuspiculum* differ from the new species in having the proximal portion open denticles in the proximal, distal, ventral and dorsal regions, and in having a bifid distal region. The description of the new species is based on several specimens that show strong variations and this could be considered sufficient to establish these individuals as a valid new taxon.

Keywords: Nematoda, Thoracostomopsidae, new species.

EFFECTS OF SALINITY ON OFFSHORE NEMATODE COMMUNITIES IN A LABORATORY MICROCOSM EXPERIMENT

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The effects of three salinity levels on offshore nematode communities of a Tunisian coastal zone (South-western Mediterranean Sea) were investigated in a microcosm experiment. Microcosms with natural fresh meiofauna were exposed to a range of salinity concentrations [low S(L) (8 PSU), medium S(M) (36 PSU) and high S(H) (70 PSU)] and effects were examined after 30 days.
Univariate analysis showed significant difference between nematode assemblages from controls (35 PSU) and those at the different salinity levels. Total nematode abundance (I), mean individual weight (bi), Shannon-Wiener index H', species richness (d), evenness (J) and number of species (S) decreased significantly in S(L) and S(H) levels. However all univariate indices did not change significantly at all S(M) replicates. Results from multivariate analyses of the species abundance data demonstrated that responses of nematode species to salinity variation were varied: *Neochromadora trichophora*, *Anticoma eberthi* and *Enoploides spiculhamatus* were eliminated at the two salinity levels S(L) and S(H) and seemed to be 'stenohaline' species. *Theristus modicus* which increased in replicates S(H), seemed to be 'tolerant' species to high salinity.

Keywords: microcosms, salinity, free living-nematodes, community structure.

KINORHYNCHS OF SPAIN: DIVERSITY AND DISTRIBUTION

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The sampling of meiofauna all along the Spanish coast is contributing to increase the number of both known and new kinorhynch species and genera revealing a great diversity. Until now we have found specimens belonging to 24 different species grouped into 9 of the 19 described genera. Ten of those species are new to science: 3 belong to the genus *Echinoderes*, 2 to the genus *Antygomonas*, 1 to the genus *Dracoderes*, and 4 to the genus *Pycnophyes*. Also, a new genus, *Meristoderes*, is being described with its type species, *M. macracanthus*.
The increase of the knowledge of those genera in the last years is significative from both taxonomic and biogeographic points of view. The present contribution includes a distribution map of the recorded families, genera and species along Spanish coasts, providing the first data to establish a comparison between the Atlantic and Mediterranean kinorhynch fauna. Further sampling is needed to complete the overview, and future sampling will include the study of sediment features in order to establish possible relationships with the species distribution.

Keywords: Kinorhyncha, distribution, diversity, Spain.

NEMATODES AS INDICATORS FOR ASSESSING THE RISK OF A TRANSGENIC MAIZE VARIETY (MON89034×MON88017) WITH MULTIPLE GENES FOR PEST RESISTANCE

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The transgenic maize Mon89034×Mon88017 contains genes of *Bacillus thuringiensis* (*Bt*) that express three different crystal proteins (Cry), protecting the plant against pests. While Cry1A.105 and Cry2Ab2 are specific toxins against the European corn borer (*Ostrinia nubilalis*, Lepidoptera), Cry3Bb1 targets the western corn root worm (*Diabrotica virgifera*; Coleoptera). As these toxins can potentially enter the soil via roots and plant residues, also non-target soil organisms may be exposed and potentially harmed. Thus, the risk of *Bt*-maize for the soil beneficial fauna should be known before its broad introduction into agriculture. Free-living nematodes play an important role in soil food webs and should therefore be considered when monitoring effects of pest-resistant crops.
A tiered approach was used to assess the risk of the Bt-maize. First, the toxicity of the relevant toxins was investigated by testing aqueous protein solutions using a standardized bioassay with the nematode *Caenorhabditis elegans*. Second, the nematode communities from a field grown with various maize cultivars, including the *Bt*-variety, were observed over a period of two years. The results showed that all three Cry-proteins had a dose-dependent inhibitory effect on the reproduction of *C. elegans*, with EC_{50} values ranging from 0.1 to 0.3 µmol.l^{-1}. In the field, no differences were observed between the various treatments, neither between *Bt*- and isogenic maize, nor between the other conventional cultivars, which can be explained by very low concentrations of Cry-proteins that were measured in the soil from the *Bt*-plots (< 1ng.g^{-1} soil dry weight). However, nematode community structure was correlated with the grain size distribution that was measured in all 40 plots. The results indicate that there is no risk of Mon89034×Mon88017 for communities of free-living soil nematodes. Moreover, nematodes turned out to be a suitable organism group for monitoring effects of genetically modified plants.

Keywords: nematodes, Bt-maize, GMO, Risk assessment, Cry proteins.

MACRODASYIDAE (GASTROTRICHA): IDENTIFYING SPECIES USING A MULTI-ENTRY TABULAR KEY

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With unique sets of characters, this key distinguishes some 50, often confusing, entries, some not yet published. Characters are based on total length (40 *Macrodasys*) or total trunk length (10 *Urodasys*) of mature specimens, tail length, location of pharyngeo-intestinal junction, position and number of adhesive tubes, type and location of sensory structures, ventral ciliary pattern, reproductive structures, ecology, and biogeography. After reviewing categories and illustrations of choices listed in the file macrodasyidae.xid, a character state from an unknown specimen is double-clicked. Missing data can be allowed; all marks can be cleared to restart; both marked and eliminated categories can be seen; species lists, images, menu structure and data are all printable. Menus and characteristics are graded according to the difficulty of their determination. Family, genus, and species when recognized are displayed.
Gallery compares all remaining species. Images, data, and references for remaining species can be scrolled. Analysis provides a dynamic list of efficient menus for further identification, based on steps to date and database (db) items remaining.
View Data Set shows all data for any selected species in the db.
Data Distribution shows the relative frequency of characteristics within the db.
Help texts are available for each species, characteristic and menu.
Graphics such as photos (b&w/color) or line drawings can be included for each species, characteristic or menu.
Unusual Characteristics lists in descending order the most unusual characteristics of any item (compared to those remaining).
User Reinforcement: the number of remaining items is shown after each step.
References can be cited by page number in up to 50 cases per species.

Keywords: Gastrotricha, Macrodasyida, key, identification.

MARINE GASTROTRICHA OF THE CARIBBEAN SEA

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This three-year inventory of marine gastrotrich species of the Tropical Northwestern Atlantic (TNWA), has a focus on small island developing states (SIDS), whose sedimentary habitats are under environmental pressure from rising sea levels/shoreline erosion. Our seven international researchers* (systematists with wide field/laboratory experience) and students will survey gastrotrichs on 14 islands, in the South Floridian, Bahamian, Lesser Antilles and Central Caribbean ecoregions. Microscopic techniques (DIC, SEM, CLSM) and molecular sequencing (cox-I mt DNA, 18S rDNA) will uncover new/cryptic species, test evolutionary hypotheses, and analyze gastrotrich systematics/biogeography. Results will appear in journals, electronic keys, taxonomic guides and type collections of host nations. Species richness of TNWA will be compared with other well-studied provinces.
Hummon, Todaro and Kånneby worked at the Virgin Island Environmental Resources Station, St. John, Virgin Islands, in February 2010. VIERS is rustic, comfortable, has excellent food, an air-conditioned lab, a very helpful staff, vehicle and collecting permit facilitated collections, all locations being within the Virgin Islands National Park. Using DIC, high resolution still/video micrography, we studied eight bays, finding 18.5 species per bay (range 8-32), with a total of 70+ species, from 155 location records. Half were macrodasyidans, the remainder chaetonotidans. Four other collections gave 1-4 species each.
*Others include: A. Schmidt-Rhaesa, A. Kieneke, B. Rothe, J.M. Lee and C.Y. Chang.
Keywords: Gastrotricha, Caribbean Sea, Macrodasyida, Chaetonotida.

METAZOAN MEIOFAUNA IN THE GOLLUM CHANNEL SYSTEM AND ON THE EDGE OF THE WHITTARD CANYON, CELTIC MARGIN – HOW THE ENVIRONMENT SHAPES NEMATODE STRUCTURE AND FUNCTION

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Within the framework of the EC FP6 HERMES project, samples were taken at ca. 700 and 1000m depth in the Gollum Channel System and the edge of the Whittard Canyon during the RV Belgica 2006/13 cruise. These two areas are expected to receive high input of organic matter and phytodetritus, but are typified by different trophic and hydrodynamic conditions. Selected biogeochemical variables of the sediments were analysed in conjunction with structural and functional diversity of nematodes, the numerically dominant group within the meiofauna. The Gollum channels and Whittard Canyon edge were characterised by relatively high meiofauna abundance (1054 – 1426 ind.10cm^{-2}) and very high nematode genus diversity (total of 181 genera). The nematode community contrasted between the two study areas, between water depths and between individual sampling stations. In addition, nematode biomass varied between areas and stations and reflected differences in trophic structure induced by local trophic conditions. Sediment layer differences had the largest impact on nematode community structure, indicating that local vertical sediment gradients were more important than other spatial contrasts. For the first time, the 'chemosynthetic' genus *Parastomonema* has been found in deep-sea sediments. This genus is characterised by a degenerated alimentary canal, the lack of a mouth, buccal cavity and pharynx and possesses a rudimentary gut containing micro-organisms which have been recognised as sulphur-oxidising bacteria providing their nematode hosts with nutrition. Together with the presence of a new nematode species associated with ectosymbiotic bacteria this may indicate the presence of a reduced environment in these canyon systems.

Keywords: deep-sea meiofauna, submarine canyons, Gollum Channels, Whittard Canyon, ecology.

MEIOBENTHIC COMMUNITIES ALONG THE POLLUTION GRADIENT IN THE WESTERN PART OF RIA FORMOSA LAGOON (SOUTHERN PORTUGAL): PRELIMINARY RESULTS

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Ria Formosa meso-tidal coastal lagoon has the sources of treated and untreated domestic and industrial waste affecting benthic fauna. The ecological effects on meiobenthic communities of urban sewage pollution were examined at this study.
The sampling stations were located along two transects which run from sewage outfalls to large lagoon channels (Austen *et al.*, 1989). A total of 17 high taxa of meiofauna were registered. Nematoda dominated the communities accounting for more than 90% of total abundance. The environmental stress gradient along the first transect was reflected by change of Nematoda/Copepoda ratio (Raffaelli and Mason, 1981) and total meiobenthos density. Along the second transect these community parameters significantly fluctuated and did not show clearly the environmental stress gradient. The maximum of total meiobenthos density of 52.07 ind.*10^6.m^{-2} and the minimum 0.61 ind.*10^6.m^{-2} were recorded in the immediate vicinity of the sewage outfalls. Preliminary results on the species diversity show clear distinctness of the communities' structure between sites close to sewage outfalls and remote to the lagoon channels.

Keywords: Nematoda/Copepoda ratio, pollution gradient.

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DIVERSITY AND BIOGEOGRAPHY OF *CYLINDRONANNOPUS* (COPEPODA, HARPACTICOIDA) IN THE ATLANTIC, SOUTHERN OCEAN AND PACIFIC ABYSSAL PLAINS

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The harpacticoid genus *Cylindronannopus* Coull, 1973 is regarded as representative for deep sea meiofauna, as no record of it exists shallower than 1500m depth. Within the framework of the international project CeDAMar, meiofauna samples from the deep-sea (1,107 to 5,655m depth) campaigns that took place worldwide in the Porcupine Abyssal Plain (NE Atlanic), DIVA (Guinea, Angola and Cape Basin), ANDEEP (Weddell and Scotia Sea), NODINAUT (Pacific nodule province), CROSEX (Indian) and LEVAR (Eastern Mediterranean) were collected and investigated in terms of copepod diversity and biogeography. In total, 486 adult copepods belonging to the *Cylindronannopus* genus were extracted from 1018 cores and were analyzed at the taxonomic morphological level. *Cylindronannopus* consists of 7 species according to morphological characteristics. The genus *Cylindronannopus* did not occur in the Eastern Mediterranean deep sea basins, whereas its members were present in all the rest of the sampled sites among the three oceans. Three morphospecies were restricted to single regions, whereas the rest showed a much wider distribution. The most world wide distributed species were *C.* (aff) *bispinosus* and two new *Cylindronannopus* species (*C.* new sp1 and *C.* new sp2).

Keywords: biogeography, deep sea, harpacticoida, *Cylindronannopus*, diversity.

SWEDISH FRESHWATER GASTROTRICHA

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Records of freshwater gastrotrichs in Sweden are few compared to other European countries. In 2007 only seven species had been reported, mainly from the northern parts of the country.
The project 'Gastrotricha of Sweden-Biodiversity and Phylogeny' is funded by the Swedish Taxonomy Initiative (STI) and aims to investigate the number of species, distribution and relationships within the group. The project started in 2007 and since then the number of morphological species has increased to approximately 60. This increase does not come as a surprise as Sweden hosts a multitude of different environments ranging from deciduous forests in the south to coniferous forests and tundra in the north.
In total 9 genera have been recorded with *Chaetonotus* as the most abundant, but also more uncommon genera such as *Haltidytes* and *Stylochaeta* have been found. The Swedish gastrotrich fauna is not very different from the rest of Europe. Some of the species found so far are considered cosmopolitans e.g. *Chaetonotus hystrix*, *C. maximus*, *Heterolepidoderma ocellatum* and *Polymerurus nodicaudus*. Among the most common species are *C. microchaetus*, *C. heideri* and *Lepidochaetus zelinkai*. Several species are new to science of which one, *Ichthydium skandicum*, was described last year.
Bogs with *Sphagnum* and ponds with *Lemna* are so far the most diverse habitats. Some species (e.g. *Ichthydium squamigerum*) have been found in clean freshwater sand at several locations. Other habitats should however not be overlooked as they may harbour few but uncommon species.
Future sampling will be concentrated to the northern parts of Sweden and larger lakes and streams.

Keywords: Gastrotricha, Chaetonotida, Sweden, distribution.

A MOLECULAR APPROACH TO THE PHYLOGENY OF CHAETONOTIDAE (GASTROTRICHA, CHAETONOTIDA)

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Chaetonotidae is the largest gastrotrich family containing over 30 genera with both marine and freshwater representatives. The most numerous genus is *Chaetonotus* with more than 200 species. The genus suffers from troubled taxonomy and many species cannot be identified with certainty. Moreover it is not unlikely that this group contains species complexes. *Chaetonotus* is currently divided into subgenera based on the evolution of cuticular structures. A phylogeny of Chaetonotidae would not only elucidate the relationships between genera but also evaluate the current morphological groupings within *Chaetonotus*. Former studies have only used a single gene (18S rDNA) for this purpose with poorly resolved phylogenies as results.
For this purpose we will study at least two nuclear genes (18S rDNA and 28S rDNA) and one mitochondrial gene (COI mtDNA). The data set will contain representatives of most of the genera within Chaetonotidae and approximately 5000 nucleotide characters and will be analyzed using Bayesian and maximum likelihood methods. Subsequently alternative tree topologies will be tested with the approximately unbiased test or with Bayes factors.
So far 18S sequences have been obtained for 40 specimens spanning 13 genera, with additional species and genera waiting for sequencing. All of the sequences will be submitted to GeneBank and can later be used for a phylogeny of all gastrotrichs.
Results will hopefully lead to taxonomic revisions of Chaetonotidae and give a better picture of evolution within the major group of gastrotrichs.

Keywords: Gastrotricha, Chaetonotidae, phylogeny, taxonomic revision.

POWER STATION EFFECTS ON MEIOFAUNA COMMUNITY. CASE STUDY AL-SUBIYA POWER PLANT 1998-1999 – KUWAIT

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Subiya area was monitored by KEPA during 1998 and 1999. The aim of the monitoring was to investigate the changes in the ecosystem pre and post installation of the power plant. The samples were collected from two locations power station inlet and outlet. It was observed that in Subiya outlet the Foraminifers and Polychaetes were the only groups that increased significantly after the installation while other groups showed decline in their densities.

Keywords: Kuwait, meiofauna, power plant, impact study.

RECLAMATION EFFECTS ON MEIOFAUNA COMMUNITY. CASE STUDY FAHAHEEL AREA - KUWAIT

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Fahaheel area was selected to investigate the effects of reclamation (1998). Two years were selected (1996-1997) before the reclamation while the years (1999-2000) were selected after the reclamation. Reclamation effect in Fahaheel area showed significant increase for Foraminifers, Bivalves, Nematodes, Ostracodes, Turbellaria, Copepods and Cilliates. There was also a decline in Gastropodes, while Polychaetes were not affected significantly in the changes. Due to physical parameters TOM increase was observed after the reclamation.

Keywords: Kuwait, meiofauna, reclamation effect, impact study.

THREE NEW SPECIES OF *CERVINIELLA* SMIRNOV, 1946 (COPEPODA: HARPACTICOIDA) FROM THE ARCTIC

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Considered one of the most common harpacticoid families in deep sea benthos, the Aegisthidae can be found in various marine sediments and at different depths. During the fourth leg of the ninth expedition of RV Polarstern into the Arctic Ocean (ARK-IX/4) in 09/1993, three new representatives of the genus *Cerviniella* were collected in multicorer samples from the Laptev Sea at a depth of 760-2017m. Although this genus had already been recorded from the Arctic Ocean by Smirnov (1946), the present research raises the number of species known for the region from 1 to 4, and to 11 worldwide. *Cerviniella* sp. nov. 01 and 03 can be easily distinguished from their congeners primarily by the segmentation of the antennules, maxilla and leg 4, and setation of legs 1-5. *Cerviniella* sp. nov. 02 differs from the other species by the following combination of characters: shape of the rostrum and armature of leg 1 and leg 3 endopods. The study of adults and copepodites also provided significant information about the development and morphological adaptation of the swimming legs in this group. This study was supported by the Census of Marine Life project 'Arctic Ocean Diversity' (www.arcodiv.org).

Keywords: Arctic, biodiversity, Copepoda, deep sea, taxonomy.

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PONTOSTRATIOTES BRADY, 1883 (COPEPODA: HARPACTICOIDA) FROM ANGOLA DEEP-SEA BASIN (SOUTHEAST ATLANTIC, DIVA 1)

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Pontostratiotes constitutes the most specious genus in Aegisthidae and a common presence in the deep-sea benthos. Twenty six species can be found in the Atlantic, Pacific and Indian oceans, in various sediments and at depths ranging from 920 to 5590m. During the first leg (METEOR 48/1) of the project DIVA (Latitudinal gradients of Deep Sea BioDIVersity in the Atlantic Ocean), samples were taken in six areas along a transect of about 700 km crossing the southern part of the Angola Basin, in July and August of 2000. A total of 143 adult specimens of *Pontostratiotes* were sampled with epibenthic sledges at depths between 5117 and 5455m, revealing eight new species that can be clearly distinguished from the other known species of this genus mainly by the dorsal processes that ornament the prosome. Other minor differences in the first antennulary segment, armature of the P5 and morphology of the caudal rami were also observed. The most abundant species was *Pontostratiotes* sp. nov. 6, dominant in the North part, followed by three species (*P.* sp. nov. 1, 2 and 3) those occurred in both extremes of the transect. Three other species (*P.* sp. nov. 5, 7 and 8) were restricted to single areas and were poorly represented. This study was supported by the Census of Diversity of Abyssal Marine Life (CeDAMar).

Keywords: biodiversity, Copepoda, deep sea, taxonomy.

MEIOFAUNAL COPEPODA (CRUSTACEA, MAXILLOPODA) FROM TODOS OS SANTOS BAY, BAHIA, BRAZIL

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During an ecological study of the meiofaunal diversity as part of the project 'Aquatic ecosystems in Todos os Santos Bay (BA), with emphasis on the area of Landulpho Alves Refinery (RLAM)' conducted by the Oceanographic Institute of the University of São Paulo (IOUSP), abundance and community structure of copepods were investigated. Samples collected at 21 stations along Todos os Santos Bay, in Jul and Dec/2003, Aug/2004 and Jan/2005 revealed a total of 9,933 individuals from 72 species, 43 genera, 16 families and 2 orders, with densities varying from 0 to 280 ind.10cm^{-2}. This is the first account of 12 genera (*Ameiropsis*, *Ameiropsyllus*, *Praeleptomesochra*, *Psyllocamptus*, *Ellucana*, *Dactylopusia*, *Neozausodes*, *Tachidiella*, *Asellopsis*, *Quinquelaophonte*, *Delavalia* and *Apodopsyllus*) and 17 species (*Ameira parvula*, *Mesochra parva*, *M. pygmaea*, *Cleptocamptus albuquerquensis*, *Stylicletodes longicaudatus*, *Psyllocamptus triarticulatus*, *Dactylopusia tisboides*, *Neozausodes shulenbergeri*, *Zausodes arenicolus*, *Z. septimus*, *Tachidiella parva*, *Quinquelaophonte quinquespinosa*, *Metis galapagoensis*, *Amphiascus parvus*, *Robertgurneya rostrata*, *Robertsonia propinqua* and *Normanella pallaresae*), widening the group distribution to 104 genera and 157 species, in Brazil. Nineteen species, 40 genera and 16 families are new reports for the investigated area.

Keywords: biodiversity, Copepoda.

COMMUNITY CHANGES ALONG THE SALINITY GRADIENT: THE MEIOFAUNA OF THE SLANEY ESTUARY, IRELAND

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There has been a paucity of research in Ireland on the meiofauna community and internationally on the distribution of this fauna along the estuarine salinity gradient. This study relates patterns in community characteristics of the dominant nematode community and major meiofaunal taxa to measured environmental characteristics for twelve stations along the Slaney estuary salinity range. The meiofauna was represented by seven phyla, with total meiofaunal abundance increasing with salinity from 167 to 6,988 ind. $10cm^{-2}$, with a decline apparent in mid salinities where salinity variation was highest. Nematodes dominated throughout the salinity range, increasing from 52.1 to 98.9% with increasing salinity, with 83 putative species identified to date. Species richness ranged from 10 to 34, with reduced diversity in mid salinities from 4 to 16‰, following the same model as Remane's (1934) macrofauna, and Gerlach's (1954) and Atrill's (2002) nematode studies. The nematode community composition and trophic type shifted along the estuary, with taxonomic distinctness decreasing with increased salinity. Three estuarine zones were confirmed through multivariate analysis; Low salinity, characterised by low abundance, the presence of freshwater nematodes including *Leptolaimus papilliger, Eudiplogaster pararmatus* and *Microlaimus globiceps*; Mid salinity, reduced diversity and dominated by *Anoplostoma viviparum* and *Sabatieria pulchra*; High salinity, highest abundance and diversity, dominated by *Metachromadora vivipara* and *Terschellingia communis*. The responses of the community to organic matter and algal biomass estimates along the salinity gradient are discussed in relation to the usefulness of meiofauna in environmental quality assessment.

Keywords: salinity gradient, meiofauna, community composition, diversity, estuary.

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SEASONAL CHANGES OF THE INTERTIDAL MEIOBENTHIC COMMUNITY AT THE WHITE SEA

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Seasonal changes in abundance and taxonomic composition of intertidal meiobenthos was studied at two sites of the littoral with different hydrological conditions (opened sandy beach and the closed bay). The studies were carried out during one year. Samples were collected also from under ice, covering the littoral in winter. At the both sites the lowest numbers and diversity indexes for all groups were fixed at winter months. Our data shows shifting of maximal abundance of the main intertidal meiobenthic groups (Nematoda, Harpacticoida, Oligochaeta) from mid- to low littoral during lowering of a daily temperature. As opposed to the closed bay, high distinction was found on the sandy beach both in quantitative and qualitative structure in the community during the year, and only here we recorded Gastrotricha, but only during September-October. It leads us to the hypothesis of an annual recolonisation of the sandy littoral by meiobentic organisms.

Keywords: meiobenthos, seasonal changes.

THE ROLE OF EMERGENT HARPACTICOID COPEPODS IN PREY COMPOSITION OF SOLENETTE *BUGLOSSIDIUM LUTEUM* (RISSO, 1810) IN THE SOUTHERN NORTH SEA

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Harpacticoid copepods have been described as important prey according to the analysis of the stomach contents of many demersal fish species. But few studies have identified the copepods at a species level. Only one study so far has compared the composition of harpacticoids in the stomach of several fish species, in relation to the prey availability in the sediment. In our study we use similar spatial and temporal scales. Preliminary analysis of the stomach contents of demersal fish species from the German Bight (Southern North Sea) revealed harpacticoid copepods as being one of the main prey subjects for the solenette *Buglossidium luteum* (Risso, 1810). In this study we wanted to know which copepod species act as important prey for solenette and if some species are eaten more frequently than others. Further questions were: What are the reasons for prey selection? Are the harpacticoid species chosen by *B. luteum* or is the fish rather eating the most available species in an unselective manner? Stomach contents of the solenette revealed *Longipedia* spp. to be the most important prey during this study. We hypothesize that harpacticoid species' emergence behaviour of leaving the sediment result in higher vulnerability to predation and this circumstance could play a major role in prey selection by *Buglossidium luteum*.

Keywords: emergence, feeding, meiofaunal prey, flatfish.

REACTIONS OF A COPEPOD COMMUNITY TO LUGWORM EXCLUSION

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Based on a large-scale, long-term lugworm exclusion experiment established on an intertidal sand flat in Königshafen (Sylt, North Sea), the effect of ecosystem engineering by the lugworm *Arenicola marina* on the meiofaunal community was studied. Samples for sediment and meiofauna analyses were taken from a lugworm exclusion plot three years after lugworms were excluded, a disturbed control plot and a pristine ambient plot. Statistical analyses revealed significantly higher concentrations of total organic matter and chloroplastic pigments at the lugworm exclusion site. The median abundance of total meiofauna was 21–29% higher at the lugworm-free site as compared to the lugworm-inhabited sites. Copepoda and Nematoda were distributed homogeneously over all experimental plots while Ostracoda and copepod nauplii reached their highest abundances in the absence of lugworms. Univariate and multivariate analyses revealed significant differences between the copepod species composition of the experimental sites. While the harpacticoid copepod *Arenosetella germanica* reacted with a decline in individual numbers to lugworm exclusion, *Halectinosoma gothiceps* and *Asellopsis intermedia* benefited from the induced changes in the sediment characteristics. Overall, a higher copepod species diversity and evenness was observed at the lugworm exclusion site. The results of this study indicate that sediment-mediated effects of bioturbating organisms influence the abundance and diversity of surface-living meiofauna.

Keywords: *Arenicola marina*, ecosystem engineering, meiofauna assemblage, Copepoda Harpacticoida, Wadden Sea sand flat.

AN INTEGRATED APPROACH TO THE DESCRIPTION AND SYSTEMATIZATION OF A NEW GENUS AND SPECIES OF MARINE GASTROTRICHA

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In sandy samples from South-West Thailand we found numerous macrodasyidan gastrotrichs belonging to an undescribed species. The abundance and originality of the specimens prompted us to undertake a deep survey of both morphological and molecular traits aiming at the unbiased systematization of the new taxon. Using several microscopical techniques (DIC, SEM and CLSM) we investigated the external and internal anatomy plus the muscular and nervous systems. The Thai gastrotrichs are vermiform, up to 800µm in total length; the head is well defined and provided at its posterior edges with a pair of leaf-like sensorial organs; the posterior half of the body appears slightly wider than the anterior region and terminates in a single lobe. The adhesive apparatus includes tubes of the anterior, ventrolateral, posterior and dorsal series. Pharynx is about ¼ of total body length and shows pores at its posterior 3/4. Adults exhibit maturing eggs and a bulky, muscular caudal organ but, surprisingly, not the frontal organ nor the (usual) spermatozoa. Phalloidin reaction indicated that the muscular system organization follows the usual macrodasyidan plan. The nervous system, revealed with antibodies against RF-amide and serotonin (5HT), is present in the central, peripheral and stomatogastrich compartments. The brain consists of paired RF-positive perikarya connected by three dorsal- and a single ventral commissures, plus paired 5HT-positive cells joined by a dorsal commissure. Paired RF- and 5HT-positive neurites run ventrally along all the body length and coalesce at the posterior end. While the anatomical details of the new species appear unique among known genera, ongoing molecular analysis will help clarify its phylogenetic position within the order.

Keywords: Gastrotricha, integrate taxonomy, new genus, nervous system, phylogeny.

PHYLOGENETIC CONSTRAINTS IN THE SOMATIC MUSCULAR SYSTEM OF ROTIFER MALES. INVESTIGATION ON THE MUSCULATURE OF MALES VERSUS FEMALES OF *BRACHIONUS MANJAVACAS*, *EPIPHANES SENTA* AND *RHINOGLENA FERTOENSIS* (ROTIFERA, MONOGONONTA)

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Sexual dimorphism is characteristic of monogonont rotifers, but at present, most investigations on the evolution of morphology within Monogononta have focused exclusively on females, with only minor taxonomic comments on male structure. Here, we make the first detailed comparison of female and male morphology through an examination of the somatic muscular organization, with the aim of understanding how factors such as phylogeny, habitat and the structural rigidity of the body wall dictate the patterns of muscle arrangement. We analysed the muscles arrangement in both sexes of three monogonont species: *Brachionus manjavacas*, *Epiphanes senta* and *Rhinoglena fertoensis*. The females of the three species differ for ecology and presence or absence of lorica: loricate and planktonic (*B. manjavacas*), illoricate and benthic (*E. senta*) and illoricate and planktonic (*R. fertoensis*). The conspecific males of all species are soft bodied and free swimmers in the same habitat as their respective females. Major differences are discernible among circular muscle states: *B. manjavacas* has circular muscles reduced to dorsoventral bands; *E. senta* possesses muscles ventrally incomplete while *R. fertoensis* has muscles incomplete both dorsally and ventrally. Results support that the circular arrangement in females is a variable trait which mainly reflects ecological adaptations. The presence of an identical condition in the conspecific males, independently of their ecology, suggests, however, that this variability may be limited by evolutionary and developmental constraints. Further investigations are needed to understand the variables shaping muscle arrangement in monogonont males and females.

Keywords: evolutionary ecology, muscles, Rotifera, morphology, confocal microscopy.

CROSSBREEDING EXPERIMENTS WITH *TIGRIOPUS* FROM THE NORTHWEST PACIFIC RIM REVEAL LIFE TABLE EFFECTS IN SUBSEQUENT GENERATIONS

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Cross breeding experiments provide a state of the art instrument to test the genetic compatibility, particularly of populations that are affected by a gradient of genetic isolation. They further provide the most suitable information about the status of biological species by testing for reproductive isolation. We screened life-table characteristics (fecundity, survival, metamorphosis rate, sex ratio, number of breeding success lines) of the first four generations following crossbreedings of *Tigriopus japonicus* from four different localities and the congeneric *T. thailandensis*. Results showed no complete reproductive separation of populations of *T. japonicus* (four localities in Korea, Japan, and Hongkong) and *T. thailandensis* (1 locality in Thailand). Hence, both species contrary to morphological indications belong to the same biological species. Relative genetic homogeneity, but the distinction of four groups of possibly subspecies status of the same *Tigriopus* populations studied here were earlier shown in the literature. In that study COI, 18S and 28S rDNA, and the ITS1 and ITS2 regions of rDNA were compared. Life table characteristics indicated both, higher and lower fitness (survival and fecundity) – depending on populations – as well as faster and slower developmental rates of pure lines compared to hybrid lines. These heterosis and hybrid breakdown effects were particularly enhanced in the crossings of geographically most distant populations, indicating that their genetic compatability was affected.

Keywords: biological species, cross breeding, life table, heterosis, hybrid breakdown, population ecology, Harpacticoida, *Tigriopus.*

COMMUNITY STRUCTURE OF HARPACTICOIDA (CRUSTACEA: COPEPODA) FROM THE COAST OF CHENNAI, INDIA

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Harpacticoid copepods of sandy beaches from the coast of Chennai in India were studied from January 2000 to February 2001. Total density of harpacticoids was $1.5*10^6 \pm 5.4*10^4$ ind.10cm^{-2}. Mean abundance was highest during February 2000 (15182.67 ± 21019.15 ind.10cm^{-2}) and lowest during July 2000 (3951.07 ± 5271.87 ind.10cm^{-2}), whereas at stations it was highest at Neelangarai (25187.33 ± 31831.51 ind.10cm^{-2}) and least at Besant Nagar (17738.93 ± 21581.63 ind.10cm^{-2}), respectively. Harpacticoid communities were dominated by copepodids belonging to several taxa during different months (25256.14 ± 14884.09 ind.10cm^{-2}) and at all stations (72470.40 ± 15892.51 ind.10cm^{-2}), respectively. Mean highest and lowest abundance of adult harpacticoids were provided by *Arenopontia indica* and *Psammastacus acuticaudatus*, during different months (12438.86 ± 8547.53 and 495.71 ± 496.88 ind.10cm^{-2}) and at different stations (34828.80 ± 10872.16 and 1388.00 ± 232.24 ind.10cm^{-2}), respectively. Cluster and principal component analysis showed that harpacticoids are grouped into six categories. Canonical correspondence analysis showed the contribution of harpacticoids towards their abundance during months and at stations. Ecological indices varied with different sampled months, stations and among harpacticoids. Abundance of harpacticoids was more significantly changing with months rather than with stations. Successful reproduction and high abundances of harpacticoid developmental stages provides an adaptation, by which these organisms can overcome natural disturbances provided at a given environmental situation.

Keywords: meiofauna, harpacticoida, sandy beach, Chennai coast.

MONTHLY DISTRIBUTION OF MEIOFAUNA FROM FIVE SANDY BEACHES OF SOUTH-EAST INDIA

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Meiofauna from five sandy beaches along the Chennai coast, Tamilnadu, south-east India were studied from January-2000 to February-2001. Total density of meiofauna was $3.73*10^6 \pm 4.1*10^5$ ind.10cm^{-2}. Mean abundance during different months was highest during February-2000 (35565.85 ± 12463.03 ind.10cm $^{-2}$) and least during March-2000 (11465.85 ± 4250.26 ind.m^{-2}). As for stations it was highest at Neelangarai (67058.31 ± 7153.43 ind.10cm^{-2}) and lowest at Marina (52517.69 ± 5373.63 ind.10cm^{-2}), respectively. Mean highest and lowest meiofauna abundance was observed from Copepoda and Cladocera during different months (109372.29 ± 10906.42 ind.10cm^{-2} and 1341.14 ± 241.15 ind.10cm^{-2}) and at stations (306242.40 ± 3905.26 ind.10cm^{-2} and 3755.20 ± 88.90 ind. 10cm $^{-2}$), respectively. Cluster and principal component analyses showed that meiofauna are grouped into three major categories according to their distribution and abundance. Canonical correspondence analysis showed the importance of abundance, different months and stations for the different meiofauna groups. Ecological indices varied with months, stations and within meiofauna groups. Monthly changes in the nematode-copepod index showed that both, Ernavoor and Thiruvotriyur are more subjected to pollution with highest diversity and evenness distribution of nematodes, compared to the remaining three stations.

Keywords: meiofauna, sandy beach, harpacticoida, nematoda, Chennai coast.

TRACING THE FOOD WEB OF SANDY BEACHES: A MULTITROPHIC APPROACH USING STABLE ISOTOPES

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The sandy beach fauna can be split in three components according to their size: macrobenthos, meiobenthos and microbenthos. Since the use of stable isotope ratios as biomarkers for trophic interactions was introduced in benthic ecology, several studies were devoted to identify the preferential diets of the organisms in diverse ecosystems, and their trophic levels. The sandy beach food web including the meiofauna however has not been investigated so far. In order to fill this gap, we studied the food web of a sandy beach in De Panne (North Sea, Belgium) using dual stable isotope analyses (^{13}C and ^{15}N). Macrobenthos was represented by polychaetes (*Scolelepis squamata*) and crustaceans (*Eurydice pulchra*, *Bathyporeia pillosa* and *B. sarsi*), meiobenthos by potential prey nematodes (deposit feeders and epistrate feeders) and predators (*Sigmophoranema rufum*, *Enoplolaimus littoralis* and *Mesacanthion* sp.), copepods and turbellarians. Analyses of stable isotope signals of suspended particulate material (SPM), diatoms and sediment were also included. Our findings may suggest the presence of at least three consumer trophic levels for the meiofauna and two consumer trophic levels for the macrofauna. This study underlines the complexity of the food web of sandy beaches.

Keywords: macrofauna, meiofauna, microbenthos, ^{13}C, ^{15}N.

EFFECTS OF CADMIUM ON THE FITNESS OF, AND INTERACTIONS BETWEEN, TWO BACTERIVOROUS NEMATODE SPECIES

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Interactions between species contribute to micro-evolution as well as to community structure and functioning. In addition to direct predator-prey relations, many other interactions (competition, facilitation, inhibition,...) may be key to the structure and functioning of communities. Such interactions often occur between species belonging to a same trophic level, and have already been demonstrated between species of bacterial-feeding nematodes, but the exact mechanisms remain poorly understood. Hence, it is difficult to predict their outcome under changing environmental conditions like pollution. Postma-Blaauw *et al.* (2005) found a contramensal interaction (-,+) between two soil and freshwater bacterial-feeding nematode species, *Plectus parvus* and *Acrobeloides nanus*, even at very low abundances of the former. We performed monospecific and combined culture experiments with these two species under optimal conditions and compared the outcome with trials in which the nematodes were exposed to a series of sublethal Cadmium concentrations. It is well established that *A. nanus* has a considerably higher tolerance of Cd than *P. parvus*. We thus set out to assess whether we could confirm the contramensal interaction between these species, and hypothesized that increasing levels of Cd would increase the negative effect of *A. nanus* over *P. parvus* and decrease the positive effect of *P. parvus* on *A. nanus*. We evaluated fitness and the outcome of interspecific interactions based on the intrinsic rate of population increase. Initial findings (first 20 days of the experiment) confirm the much higher sensitivity of *P. parvus* to Cd and the contramensal relation between both species. Surprisingly, though, this relation appears to hold irrespective of Cd concentration. These results suggest that at least the positive effect of *P. parvus* on *A. nanus* is not density-dependent. At the conference, we will present results of the entire experiment lasting up to 48 days of inoculation.

Keywords: bacterivorous nematodes, horizontal interactions, facilitation, inhibition, fitness, cadmium pollution.

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ABUNDANCE AND BIOMASS OF MEIOFAUNA ON INTERTIDAL MUDFLAT OF TONGZHAO IN XIANGSHAN BAY (EAST CHINA SEA)

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The abundance and biomass of benthic meiofauna were quantitatively investigated based on samples collected in April, July, October, 2006 and January, 2007 on intertidal mudflat of Tongzhao in Xiangshan Bay. A total of 14 meiofaunal groups was identified: Nematoda, Copepoda, Polychaeta, Turbellaria, Oligochaeta, *et al*. The average abundance of meiofauna was 3713.05±1229.52 ind.10cm^{-2}. Nematodes were the dominant meiofaunal group, contributing 91.26% of the abundance and 42.85% of the biomass. The average biomass of meiofauna was 3162.81±1059.40 μg.10cm^{-2}.
The seasonal changes of abundance and biomass were revealed. The abundance of summer was the highest in four seasons, which was 5326.03±2826.77 ind.10cm^{-2}, and the abundance of autumn was the lowest. The biomass of summer also was the highest, which was 4496.63±3432.50 μg.10cm^{-2}. Analysis of vertical distribution indicated that 64% of the total meiofauna were in the 0~2 cm layer of sediment. The feeding types of free-living marine nematodes were studied. The selective deposit-feeders (1A) were the dominant group, which accounted for 60% of the total free-living marine nematodes. The epigrowth-feeders (2A) were the second which accounted for 33% of the total of nematodes.

Keywords: meiofauna, abundance, biomass, intertidal mudflat, Tongzhao in Xiangshan Bay.

TEMPORAL DYNAMICS OF MEIOBENTHOS IN THE EPILITHON OF THE GARONNE RIVER (SW FRANCE)

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Lotic epilithon, which grows on streambed rocks and pebbles, is a heterogeneous assemblage of bacteria, microalgae, fungi and protozoans embedded in a matrix made of exopolymeric substances, detritus and sediment. The epilithon growth is strongly influenced by hydrodynamics, light and nutrient availability. It is also expected that the numerous small benthic metazoans inhabiting the epilithon could influence their habitat through grazing, excretion and bioturbation. In terms of density, meiobenthic organisms dominate the metazoan community. Nevertheless, studies on meiobenthos in lotic epilithon are scarce. In this study, we followed the temporal dynamics of the meiobenthos through two sampling campaigns: from November 2004 to February 2006 and from September 2008 to March 2010. Density and biomass of meiofauna (mainly nematodes and rotifers) was weekly determined in relation with total epilithic biomass, density of aquatic insect larvae, microalgae availability and abiotic factors. The aim was to follow the recolonization processes of the meiofauna in the epilithon (e.g. after a flood), and to determine the main factors that could influence the temporal dynamics of meiobenthic assemblages.

Keywords: nematodes, rotifers, microalgae, periphyton, stream.

INFLUENCE OF TEMPERATURE ON THE PRIMARY SEX RATIO OF THE HARPACTICOID COPEPOD *PHYLLOGNATHOPUS VIGUIERI* (MAUPAS, 1892) AND ITS POSSIBLE IMPACTS FOR POPULATION DYNAMICS IN CONTEXT TO CLIMATE CHANGE

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Understanding of critical factors affecting population dynamics in copepods is of great biological and economical interest, because they are important primary consumers in pelagic food chains and the main food of many commercially used fish species. One important life history character influencing population dynamics is sex ratio and inextricably connected to this sex determination. With respect to this, the influence of temperature on primary sex ratio was tested in the harpacticoid copepod *Phyllognathopus viguieri* (Maupas, 1892), because temperature becomes especially important in context of climate change. Temperature has no effect on the overall sex ratio, but the sex ratios of different progenies do significantly vary. Furthermore extra-binomial variance in sex ratio was found, which cannot be explained by heterogametic sex determination with sex chromosomes. Genetic correlation across two temperature conditions indicates substantial genotype-by-temperature interactions. Hence temperature has an influence on primary sex ratio in this species. Climate change might not significantly affect population dynamics because of phenotypic differences in genotypes with various temperature conditions.

Keywords: sex determining mechanisms, population dynamics, genotype environment interaction, common garden.

HOW MANY VALID SPECIES ARE KNOWN IN THE DEEP SEA TO DATE? SOME REGULARITIES IN MODERN KNOWLEDGE ON DEEP-SEA NEMATODE TAXONOMY

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All available published information on deep-sea valid nematode species was analyzed, in order to obtain an overview of the state of knowledge in deep-sea nematode taxonomy. 127 taxonomic and ecological literature sources reported a total of 638 valid species belonging to 175 genera and 44 families, from 474 deep-sea stations at depths of 400-8,380m. This number is less than 16% of all known marine nematode species, whereas the deep sea comprises about 91% of the ocean bottom. 71% of these species were initially described from the deep sea. Most of the valid species have been reported from the North Atlantic, including the Mediterranean. The rest of the World Ocean including the Pacific, Indian, Arctic and Antarctic oceans are considerably less studied. Among large-scale habitats, the largest numbers of valid species were reported from the continental slope and the abyssal plains, while the information on valid species from other deep-sea habitats is extremely scanty. Some deep-sea families are much more investigated than others in proportion to their relative species abundances in the deep sea, i.e. the percentage of valid species from these families among all valid deep-sea species is much higher than the real percentage of species from these families reported in faunistic studies (e.g., Desmoscolecidae, Comesomatidae, Sphaerolaimidae, Benthimermithidae, Leptosomatidae, and Draconematidae). On the other hand, the families Xyalidae, Oxystominidae, and Monhysteridae were recognized as the most 'underinvestigated', as, in spite of their high species abundance in the deep sea, there are quite a few taxonomic studies on these taxa. Some deep-sea nematode species were reported from two or three oceans, and can be considered probable cosmopolitan species. Some number of probable eurybathic species were also found (the difference between minimum and maximum depth was from 1 to more than 5km).

Keywords: cosmopolitanism, eurybathic, habitats, valid deep-sea nematode species.

NEMATODE ASSEMBLAGES FROM THE ANAXIMENES SEAMOUNT, THE EASTERN MEDITERRANEAN (PRELIMINARY RESULTS)

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Nematodes inhabiting seamounts are still very poorly studied. To date, there are no studies describing nematode assemblages from seamounts, their diversity and density. The present material was obtained from the Anaximenes Seamount (Eastern Mediterranean) during the 71th cruise of RV 'Meteor' in 2006 using a multicorer. Quantitative data from 19 stations and 67 samples were obtained. Samples were collected from the summit and the slope of the seamount, from the mud volcano located at the other side of the seamount slope, and from the abyss surrounding the seamount. The maximum average nematode density was at the mud volcano (315 ind.10cm^{-2}). At the seamount slope lacking mud volcanic activity, the average nematode density was about 100 ind.10cm^{-2}. It was higher than in the surrounded deep-sea (33 ind.10cm^{-2}). The total nematode density at the Anaximenes Seamount was 3-5 times less than it was reported earlier for the same depths in the Mediterranean slope and canyons. As a preliminary study, nematodes from 4 samples were identified at genus level: from the summit (860m depth), the upper slope (910m), the medium part of the slope (1540m), and the mud volcano (1254m). About 500 nematodes were examined. A significant difference in dominating genera was between all studied localities: *Halalaimus* and *Marylynia* at the lower slope; *Syringolaimus* at the upper slope; *Bathynox*, *Syringolaimus*, and *Longicyatholaimus* at the summit; and *Microlaimus* at the mud volcano. These sets of prevailing genera significantly differ from the sets of prevailing genera reported from the Mediterranean abyss and slope. The highest genus diversity [EG(51) = 28] was at the summit and the upper slope, whereas the lowest one (17) was the mud volcano. The nematode diversity from the seamount slope is comparable with nematode diversity at other global habitats, like a continental shelf, a continental slope, an abyss, etc., and with nematode diversity from other parts of the Mediterranean.

Keywords: Anaximenes seamount, nematoda, Mediterranean, diversity, mud volcano.

MEIOBENTHOS OF MANGROVE INTERTIDAL OF VIETNAM

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Meiobenthos was studied in two contrasting mangrove sites in Central Vietnam near NhaTrang city: in riverine mangrove and in oceanic fringe mangrove both dominated by *Avicennia* spp. and *Rhizophora* spp. Meiobenthos was represented by seven taxonomic groups: Nematoda, Copepoda: Harpacticoida, Oligochaeta, Turbellaria, Kinorhyncha, Tardigrada and Foraminifera: Allogromiida. Species diversity and community structure were described for free-living nematodes. Each site contains more than 50 species. The spatial distribution of species assemblages was tested in several spatial scales. The mangrove trees are the key factor in structuring the meiobenthic communities. The roles of different mangrove species in structuring of meiobenthic communities are discussed. The relative importance of alfa and beta diversity in overall species diversity was tested. Changes in nematodes community structure were described during the primary succession of artificial mangrove forest.

Keywords: nematodes, Vietnam, mangroves, ecology.

FIRST EVALUATION OF THE BENTHIC MEIOFAUNA OF 'PINHEIROS RIVER', ON GUARATUBA BAY, PARANÁ – BRAZIL

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The benthic meiofauna of Pinheiros River, a tidal channel of Guaratuba Bay-Brazil, was for the first time evaluated during the year of 2005 in four seasonal campaigns (summer, spring, autumn and winter). This was part of a project that used the diversity and abundance of meiofauna together with benthic macrofauna, to evaluate the quality status of the environment that is under the influence of an oyster farm. In each campaign, six meiofauna replicates were taken, and one sample for sediment analysis. The identification was made for higher groups, and nematodes were identified to genus level; and classified in different feeding groups. In total, 4448 meiofauna organisms were counted, and 66 different Nematoda identified. The sediment was characterized as predominantly sandy, with considerable percentages of silt and clay. This explains the presence of a high diversity of Nematoda, genus, characteristics of those different types of sediments. Nematode of the genus *Daptonema* and *Sabatieria* were the most frequent and abundant, but *Daptonema* was equally distributed along the seasons and *Sabatieria* had a peak of 58% in the summer. Almost 50% of the nematodes were non-selective depositive-feeders, with a more homogeneous distribution than the other feeding-types. A low occurrence of epistrate feeders on summer, at a sample point under the oyster farm, suggests that the structure is blocking the sun light and affecting the primary production and thus, the available food for epistrate feeders. Carnivores/omnivores presented the smaller density variation along the seasons, reflecting the flexibility of the food habit of this group. Further studies are needed to explain the Nematoda occurrence and distribution and its relation to the abiotic parameters, in special identifications to species level.

Keywords: meiofauna, ecology, estuary.

EFFECTS OF HEAVY METALS ON FREE-LIVING NEMATODES: A MULTIFACETED APPROACH USING SURVIVAL, GROWTH AND BEHAVIORAL ASSAYS

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Toxicity tests, using single species bioassays, are a promising way to understand the biological effects of toxicants. The aims of this study are threefold: (a) to assess lethal and sublethal (0.01 to 1mg.l^{-1}) effect concentrations of lead, zinc and nickel for the free-living nematode *Caenorhabditis elegans* using a liquid assay focusing on survival, growth and reproduction as endpoints, (b) to test a behavioral assay with taxis to food as an endpoint, focusing on the same metals, and (c) to develop a parallel bioassay for use in marine/estuarine systems, focusing on the marine rhabditid *Rhabditis marina*. The liquid assays with *C. elegans* showed that only the highest tested concentrations of Pb and Ni caused a significant negative effect on growth and reproduction, while we found no effects of Zn, even at concentrations up to 4mg.l^{-1}. The liquid assays are not suitable for *R. marina*, since this species exhibits retarded development and depressed reproduction when submersed in liquid without a substratum such as agar. We are currently testing modifications to the assay to overcome this problem.
For the behavioral assays, we compared an approach in which the pollutant was only present in the food spots with one where the pollutant was homogenously distributed in the agar medium. The results at lethal metal doses differed according to the metal as well as to the type of assay. For instance, *C. elegans* did not avoid Ni-contaminated food patches, but their motility on polluted agar was immediately impaired and most nematodes died within a few hours. At lethal doses of Zn, *C. elegans* did avoid contaminated food patches. Sublethal concentrations of Ni caused a radical shift in the way *C. elegans* moves, also resulting in poor attraction to food patches. No such effects were observed on Pb or Zn. Behavioral assays with *R. marina* are ongoing.
Our results show that behavioral assays may provide important insights complementary to those of survival, growth and reproduction tests.

Keywords: ecotoxicology, bioassays, heavy-metals, nematodes.

THE NEMATODE FAUNA OF THE AMUR RIVER ESTUARY

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The estuary of the Amur River is the largest estuary of the eastern coast of Russia. Geographically it is located between the Japan Sea and the Okhotsk Sea. The samples were collected from 58 stations in the summer of 2003, 2005, 2006, and 2008 in different parts of the estuarine area. The samples were analyzed for metazoan meiofauna, nematode diversity as well as environmental parameters such as organic carbon, phytodetritus, sediment grain size, salinity and temperature. The environmental parameters composition was very diverse in the different zones of the estuary. Nematodes were the most abundant meiofauna taxa. A total of 233 species of nematodes was recorded, and the mean density was 600.67 animals per $10cm^2$ (range: 0.5-2912.0). The density and composition of the nematodes assemblages were distinctly different among stations; these differences were used to cluster stations into groups with similar species composition. However, some species (*Daptonema longissimecaudatum*, *Halalaimus leptoderma*, *Neochromadora poecilosoma*, *Parodontophora marisjaponici*, *Sabatieria pulchra*, *Sphaerolaimus gracilis*, *Terschellingia longicaudata* etc.) were widely distributed. The spatial distributions of nematodes were strongly correlated with salinity. The influence of the different environmental settings of the Amur River estuarine area on nematode diversity patterns will also be discussed.

Keywords: marine nematodes, Amur River estuary.

STRUCTURE AND TAXONOMIC COMPOSITION OF SUBTIDAL MEIOFAUNA ASSEMBLAGES IN THE NORTHEAST SAKHALIN SHELF AND THEIR LINK TO OTHER COMPONENTS OF THE BENTHIC FAUNA

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The aim of this work was to describe the diversity and structure of meiofauna communities collected at 23 stations in the northeast Sakhalin shelf (the Sea of Okhotsk) in relation to a number of measured environmental variables. Patterns observed for meiofauna were compared with those from larger-sized benthic fauna. All benthos samples were obtained using a van Veen bottom grab sampler (grab area 0.2 m^2). Four replicate samples were taken at each station. Before the start of grab sampling, an underwater video recording was made. The stations were situated on soft sediments (predominance of sandy fractions) at water depths of 11 to 27m. The data showed an increase in total macrobenthos biomass with depth throughout the studying area, due mainly to increasing biomass of the sand dollar *Echinarachnius parma*, which accounted for most (>75% on average) of total biomass, and increased to 85-95 % at depths of 20-27m. The proportion of other groups in the total biomass was significantly lower. Regarding meiofauna, nematodes were dominant at all stations. The combined analysis of meio- and macrofaunal groups was done. The results suggest that a relation between species distribution patterns can be based, in part, on common affinities for particular habitat conditions.

Keywords: Sakhalin shelf, meiofauna, macrofauna, marine nematodes.

TEMPORAL CHANGES IN THE COMPOSITION AND ABUNDANCE OF DEEP-SEA METAZOAN MEIOFAUNA IN THE IERAPETRA BASIN, EASTERN MEDITERRANEAN

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The deep sea has long been considered as a stable environment, buffered from short-term changes in the atmosphere or the upper photic zone. However, recent long-term monitoring studies have shown that the deep sea is a dynamic environment linked to upper water column processes which significantly influence its benthic communities. In the eastern Mediterranean, long-term monitoring has been going on for the last twenty years in the Ierapetra Basin (southern Cretan margin) at 2500-4500m. Here we present trends in meiofauna community structure based on five different sampling campaigns covering a period of 16 years (from 1993 to 2009). The meiofauna was composed by 16 taxa, with nematodes and harpacticoid copepods comprising more than 95% of the fauna. Total meiofauna densities ranged from 12 to 160 ind.10cm^{-2} and responded with a rapid increase in abundance to a pulse of organic matter input in 1993. This event, known as the Eastern Mediterranean Transient (EMT) caused an increasing outflow of nutrient rich water masses into the Levantine Basin, resulting in enhanced biological productivity and OM flux to the seabed. The effects of seasonal food pulses on the vertical distribution of meiofauna and nematode species composition will be discussed.

Keywords: meiofauna, temporal changes.

EFFECTS OF ENDOSULFAN (THIODAN 35 EC®) CONCENTRATIONS ON MEIOFAUNA COMMUNITY: AN INNOVATIVE MICROCOSM APPROACH IN BRAZIL

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A microcosm experiment with natural community of meiofauna from a muddy flat, Santa Cruz Canal, Pernambuco, Brazil was performed to test concentrations effects of the endosulfan organochlorine pesticide (Thiodan 35 EC®) that are most probable as runoff from sugar cane crops. An innovative methodological proposal for microcosms was performed for the first time in Brazil. The nominal concentrations (0.001, 0.005, 0.01, 0.05, 0.10, 0.20, 0.35 and 0.55µg.g^{-1} + control) and experimental times (days 0, 1, 4, 8 and 16) were adopted. Nominal and measured endosulfan concentrations showed highly significant correlation with losses below 60%. Significant differences were detected for meiofauna structure between experimental days and concentrations tested. Treatments explained part of the variation in Kinorhyncha densities. There were no significant concentration effects on microphytobenthos. Chlorophyll-a concentration explained positively part of the variation of Copepoda densities. Despite the moderate to high volatilization rate of the endosulfan observed in the end of the experiment, it is suggested that the absence of mortality patterns due to pesticide bioavailability is related to both sedimentary factors and the presence of microalgae. Possible replacement of sensitive by tolerant species or predominance of resistant species in each meiofauna group throughout the experiment is another hypothesis to be discussed.

Keywords: meiofauna, microcosm, pesticide, endosulfan, sugar cane.

MEIOFAUNA ASSEMBLAGES IN FIVE MEKONG ESTUARIES (SOUTH VIETNAM)

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Meiofauna assemblages in 5 estuaries (Cua Tieu, Cua Dai, Ba Lai, Co Chien and Dinh An) of the Mekong river system were investigated in March 2009. In each estuary, four stations along a salinity gradient from river mouth to inland were investigated for meiofauna, sediment and environmental parameters such as coliform bacteria, nutrients, pigments, etc. Twenty three meiofauna taxa were recorded, dominated by Nematoda, Copepoda, Turbellaria, Oligochaeta. The densities of the meiofauna range from 105 ind.10cm^{-2} to 3678 ind.10cm^{-2} on average. Nematodes always occupy the highest numbers with a percentage ranging from 40-98% of total meiofauna. The diversity of meiofauna assemblages calculated by Hill indices, Margalef and Shannon-Wiener is high. Significant correlations exist between meiofauna contributions and environmental parameters; especially chlorophyll a, NH_4, coliforms and temperature with densities of taxa number, densities following the tendency toward inland.

Keywords: meiofauna, Mekong, estuary, environmental parameters, diversity.

IMPROVED EXTENSIVE SHRIMP SYSTEM IN THE MEKONG DELTA OF VIETNAM: POND CHARACTERISTICS AND SUITABILITY TO SHRIMP *(PENAEUS MONODON)*

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Successive failure of the improved extensive shrimp system has deterred the economy of some coastal areas in Vietnam. To investigate pond characteristics and evaluate pond suitability to shrimp growth in this system, a monitoring scheme was performed on a two-month basis in the Cai Nuoc district of South Vietnam. Results showed that the system was not optimal for shrimp. Ponds were not contaminated by organic loadings and major nutrients (N, P). While salinity and pH were almost optimal for shrimp, more than 37% of dissolved oxygen (DO) measurements were lower than recommended. The situation was even worse in early mornings (DO 0.84 to 2.20mg.l^{-1}). Total suspended solids (TSS) were higher than the acceptable limit (<50mg.l^{-1}), particularly during the wet season. Iron and alkalinity were also higher than recommended. Chlorophyll-a (Chl-a) (1.51 to 37.2µg.l^{-1}), phytoplankton density (6,333 to 974,444 cells.l^{-1}), and zooplankton density (7.1 to 517.2 cells.l^{-1}) were comparable to shrimp farms elsewhere. However, zoobenthic community was poor (0 to 1,971 ind.m^{-2}). Toxin-producing cyanobacteria were found. Pond sediment was anaerobic (Redox potential -422 to -105 mV) and accommodated large amounts of organic matter (OM 9.84 to 21.96%). Total bacteria and Vibrios were present in large numbers (respectively 104,042.9 and 664.1 CFU.l^{-1} in pond water, 633,433.3 and 9,469.5 CFU.g^{-1} in sediment). Lethal DO levels, high TSS, anoxic sediment, presence of toxin-producing organisms, poor zoobenthic community, and abundance of total bacteria and Vibrios were the drawbacks in this system. All of these have enhanced shrimp susceptibility to diseases. Appropriate planning, technical modifications, and better shrimp seed control are all needed to enhance the sustainability of shrimp farming in this system.

Keywords: biological, physico-chemical, sediment, shrimp farming, water.

NEW SPECIES OF ACOELA FROM THE MEDITERRANEAN AND NEW CALEDONIA IN THE SOUTH PACIFIC OCEAN

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Acoela are a neglected component of the marine meiofauna although they can be very abundant. Here we present several new species of Acoela that were collected in the Mediterranean as well as the first species of Acoela reported from New Caledonia in the South Pacific Ocean. In addition to traditional morphological studies we used the mitochondrial CO1 and the nuclear 18S and 28S genes to identify and delimit species.

Keywords: Acoela, new species, Mediterranean, South Pacific Ocean.

AN INTEGRATIVE APPROACH TO CHARACTERIZE THE *THORACOSTOMA TRACHYGASTER* HOPE, 1967 CRYPTIC SPECIES COMPLEX

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Nematodes are known as a highly successful, abundant and diverse invertebrate phylum. So far, about 27,000 species have been described, but species estimates are several orders of magnitude higher. In addition, the integration of different disciplines revealed the existence of substantial cryptic diversity, suggesting that the number of nematode species may be underestimated. Here, we investigate the taxonomic status of molecular lineages within *Thoracostoma trachygaster* Hope, 1967 using an integrative approach by combining molecular markers (COI, ITS and D2D3) and morphometric data. In 2007, nematodes were collected from holdfast from nine Californian populations and identified and video vouchered prior to molecular analysis. Two distinct molecular clades were found and *a posteriori* measurements on the movies showed morphometric differences on cephalic capsule length, tail length and body length. These morphological differences were investigated in more detail on new samples collected in 2009 and 2010 from other Californian populations. Measurements were carefully done *a priori* for each specimen. The two molecular clades from 2007 were again recovered, and showed differences in body diameter at the distal end of the pharynx, in anal body diameter and in cephalic capsule length. Most interestingly, in the south of Ventura beach, a third clade was found in the molecular COI trees which can be distinguished morphologically from the other two clades by a shorter body length, and by the undulated posterior edge of the cephalic capsule. This latter character makes it similar to *T. microlobatum*. However, this one can be distinguished by a significant larger body size, the presence of three trops and a granular ring surrounding the stoma. Detailed head sections of specimens from each of the three clades will be investigated, and nuclear DNA trees based on D2D3 and ITS are currently generated to further characterize the cryptic species within *T. trachygaster*.

Keywords: integrative taxonomy, cryptic species.

DIVERSITY AND SPATIAL VARIATION OF MEIOFAUNA IN THE SEGARA ANAKAN LAGOON, JAVA, INDONESIA

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Meiofauna organisms inhabit various environments and different salinities. The knowledge on diversity and trophic role of meiofauna is still scarce. Within the SPICE II project in the Segara Anakan lagoon (Central South Java), meiobenthos was studied to get knowledge on the taxonomic groups inhabiting this ecosystem as well as diversity and abundance of meiobenthos. Third it was asked if there are biotic disturbances due to burrowing organisms or feeding mainly by crabs.
For the taxonomic overview on meiobenthos in this ecosystem, samples were taken with a core (2.6cm diameter, 5cm depth) at 22 stations in the lagoon. Diversity and distribution was performed by taking samples at four transects, two in western and eastern part respectively. The biotic disturbances were analysed by distributing 15 cages at one station with a mesh size of 4mm (five cages each closed, semi-closed and open). Abiotic and sediment parameters were analysed additionally.
First results show that nematodes and copepods are the most abundant taxonomic groups, followed by other taxa like Annelida, Bivalvia and Gastrotricha. Similarity and diversity analyses are done to compare the different locations in the western and eastern regions.
To get more knowledge on meiofauna distribution, diversity, taxonomy and trophic role in mangrove and lagoon ecosystems more research needs to be done.

Keywords meiofauna, diversity, ecosystem.

MEIOFAUNA COMMUNITY IN THE SOUTHWESTERN WATERS OF KOREA FROM MAY 2009 TO JANUARY 2010

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Meiofauna community was surveyed from the subtidal zone in southwestern waters of Korea at ten stations from May 2009 to January 2010. Meiofauna samples were collected four times during the period from May 2009 to January at ten stations using a van Veen grab, and were subsampled by acrylic corer (surface area: 10cm^2). The community of meiofauna consists of nine taxa, Nematoda, Copepoda, Foraminifera, Polychaeta, Oligochaeta, Ostracoda, Amphipoda, Kinorhyncha, and Bivalvia. The two dominant taxa were Nematoda (93.02%) and Copepoda (3.21%). The mean density of meiofauna was 276 ind.10cm^{-2} during the study periods. The highest mean density was 501 ind.10cm^{-2} in November 2009, and the lowest value was 115 ind.10cm^{-2} in January 2010. The total biomass of meiofauna was the highest 5785.45μg C.10cm^{-2} in August 2009, and the lowest 265.19μg C.10cm^{-2} in January 2010.
A total of 26 harpacticoid species were identified. They belong to 22 genera, and 11 families. Miraciidae was the most diverse family, which includes seven species. Ectinosomatidae was the second in diversity with six species. Copepods clearly have seasonality in their occurrence in the study area.

Keywords: meiofauna, Southwestern waters, Harpacticoida, Miraciidae.

A NEW GENUS OF THE FAMILY LEPTASTACIDAE (COPEPODA: HARPACTICOIDA) FROM THE SUBTIDAL ZONE OF JAWOL ISLAND, KOREA

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During a study of benthic harpacticoid copepods from the subtidal zone of Jawol-island, Korea, a new genus of the family Leptastacidae was recognized. So far, the family Leptastacidae has 16 genera and generally they are abundant in marine sandy sediments. The new genus is closely related to the genera *Ceroneotes* and *Belemnopontia* with the characters of antennary exopod with 2 distal setae, 3-segmented P1 exopod and seta formula of P2-P4. This new genus has superficial resemblance with the genera *Ceroneotes* in the third expodal segment of leg 1 with 3 setae. However, the new genus is clearly distinguished from *Ceroneotes* by the differences in the characters of non-fused caudal setae IV and V, the triangular shape of caudal rami, and the median spinous process of female P5. The new species also differs from *Belemnopontia* with only three setae on the P1 exp-3. It is necessary to establish a new genus for accommodating the new species from Jawol Island, Korea.

Keywords: Copepoda, Harpacticoda, Leptastacidae, new genus, Korea.

FERTILIZER EFFECT ON FOOD WEBS OF MUDFLATS OF A SALT MARSH OF NEW ENGLAND

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Eutrophication by the addition of fertilizer may change the standing stock and production of benthic bacteria and algae. Consequently grazers could also be affected. We examined the effect of whole-ecosystem manipulation of nutrient enrichment on food webs of mudflats of the Plum Island Estuary (Massachusetts-USA). During summer, nitrate and phosphate loading rates were increased 10X above background levels in experimental creeks: such manipulation was performed over six years in one creek, during one year in a second creek and a third creek was never fertilized. In each creek, meiofauna (nematode, copepod, ostracod, foraminifera) and macrofauna (*Ilyanassa obsoleta*, *Hydrobia* sp.) were studied. The abundance of each taxon was quantified and their diet composition was evaluated using their natural isotopic composition. Grazing experiments with bacteria enriched in ^{15}N and algae enriched in ^{13}C were run in each creek. Stable isotope enrichment of grazers is proportional to ingestion of labeled prey. Such kind of experiment allows simultaneous evaluation of grazing rates of both bacteria and benthic microalgae and gives information on grazer ability in selecting prey.

Keywords: fertilizer, food-web, bacteria, microphytobenthos.

FISH FARM IMPACTS ON MEIOFAUNA AND THE MICROBENTHIC LOOP IN *POSIDONIA OCEANICA* MEADOWS

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For about ten years, fish farming has been expanding all over the world. Even if this way of producing fishes is presented as a solution against overfishing, its impact on the surrounding environment can be important. For example, meadows of *Posidonia oceanica*, the endemic seagrass of the Mediterranean coastal zone, are fading close to those aquacultures, showing negative impacts on this hot spot of biodiversity.
This seagrass is used as an indicator of perturbations, although it does not react quickly, mainly because of its low turnover rate ($1.5y^{-1}$). So, it is proposed here to use meiofauna and the microbenthic loop (organic matter, bacteria, microphytobenthos and meiofauna) of this ecosystem to detect earlier perturbations due to fish farms. Moreover, the exergy index, measuring the distance between an ecosystem and its optimum state (climax), is also calculated on the microbenthic loop in order to show its interrest in ecological studies.
Study sites are both situated in the Gulf of Calvi (Corsica, France), in *P. oceanica* meadows, at a depth of 22m. The studied fish farm is small (10 cages), situated offshore in front of Calvi and produces 40 tons of seabass (*Dicentrarchus labrax*) per year. The reference site is located in front of the research station STARESO (STation de REcherches Sous-marines et Océanographiques). Sediment cores (diameter: 4.7cm) were taken in November 2008 at both sites and sliced in four layers (0-1cm, 1-2cm, 2-5cm and 5-10cm), according to the expected abundance of meiofauna organisms. Biomass and abundance of every part of the microbenthic loop were thus analysed.
Results concerning abundance, biomass and diversity of meiofauna organisms are presented here and compared with the rest of the microbenthic loop. Values of biomasses are also integrated in the calculation of the exergy index. Finally, this study evaluates the interest of meiofauna and the microbenthic loop to detect perturbations due to an aquaculture.

Keywords: fish farm, microbenthic loop, seagrass.

FIRST DESCRIPTION OF A TEGASTID COPEPOD FROM A DEEP-SEA COLD SEEP: A NEW SPECIES OF *SMACIGASTES* IVANENKO AND DEFAYE, 2004 (COPEPODA: HARPACTICOIDA: TEGASTIDAE) FROM THE GULF OF MEXICO

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The new tegastid species *Smacigastes methanophilus* sp. nov. was described from cold-seep samples collected from the Gulf of Mexico in 2006 as part of the project 'Investigations of chemosynthetic communities on the Lower Continental Slope of the Gulf of Mexico'.
Besides *Smacigastes micheli* Ivanenko and Defaye, 2004, and *Smacigastes barti* Gollner, Ivanenko and Martínez Arbizu, 2008, this is the third species of the genus *Smacigastes*. To date, this genus contains the only species within the family Tegastidae known from deep-sea habitats. Furthermore, *S. methanophilus* sp. nov. is the first tegastid species found at a cold seep in association with tubeworm aggregations. It has the same primitive features as *S. micheli*, but can be distinguished from the latter by the setation of second and third segments of female antennule and second segment of male antennule, the setation of the mandibular palp, the ornamentation of P5 exopod in both sexes, setation of male P5 exopod, form of the female P5 baseoendopod, and the different shape and length of the P5 setae in female. Moreover, both sexes of *Smacigastes methanophilus* sp. nov. are much smaller than those of *S. micheli*. Compared to *S. barti*, *S. methanophilus* sp. nov. differs in the segmentation and setation of female antennule, the setation of male antennule, setation of mandibular palp, setation of the maxillule, number of endites of the maxilla, number of setae in P1, the ornamentation of female P5 and setation in male P5.

Keywords: reduced environment, deep sea, taxonomy, Copepoda, Harpacticoida.

NEMATODE SPECIES DISTRIBUTION PATTERNS AT THE NYEGGA POCKMARKS

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During the cruise of the Norwegian research vessel G.O. SARS in July-August 2008 in the Nyegga region (710-740m), Norwegian Sea, six large pockmarks were explored. The Nyegga pockmarks are depressions up to 15m deep, 50-300m across. Some of them are encircled with 8-10m high ridges of methane-derived authigenic carbonate rocks. Numerous pingo structures inside the pockmarks were distinguished usually associated with Siboglinidae tubeworms fields and bacterial mats. Obvious evidence of crashed clams of bivalves was observed during the TV surveys at the ridges. Our material was collected at 7 ROV sample stations from G11, Dodo, Tobic pockmarks. A total of 11 meiobenthic taxa were identified (Nematoda, Harpacticoida, Tantulocarida, Gastrotricha, Ostracoda; Polychaeta, Gastropoda, Bivalvia, Amphipoda, Porifera, Sipunculida). Nematoda were the dominant taxon at all habitats, except at bacterial mats, with predominance of Harpacticoida and Amphipoda. Abundance of Nematodes at the ridge was in twice lower than at all other habitats, sampled inside the crater. Maximum abundance of nematodes characterized for flat sediment inside the crater (1,708 ind.10cm^{-2}), Siboglinidae field and grey spot at the pingo's slope (986 and 1,554 ind.10cm^{-2}). The lowest abundance of nematodes was at the bacterial mat stations (72 ind.10cm^{-2} and 77 ind.10cm^{-2}). A total of 99 species and 26 families of nematodes. The number of species per station ranged from 3 to 71. *Sabatieria* sp. was dominant species at all stations, except bacterial mats. Nematode community with the subdominant species *Enoploides* sp.1 and *Terschellingia longicaudata* were found at the sediment collected at the ridge and at the flat seafloor inside the pockmark. *T. distlamphida*, *T. longicaudata*, *Aponema* sp. were subdominants at the Siboglinidae and grey spot sediments at the pingo. The nematode assemblages of the bacterial mat sites were unique with strong dominance of *Halomonhystera disjuncta* and *Neochromadora* sp.

Keywords: habitat heterogeneity, meiobenthos, nematode species.

MEIOBENTHIC COMPONENT OF THE BALTIC BIOLOGICAL DIVERSITY

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The Baltic Sea, a large semi-enclosed brackish water body of a relatively short geological history, is inhabited by species of various origins and environmental tolerances. These species immigrated to the sea 10,000 to 15,000 years ago or have been artificially introduced to the area over the relatively recent history of the system. In an effort supported by the European Census of Marine Life, the Baltic biological diversity has been recently assessed (Ojaveer *et al.*, submitted). Here we focus on the meiobenthic component of the Baltic biodiversity by surveying the available sources of information (journal publications, published and unpublished reports, internet resources, and results of our own research). Although the ecological importance of the meiobenthos in the Baltic has been investigated from various angles (e.g. responses to environmental forcing, food web carbon and energy flows, effects of anthropogenic activities), the research itself and possible insights and implications have been greatly hampered by there being not enough well-defined taxonomic information. For example, as opposed to the macrobenthos, no non-native meiobenthic species has been identified, except for some harpacticoid copepods thought to penetrate into the Baltic with North-Sea water inflows. Due to salinity constraints in the Baltic, numerous major marine meiobenthic taxa are either totally absent (e.g. Loricifera, Gnathostomulida) or their distribution is confined to the western, south-western and southern part of the sea. Those meiobenthic taxa which adapted to or persisted under the osmotic stress in the brackish Baltic Sea are still insufficiently known, the taxonomic expertise is scarce, and relevant identification guides are either old, treat the Baltic representatives of a taxon in a perfunctory manner, or – due to the lack of data – fail to mention that a taxon in question could be encountered in the Baltic. We conclude that the knowledge of the meiobenthic component of the Baltic biodiversity is far from complete and needs further investigation.

Keywords: meiobenthos, diversity, Baltic Sea.

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EUKALYPTORHYNCHIA (RHABDOCOELA, PLATYHELMINTHES) FROM THE GALAPAGOS, WITH THE DESCRIPTION OF THREE NEW SPECIES

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The marine interstitial turbellarian fauna of the Galapagos is rather well-studied, a result of intensive sampling by members of the Zoological Institute of the University of Göttingen in the beginning of the 1970's. Also many eukalyptorhynchs, rhabdocoels with a proboscis, were present in the material. Most of these specimens belonged to the family Polycystididae, and these data were published in several papers (Artois and Schockaert, 1999, 2000, 2001). The other eukalyptorhynchs, seven species in total, are treated in this contribution. Six of these species belong to the family Koinocystididae Meixner, 1924. Three of them are new to science. They are described and their taxonomical position is discussed. Additional information is given on the morphology of three known species: *Itaipusa divae* Marcus, 1949 (previously only known form the South American Atlantic coast), *I. variodentata* (Karling, Mack-Fira, and Dörjes, 1972) Karling, 1980 (previously only known from Hawaii) and *Utelga heinckei* (Attems, 1897) Karling, 1954 (previously only known from the North Atlantic). The seventh species is a known species of Gnathorhynchidae Meixner, 1929: *Prognathorhynchus eurytuba* Ax and Armonies, 1987. This species was until now only known by few specimens from the North American Atlantic Coast. The Galapagos material is suitable for a more detailed and complete reconstruction of the reproductive structures. This shows the presence of a second gonopore, which is an aberrant character for the species and the family.

Keywords: interstitial, Turbellaria, Eukalyptorhynchia, Galapagos, taxonomy.

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A STUDY ON THE BENTHIC MEIOFAUNA INHABITING SEDIMENT IN BALLAST TANKS OF SHIPS DOCKED IN THE SZCZECIN REPAIR SHIPYARD (SZCZECIN, POLAND)

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Sediment in ships' ballast tank supports a number of benthic animals, including meiobentic species. Owing to increasing marine traffic, ships can act as vectors of meiofaunal species dispersal on different scales, from local to global. Sediment-dwelling organisms transported in ships' ballast tanks can easily be introduced to a new environment along with the discharged ballast water, which contributes to dispersal of meiofauna worldwide. In 2007, a project aiming at studying ballast tank biota, including meiofauna, of ships docked in the Szczecin (Poland) Repair Shipyard, located in the Szczecin harbour, was initiated. Preliminary results concerning meiobenthic assemblages inhabiting ballast tank sediments showed the meiobenthos density to range from 400 to 2800 ind.dm^{-3} sediment. The assemblages were found to consist of 3-6 taxa (Foraminifera, Nematoda, Harpacticoida, Turbellaria, Bivalvia, and Polychaeta). Nematodes, harpacticoids, and forams proved the most frequent taxa found so far. The meiobenthic assemblages were dominated by nematodes which accounted for 56-96.4% of the total meiofaunal abundance. The nematodes were represented by 11 genera the most abundantly represented of which where the *Leptolaimus* and the *Anoplostoma*.
The research was supported by the Polish Ministry of Science and Higher Education grant No. N N304 163736.

Keywords: meiobenthos, dispersal, ballast tank, nematodes.

PRELIMINARY RESULTS OF A MULTIYEAR MEIOFAUNA SURVEY OF THE NORTHERN GULF OF MEXICO WITH EMPHASIS ON TARDIGRADES

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A multiyear, collaborative study of meiofauna from the northern Gulf of Mexico benthos (both continental shelf and slope) is currently underway from Brownsville, Texas to the Florida Keys. Substrate samples were collected using a Shipek grab sampler and 4-5 x 5cm (dia) PVC pipe core samples were removed (three samples were processed for meiofauna and the 4th for granulometry). Animals were fixed in 8% buffered formalin and processed by sieving followed by centrifugation in Ludox. Processed samples were stored in ethanol and enumerated under a dissecting microscope. Water column abiotic factors were collected via a Seabird CTD scanner. Data from the 2007 samples include a total of 12,296 meiofauna (total of 89,576 organisms) of which 86.27% were forams and radiolarans (77,280), 12.3% (11,018) were nematodes, and 5.46% (668) were harpactocopepods. Data from the 2008 samples include a total of 11,349 meiofauna (total of 98,437 organisms) of which 88.47% were forams and radiolarans (87,088), 5.3% (5,241) were nematodes, and 5.62% (5,531) were harpactocopepods. Others found were 45 (31,14) kinorhynchs, 52 (16,36) priapulids, 112 (11,101) tardigrades and 5 (1,4) loriciferan. Tardigrades were found on the continental shelf off both Texas and Florida with none being found in the middle portions of the northern Gulf. Comparing 2007-2008 nematodes decreased by 52.4%, harpactocopepods increased by 8.28x, and tardigrades increased by 9.18x. Kinorhynchs, priapulids, and loriciferans were found but their numbers were not drastically different between years. Correlations between abiotic factors and number of meiofauna organisms were calculated. Tardigrades seemed to correlate with dissolved oxygen ($mg.l^{-1}$) ($p>0.032$) in the 2007 sample. All other meiofauna had no significant correlations with any of the abiotic factors.

Keywords: meiofauna, Gulf of Mexico, tardigrades.

WHAT DO WE KNOW ABOUT MARINE MEIOFAUNA IN THE AMAZON COAST?

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The first study on the Amazon meiofauna was the description of *Nannonchus amazonicus* Gerlach, 1957, later re-named *Tripyloides amazonicus* by Riemann in 1970. Studies on the ecology of marine meiofauna only began after 2003, when researchers of the Faculty of Oceanography (UFPA) conducted sampling in several areas of the coast, aiming to understand the structure and the functioning of meiofauna communities on the Amazon coast. Since then, sandy beaches (Ajuruteua, Salinópolis and Princesa), mud beaches (Northern Amapá coast), Polychaeta reefs (Algodoal) and mangroves (Curuçá estuary) have been sampled. Samples were taken using a core (2cm diameter, 10cm length) and fixed with 4% buffered formalin. In the laboratory meiofauna was extracted from the sediment (elutriation and sieving through meshes of 0.045 and 0.5mm). To the extent possible, free-living nematodes were mounted on permanent slides to identification to genus or species level. In all areas, the meiofauna was dominated by Nematoda (60-96% of the total fauna), mainly during the rainy season, followed by Copepoda (adults and nauplii, 2-30% of the total) and other groups (<5% of the total). In sandy beaches and reefs, richness was higher during the dry season, whereas in estuaries maximum richness was recorded in the rainy months. In estuaries, significantly higher density (30-1416 ind.10cm^{-2}) occurred in the wet months, whereas in beaches, significantly higher densities were recorded during the dry months (566-1758 ind.10cm^{-2}). Regarding nematodes, to date we have representatives of 6 orders, 28 families, 116 genera and 5 species (*Gomphionema fellatur*, *Metachromadora chandleri*, *Pseudochromadora incubans*, *Pseudolella intermedia* and *Ptycholaimellus macrodentatus*). The results demonstrated how variable, spatially and temporally, is the meiofauna on the Amazon coast, indicating the need for more studies in order to increase the knowledge of meiobenthos in humid-tropical coasts. Financial support: CNPq/Petrobras.

Keywords: meiofauna, Nematoda, Amazon, coastal zone, meiobenthos.

CUTICULAR TOPOGRAPHY IN HOMALORHAGID KINORHYNCHS

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The order Homalorhagida Zelinka, 1896 is included in the phylum Kinorhyncha, meiobenthic marine organisms less than 1mm in length. To establish a sound and homogeneous basis for future studies we have marked positions on the cuticle where taxonomically important cuticular characters usually appear. Those positions correspond either to longitudinal lines or to bands along the trunk. These topographical and terminological revisions agree with the terminology established by Pardos *et al.* (1998) for the order Cyclorhagida. The new emended terminology for positions in homalorhagid kinorhynchs are:
Dorsal series (tergal plate):
Middorsal (MD). (Line) On the middorsal line of the segment. This is the highest point of the triangular shaped trunk in cross section.
Paradorsal (PD). (Line) Adjacent to the middorsal position.
Subdorsal (SD). (Band) On the dorsalmost 50% of the area between the paradorsal position and the widest point of the trunk.
Laterodorsal (LD). (Band) On the ventralmost 50% of the area between the paradorsal position and the widest point of the trunk.
Lateral series (tergal plate):
Midlateral (MlL). (Line) The widest point of the trunk, on the lateral edge of the segment, seen from both the dorsal and ventral sides.
Lateroventral (LV). (Line) Adjacent to the tergosternal junction, as seen from the ventral side.
Ventral series (sternal plate):
Ventrolateral (VL). (Band) Adjacent to the tergosternal junction.
Ventromedial (VM). (Band) At or near the middle of the sternal plate, between ventrolateral and paraventral bands.
Paraventral (PV). (Band) Adjacent to the midventral line of the segment.
The word `pair` will refer to bilaterally symmetrical structures. When two very close cuticular structures appear on the same position, they will be referred to as `twins`, having their correspondent pair of twin structures on the other side of the animal.

Keywords: cuticular characters, Kinorhyncha, terminology.

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LONG-TERM EFFECT OF HUMAN TRAMPLING ON MEIOFAUNA INHABITING TURF ALGAE (PORTO DE GALINHAS, BRAZIL)

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Benthic communities suffer the impact of human trampling in various locations around the world due to growing tourism. To evaluate the effect of human trampling on the meiofauna community in the sandstone reefs of Porto de Galinhas (PE, Brazil) five paired stations were sampled. At each station, three replicates of the algal turf meiofauna were sampled with a $10cm^2$ corer in two areas: (1) subjected to tourist visitation and (2) adjacent area of conservation. The turf biomass and sediment weight were evaluated for each replicate. Meiofauna was extracted by manual elutriation with filtered water between sieves of 500 and 63µm mesh size. Multivariate analysis (MDS and ANOSIM) indicated that trampling was responsible for significant changes in major taxa community structure among areas. However, in spatial terms two groups of stations should be considered since they present different patterns: station one versus stations two, three, four and five. The algal turf at station one was formed by *Chondrophycus papillosus* (Rhodophyta, Ceramiales). At this station 2-way ANOVAs indicated that Harpacticoida, Nematoda, Oligochaeta, Polychaeta and Turbellaria were sensitive with their densities being reduced by trampling, whereas Ostracoda and Tardigrada had their densities increased. In the other four stations, the turfs were formed by *Gelidiella acerosa* (Rhodophyta, Gelidiales). In this substrate the 2-way ANOVAs indicated that only Tardigrada was not sensitive to trampling, other taxa showing an average reduction of approximately 70% in their densities in the trampled area. An analysis of covariance showed that the trampling effect on the total meiofauna density in *G. acerosa* was related only partly to the loss of habitat (algae and sediment associated). Results demonstrate that specific differences in algae composition were important to understand the long-term effect of human trampling on meiofauna community.

Keywords: impact, tourism, sandstone reef.

IMPACT OF LONG-TERM TRAMPLING ON PHYTAL HARPACTICOIDA OF PORTO DE GALINHAS SANDSTONE REEFS (NORTHEAST BRAZIL)

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Trampling associated with tourism in intertidal reef areas is a growing impact on Brazilian benthic communities, though, little is known about its consequences. Meiofauna samples were taken at five paired stations in the sandstone reefs of Porto de Galinhas (Northeast Brazil). At each station, three replicates of the algal turf were sampled with a $10cm^2$ corer in two areas: (1) subjected to tourist visitation and (2) adjacent area of conservation. The first 20 Harpacticoida for each replicate were identified. The 2-way ANOVA for the total density indicated that this group was sensitive to trampling with an average reduction of 57% in the trampled area. Multivariate analysis (MDS and ANOSIM) indicated that trampling significantly changed the structure of Copepoda Harpacticoida assemblage between areas. However, significant differences were not found for the univariate indexes diversity, evenness and richness. Two-way ANOVAs for species with more than 2% of abundance indicated that *Ameira* (aff) *parvula*, *Orthopsyllus linearis*, *Parastenhelia spinosa*, *Paramphiascella* sp. and *Robertsonia knoxi* were sensitive to trampling with reductions in their densities in the trampled area, while *Amphiascoides* sp., *Mesochra* sp. 1, *Paralaophonte* sp. and *Robertsonia mourei* were not sensitive to trampling. The species *Amphiascopsis cinctus*, *Paradactylopodia* sp., *Harpacticus* sp., *Melima* sp. and *Melima indica* were not sensitive to trampling, however, this may be due to their low abundance values. The species *A. parvula* (sensitive) and *Paralaophonte* sp. (not sensitive) occurred only in station one, where turfs were formed by *Chondrophycus papillosus*, while in the other four stations turfs were formed by *Gelidiella acerosa*. The trampling impact on Harpacticoida assemblage was species specific and independent of microenvironmental factors such as the composition of algal turfs.

Keywords: human impact, tourism, meiofauna, algal turf.

THE IMPACT OF SEABED DISTURBANCE ON THE DIVERSITY OF MEIOFAUNA COMMUNITIES – LINKING FIELD AND LABORATORY OBSERVATIONS

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Physical disturbance is a key factor in controlling the spatial and temporal composition of shallow-water benthic communities. Like shallow waters, deeper waters are increasingly subject to a range of anthropogenic disturbances which can lead to significant alterations in sedimentation patterns. These alterations often exceed naturally occurring changes. We used a combined analysis of six independent data sets arising from large-scale field surveys and small-scale laboratory experiments to investigate the effects of seabed disturbance on nematode communities. Disturbance response was documented as a function of disturbance type (coastal development, dredged material disposal, bottom trawling, glacial fjord), origin (man-made, natural) and intensity (low, medium, high). Natural and human-induced seabed disturbance exerted differential effects on exposed populations, generating changes in the taxonomic (genus) and functional (feeding type) attributes of their assemblages. The magnitude and direction of effects was variable and depended on the origin and nature of the stress-generating factors. The genus composition of nematode assemblages from geographically separate seas converged with increased level of various types of man-made disturbance. Assemblages present along a gradient of natural disturbance in a glacial fjord followed an opposite response vector, suggesting that community changes induced by anthropogenic activities, or experimental treatments simulating the principal impacts of these, inherently differ from disturbance of natural origin. Changes in trophic diversity and structure were primarily driven by factors confounding physical disturbance such as metal contamination. Coupling the results of analyses at multiple scales proved a useful means of providing deeper insights into the general response of ecological communities to environmental change.

Keywords: community structure, disturbance, free-living nematodes.

SPATIAL DISTRIBUTION OF MEIOFAUNA IN THE MALDIVIAN ARCHIPELAGO

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The Maldivian archipelago includes some of the most characteristic and significant atoll systems worldwide, but the meiobenthic assemblages of these islands are largely unknown. A joint research project on the biodiversity and ecology of meiofauna from Maldive Islands has been carried out in several habitat types since 2004 with the aim of widening the knowledge on this archipelago. Furthermore, given that the beta-diversity estimation is largely used for macrofauna, but is quite neglected for meiofauna, an assessment of the turnover in the taxonomic composition of nematodes and tardigrades was performed. The meiofauna of Maldives resulted well-diversified with very rich nematode and tardigrade assemblages (186 nematode genera and 37 tardigrade species). As the 90% of these taxa species are new records for Maldives, these findings are of great interest. Desmodoridae, Chromadoridae, Xyalidae and Cyatholaimidae were the most abundant and rich families of nematodes, while Halechiniscidae and Batillipedidae were among tardigrades. Both nematodes and tardigrades revealed a lower beta-diversity at a 'large' scale (i.e. at atoll level), than at a 'small' scale (i.e. at site level) highlighting that the turnover diversity did not increase with the increasing of the distance among sampling sites. This might be related to a marked influence of the patch dynamic effects (e.g. sediment granulometry) on the assemblages at a small scale, increasing significantly the beta-diversity according to the heterogeneity of the habitat.

Keywords: meiofauna, Nematoda, Tardigrada, Maldives, beta-diversity.

MEIOBENTHIC AND MACROBENTHIC ASSEMBLAGES IN THE COASTAL AREA OF THE CENTRAL ADRIATIC SEA (ITALY)

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Many coastal areas serve as repositories of different anthropogenic- and natural-induced organic material and nutrients. The major sources are riverine inputs which strongly influence the spatial and temporal distribution of the benthic communities. In this study, benthic foraminiferal, meiofaunal and macrofaunal communities have been examined, concurrently, in front of three rivers in a poorly known but environmental valuable area of the central Adriatic Sea. Physical-chemical parameters of bottom water and sediment characteristics were determined to characterize both the sediment-water interface and the benthic environments. Although changes in the biota are not univocal neither unidirectional, it can be inferred a moderate influence of riverine input on the components of each community. The most influenced taxa are foraminifera and copepods and at a lower extent the meiofaunal platyhelminthes and polychaetes. These results are also corroborated by the ABC curves showing that the macrofaunal communities closest to the river mouths are moderately disturbed. This integrated investigation confirms that the benthic communities can be used as an early warning to monitor the health quality of a coastal ecosystem.

Keywords: foraminifera, meiofauna, macrofauna, riverine input, Adriatic Sea.

FREE-LIVING MARINE NEMATODE DISTRIBUTION ALONG THE ITALIAN COASTS

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Marine nematodes are a dominant group of the meiofauna, and are generally considered among the most suitable taxa for studying the ecological conditions of marine benthic ecosystems. Currently, due to the difficult identification at species level, faunistic research has been significantly replaced with ecological surveys. Since a superspecific level of identification is usually applied in ecological research, a general standstill of faunistic knowledge both at local and global level has occurred. A first synthesis of the information about the Italian marine nematodes is proposed here, according to the biogeographic subdivision of the Italian seas by Bianchi (2004), with the aim to draft a map of the nematode distribution along the coasts. Overall, 443 species are known from the Italian coasts belonging to 262 genera and 46 families. The highest number of species is reported for the Northern Adriatic Sea (247 species), followed by the Southern Tyrrhenian Sea (197) and the Ligurian Sea (125), where the major efforts have been spent on the analyses of nematode diversity also in a wide range of habitats. Conversely, nematode species records are very few or even absent for the Central Adriatic Sea, Straits of Messina and South-eastern Sicily. Chromadoridae (*Neochromadora*, *Chromadorina*, *Chromadorita*), the most frequent family, is widespread over all nine biogeographic Italian sectors, followed by Cyatholaimidae (*Cyatholaimus*, *Marylynnia*) and Desmodoridae (*Desmodora*, *Molgolaimus*). The most abundant families in the Italian seas are Xyalidae (*Daptonema*, *Theristus*), Comesomatidae (*Sabatieria*, *Dorylaimopsis*) and Linhomoidae (*Terschellingia*). The present update attests an overall good state of knowledge of Italian nematodes in spite of several gaps in some sectors of the Italian coasts, and highlights the need of further increasing efforts in order to integrate local and regional inventories of nematode species.

Keywords: marine nematodes, checklist, Italy, faunistics, systematics.

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BIODIVERSITY OF THE NEMATOFAUNA IN TWO CANYONS FROM SOUTHEAST ATLANTIC – CAMPOS BASIN, RIO DE JANEIRO – BRAZIL

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The phylum Nematoda is the most abundant group in several environments. In Campos Basin, the nematodes are used for ecological and taxonomic studies in deep sea, including two submarine canyons. The aim of this work is to characterize the nematofauna from canyons in Campos Basin, identifying the relations of the main genera with biomass, granulometry and depth in two different seasons (winter 2008 and summer 2009). Four stations were prospected in each canyon (Almirante Câmara and Grussaí) and four stations on each adjacent area at 400m, 700m, 1300m and 1900m. The sampling was made using a Box corer of the Ocean Instruments modified for sampling of 0.25m^2 of the sediment. In each station, three replicate were prospected. In laboratory, the samples were washed through 0.45mm mesh sieves and the nematodes were gently picked out with a stainless-steel stylet, fixed with 10% formaldehyde, and gradually transferred to glycerin. The nematofauna from the two canyons and adjacent area were composed of 182 genera. *Sabatieria* is the most abundant in almost all stations in the winter of 2008, but not in the summer of 2009. This genus was also dominant in both canyons and adjacent areas. At least six Sabateria species were found, among them: *S. fidelis, S. bitumen, S. spiculata* and *S. exilis*. *Cervonema*, *Desmodorella* and *Acantholaimus* showed alternate dominance in both seasons. *Thalassomonhystera* was abundant in higher depths and *Desmoscolex* was present only in the summer of 2009. Granulometry did not show any correlation with genera dominance, except for *Metasphaerolaimus*. The nematofauna richness of the canyons in Brazil and nematodes correlations with sedimentological parameters are totally unknown and these results will contribute to the knowledge of the Brazilian biodiversity in deep sea, mainly on these depressions and adjacent areas. This work is part of the 'Habitats Project – Campos Basin Environmental Heteogeneity' by CENPES- PETROBRAS.

Keywords: Nematoda, deep sea, canyons, depth.

INTRATROPHIC INTERACTIONS AND THE DIVERSITY-ECOSYSTEM FUNCTIONING RELATIONSHIP

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There are many unexpected, indirect intratrophic interactions among bacterivorous nematode species. Species may both facilitate or inhibit the growth and population development of closely related species with which they often co-occur. It is poorly understood what determines the colonization of detrital patches by nematodes and how the presence of early colonizers affects the succession and population development of other species (priority effects) onto the often ephemeral habitat spots. This study aims to determine the colonization of cordgrass detritus by bacterivorous nematodes with particular focus on their species succession. Three bacterivorous monhysterid nematode species *Diplolaimelloides meyli*, *D. oschei* and *Diplolaimella dievengatensis* were inoculated in two main laboratory microcosm experiments, one focusing on colonization and succession, the other on priority effects. In the former experiment, we inoculated the three species simultaneously and allowed them to colonize nearby cordgrass patches devoid of nematodes. In the latter, these patches had been inoculated beforehand with one of the three nematode species. Based on the first 20 days of the incubation, it is clear that *D. meyli* is by far the best colonizer of detritus and *D. oschei* the weakest. Surprisingly, there was a clear habitat segregation between species, *D. oschei* dominating the agar substratum underneath the detritus patches, with *D. dievengatensis* being the second most abundant species. In the priority experiment, *D. meyli* consistently rapidly became dominant irrespective of whether or not detritus patches had been pre-inoculated with another nematode species, suggesting priority effects to be of limited importance in the colonization of cordgrass detrital spots. At the conference, we will present the results from the entire experiment, lasting up to 6 or 8 weeks of incubation.

Keywords: bacterivorous nematodes, colonization, succession, Monhysteridae, priority effects.

THE ROLE OF HABITAT HETEROGENEITY ON THE SPATIAL DISTRIBUTION OF MEIOFAUNAL COMMUNITIES IN THE NE PACIFIC

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Bioturbation of the sediment may influence substantially both its physical and chemical properties, thus affecting its suitability for colonisation and exploitation by other organisms. In the present study, the effects of different biogenic structures, such as bioturbation mounds or tracks produced by larger organisms, on the meiofaunal community were investigated at a long-term monitoring site in the NE Pacific. For this reason, a series of dives with the submersible ALVIN were undertaken at Station M (4100m) in August 2009 to investigate the relationships between meiofauna and 12 different microhabitats which were: a) one control site, b) within the track of *Echinocrepis* urchin, c) outside the track of *Echinocrepis* urchin, d) within the track of *Cystocrepis* urchin, e) outside the track of *Cystocrepis* urchin, f) on a bioturbation mound, g) along the periphery of the bioturbation mound, h) away from the bioturbation mound, i) away from a sponge, k) near the stalk of a sponge, l) near a decomposing kelp holdfast and m) away from the kelp holdfast. Total meiofaunal densities ranged from 244 to 1,203 ind.10cm^{-2}. The station away from the sponge exhibited the highest values while the bioturbation mound had the lowest densities. Nematodes were the dominant group in all samples, ranging from 71 to 89% and were followed by harpacticoid copepods and polychaetes. The other groups were represented on average with less than 6%. The effects of habitat heterogeneity on the diversity and spatial distribution of nematodes will be discussed.

Keywords: meiofauna, microhabitats.

FREE-LIVING NEMATODES IN HYDROTHERMAL SITES OF THE MID-ATLANTIC RIDGE

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Nematode collection of 987 specimens gathered in six hydrothermal sites along Mid-Atlantic Ridge from 38°N to 22°N was examined. Altogether 17 species were isolated, the most numerous are *Prochaetosoma* sp., *Paracanthonchus* sp., *Oncholaimus* sp., *Desmodora* sp., *Thalassomonhystera vandoverae* Zekely, 2006, *Innocuonema* sp., *Halomonhystera* sp., *Prochromadorella* sp., *Microlaimus* sp., *Leptolaimus* sp., arranged in decreasing order. Hydrothermal vent sites present quite peculiar biotopes with nematode communities strongly distinguished from those of surrounding oligotrophic abyssal plains. Endemism of the nematofauna of the deep-sea hydrothermal vent biotopes is comparatively low and does not exceed the species level. In the generic composition and average body size, nematode communities of the hydrothermal vents are more similar to those of shallow water sediments than to communities of the surrounding abyssal bottom. Species richness of the deep-sea hydrothermal nematodofauna is low, especially in comparison with that of surrounding abyssal oligotrophic plains. The project is supported by grant RFBR 09-04-01212-a.

Keywords: diversity, free-living marine nematodes, hydrothermal habitats, Mid-Atlantic Ridge, taxonomy.

TARDIGRADES IN A RESTORING MANGROVE HABITAT IN THE CENTRAL VIETNAM

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Three tardigrade species are discovered in a restoring mangrove habitat in the Nha Trang area, Central Vietnam. *Halechiniscus jejuensis* Chang and Rho, 2002 has been originally described at the southernmost point of the Korean Peninsula, hence the new find extends considerably the geographic distribution of the species southwards to the tropical zone. The Vietnamese specimens slightly differ from the Korean ones in shape and number of the lateral body expansions. *Florarctus* sp. is possibly a new species differing from related species by the shape of lateral cuticular alae and longer primary clavae. *Batillipes* sp. may represent another new species differing from related species *B. gilmartini* and *B. pennaki* by other shape toe suckers and other shape and number of lateral body projections. Both *Halechiniscus jejuensis* and *Florarctus* sp. but not *Batillipes* sp. bear thicket of thread-like colonial prokaryotes on the ventral surface of the head.

Keywords: diversity, mangroves, tardigrades, taxonomy, Vietnam.

FREE-LIVING NEMATODES ASSOCIATED WITH EXTERNAL AND INTERNAL PROKARYOTE SYMBIONTS IN THE GOLLUM CHANNEL SYSTEM AND EDGE OF THE WHITTARD CANYON

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Two new species associated with external and internal prokaryote symbionts from the Gollum Channel System and the edge of the Whittard Canyon area are described in this study: 1) *Parastomonema* sp. (Order Monhysterida, Family Sipholaimidae) and 2) *Eubostrichus* sp. (order Desmodorida, family Desmodoridae, subfamily Stilbonematinae). The *Parastomonema* specimens contain internal prokaryote symbionts within a degenerated gut, which are rather large and unusually transparent. The filiform *Eubostrichus* nematode specimens are covered on the outside with long and slender, slightly curved prokaryote cells which are attached to the cuticle. Both species were found in an unusual place; all hitherto known symbiotic species of *Astomonema-Parastomonema* are confined within intertidal or shallow (sublittoral) sites, mostly under reduced conditions (sulphide layer in sediments or methane seeps). So far, only once have Stilbonematinae species been found in the deep sea (900m water depth, Darwin mounds, NE Atlantic).

Keywords: deep-sea marine nematodes, *Eubostrichus*, *Parastomonema*, symbiosis with prokaryotes, taxonomy.

DISPERSAL MECHANISMS OF NEMATODES IN A SUBTROPICAL INTERTIDAL FLAT

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Passive erosion from the sediment and rafting are currently accepted as potential vectors of nematode dispersion via the water-column. Through the use of a vital stain and the recapture of nematodes in situ, we tested the hypothesis that dispersion is also a function of prevailing locomotion/feeding strategies and body morphology. We compared species composition in the water column to species composition in the sediment and we related species occurrence and traveled distances in the water column to behavior categories (active/swimmer, active/non swimmer, and lethargic). The experiment was conducted during a single tidal event in an intertidal flat of Paranaguá Bay (Southern Brazil), and replicated in the winter of 2008 and in the summer of 2009. Neutral Red was applied to the sediment inside a core. Sampling points were established along a unidirectional transect at 3, 6, 12, 24, 96, and 192 meters from the stained core. At each point, 3 sediment samples and 3 plankton samples (10cm above the bottom) were collected. Numbers of stained recaptured nematodes in the water column and the sediment were very low in comparison to their mean densities at the stained core. In the winter experiment, the presence of *Chromadorina germanica*, *Euchromadora estriata*, and *Eurystomina* sp. 1 in the water column suggested that algal rafting is an important transport vector. Though we were not able to differentiate active entry into the water from passive erosion processes, it was possible to relate nematode occurrence and traveled distances in the water column to their locomotion/feeding behavior and body morphology. Both swimmer and non-swimmer active nematodes presented slim bodies and long tails (*Viscosia* sp. 1 and *Spirinia parasitifera*). Lethargic species had robust and truncated bodies and short and conical tails (*Metachromadora* sp. 1). Therefore, water-column processes play an important role in nematode dispersal and colonization of new areas, but may differ widely among species.

Keywords: nematodes, dispersion, water-column, intertidal flat, Brazil.

MITOCHONDRIAL DNA VARIATION WITHIN THE 'LETHARGIC' FREE-LIVING MARINE NEMATODE *METACHROMADORA CHANDLERI* (CHITWOOD, 1951)

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Dispersal processes ultimately determine the present and potential distribution range of a species. Since free-living marine nematodes lack planktonic larvae and are considered poor swimmers, passive and/or 'rafting' strategies are currently favored in the literature to explain juvenile and adult dispersal. We investigated the population genetic structure in the free-living marine nematode *Metachromadora chandleri* which shows 'lethargic' locomotion patterns, closely related to body morphology (robust and truncated, with a short, conical tail). A total of 426 bp of the mitochondrial cytochrome oxidase subunit 1 (COI) gene were surveyed on a geographic scale of about 50km in Southern Brazil estuaries, during spring 2009 and summer 2010. Nematodes were collected at three locations (BPPI- reference point; BPPII- scale of meters from the reference point and IR- hundreds of meters) in Paranaguá Bay and two locations in Guaratuba Bay (GUA and GP- tens of kilometers). Only two different haplotypes were observed and sequence divergence within 89 individuals ranged from 30 to 60%. Analysis of molecular variance (AMOVA) did not indicate genetic differentiation among populations ($FST=0.01$, $p>0.05$). The population of Guaratuba Bay was genetically indistinguishable from the population of Paranaguá Bay. Our results and the a priori assignment of *M. chandleri* to the category of 'lethargic' provide support to a new look into the mechanisms of dispersal of marine nematodes. The occurrence of genetically homogeneous subpopulations at all sampled scales shows that *M. chandleri* can passively disperse for many kilometers. An expanded test of this hypothesis will require comparative analyses of larger spatial scales and the comparison with species categorized a priori as 'active swimmers'.

Keywords: nematodes, dispersion, mitochondrial DNA, intertidal environment, population genetics.

METAZOAN MEIOFAUNA OF THE MEDITERRANEAN SUBMARINE CAVE 3PP

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The cave 3PP near Marseille is a unique deep-sea habitat in the scuba zone, particularly because of the thermal regime of cold homeothermy which is similar to that of the deep Mediterranean. The aim of this survey was the data capture of abundance and diversity of the meiofaunal community within the submarine cave. Changes of taxa composition within the cave were analyzed. Besides, particular attention was paid to the Copepoda taxocene.
A different composition of metazoan meiofauna at sampled stations inside the cave was not recorded. However, due to decreasing individual densities of different taxa from the cave entrance to the cave end, significant differences between stations could be ascertained by help of a community analysis. The only exception was shown by the tardigrads, whose density increased from cave entrance to cave end.
In comparison to marine sublitoral of the Gulf of Lion, densities of meiofauna within the cave 3PP were very low. Comparisons of densities between cave 3PP and another submarine cave verified also relatively low individual density of cave 3PP.
A total of 405 copepods, which were found in the samples, could be assigned to 27 different families and 90 different species. 24 species of them were already described. The other 66 species are new to science until now.
Most frequently Cletodidae Scott, 1904 and Miraciidae Dana, 1846 (Willen, 2002), appeared in the whole cave, hence the two of them define half of all copepods. Zosimidae Seifried, 2003, Ameiridae Monard, 1927, Pseudotachidiidae Lang, 1936 (Willen, 2000) and Ectinosomatidae Sars, 1903 were also often represented. Detailed community analyses at family and species level reveal significant differences in the composition of taxa in regard to the cave entrance and the rest of the cave where conditions can be found similar to the deep sea.

Keywords: meiofauna, copepods, submarine cave, Mediterranean, deep sea.

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MARINE GASTROTRICHA FROM SWEDEN

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The Swedish gastrotrich fauna, both marine and freshwater is poorly known. Until 2007 only 22 marine species, including 18 Macrodasyida and 4 Chaetonotida (M and C), were reported from coastal areas. Faunistic comparison with well investigated regions is amazing: approximately 180 species have been recorded in Italy, about 115 species are known from the British Isles and a total of 146 species, including 51 from Norway, have been reported in northern European seas. In an attempt to close this gap two major sampling campaigns, both along the west coast of Sweden, were carried out in the summer of 2007 and 2009. The first survey focussed in the surrounding of Tjärnö whereas the second was centred at Kristineberg, both locations host a state of the art marine research station. All together we found 46 species of Gastrotricha (25M and 16C); of these, 32 species (19M and 13C) were discovered from six locations at Tjärnö and 27 (15M and 12C) were found from five locations at Kristineberg, with only 14 species (6M and 8C) being in common between the two areas. So far, it seems that 60-70% of the species appear underscribed or new to the Swedish fauna. From a biogeographical point of view, only a few records really stand out. Some species seem to be restricted to the north Atlantic and adjacent seas (e.g. *Dinodasys mirabilis*, *Thaumastoderma mobjergi*, *Urodasys mirabilis*, etc.), while most of the collected species have been found also in the Mediterranean Sea and in other regions of the world (e.g. *Lepidodasys martini*, *Turbanella cornuta*, *Aspidiophorus marinus,* *Xentrichula punctata*, etc.). The supplementary information on morphology gathered on site along with data that will emerge from specimens stored for ultrastructure and DNA analyses will help clarify the real distribution of many species putatively considered cosmopolitan.

Keywords: biodiversity, benthos, taxonomy, Swedish fauna.

LARGE-SCALE PATTERNS IN THE QUANTITATIVE DISTRIBUTION OF MEIOBENTHOS IN THE WORLD OCEAN

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In the second half of the past century, L.A. Zenkevich and others formulated the concept of the biological structure of the World Ocean. They revealed large-scale regularities of the plankton and macrobenthos distribution. The existence of such large-scale pattern in the distribution of meiofauna often raised the doubts due to its great microspatial variability. To answer this question the database was compiled, included the published and original data of the meiobenthic abundances at the depths ranged from intertidal to 9,807m and covered all the World Ocean. The database includes more than 2,000 records, 680 of them obtained for the depths exceeding 1,000m. Despite the great micro- and mesoscale variations of meiobenthic densities (up to 5–6 orders of magnitude), the large-scale regularities in meiobenthic distribution were observed. The two main trends were revealed on the Ocean scale, related with the depth and latitude. Decrease of meiobenthic density occurred from the lower limit of phytal zone (200m) and controlled mainly by the bottom macrotopography and trophic conditions. Quantitative characteristics of meiobenthos at the different depths, in various trophic zones and on the main forms of the relief (shelf, slope, abyssal plains, trenches, canyons, etc.) were described. On the intertidal and upper shelf, the other factors (sediment texture, salinity, etc.) play a main role in meiobenthic distribution. In this zone the latitudinal trend in meiobenthic density was found. In the northern hemisphere the maximum meiobenthic density was in the zone between 44° and 56° N, while in the southern hemisphere it was between 23° and 34° S.

Keywords: meiobenthic distribution, database, large-scale, water depth, latitudinal gradient.

QUANTITATIVE MEIOBENTHIC DISTRIBUTION IN THE WORLD OCEAN: A HALF-CENTURY OF RESEARCHES

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The meiobenthic concept was formulated by Mare (1942) and the first quantitative deep-sea meiobenthic sample was gathered by Wigley and McIntyre (1964). The poster presents the maps of areas where meiobenthic researches were made during the last half-century and some general results – the changes in the meiobenthos abundance with different environmental factors (depth, sediments, salinity, primary production, etc.).

Keywords: maps of meiobenthic researches, the World Ocean, environmental factors.

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NEMYS: AN ONLINE NEMATODE INDICATION AND TAXONOMICAL TOOL

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NeMys is an online biogeographical information system, accessible through www.nemys.ugent.be. Due to its generic structure, this tool can be used for the storage of taxonomical and biogeographical data of many taxa. At the moment, Nemys is used for data on mysids, nematodes, Turbellaria, Peperomia, amphibians, reptiles, ladybirds and phytoplankton. In total, information on more than 15,000 taxa is available. The taxonomic content of the nematode part of the database has been updated and all non-marine species have been removed. It now consists of 2,353 references, 8,895 taxa, 5,733 map records and 11,929 media files. From almost all nematode species, morphological and morphometric information is available thereby facilitating nematode identification at species level. New online nematode identification keys to genus and species level have been added and the pictorial keys of Platt and Warwick (1988) and Warwick *et al.* (1998) have been incorporated. Since NeMys provides information on almost all marine species ever described, we make it possible to identify species in most parts of the world. In addition, 'private workspaces' were made available in NeMys in order to facilitate communication between scientists working on the same project or within the same area. Here, pictures and drawings of not yet described species can be shared and discussed with a limited number of users while these are not accessible for scientists outside this workbench. As an extra tool, a methodological section provides information on sampling and lab treatment of samples, again in order to facilitate meiobenthic research around the globe.

Keywords: database, nematodes, taxonomy, bioinformatics, online repository

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ANALYSIS OF GENE EXPRESSION AND FLEXIBILITY/ADAPTATION OF MARINE NEMATODES FROM SULPHIDIC ENVIRONMENTS USING THE LATEST MOLECULAR METHODS

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Nematodes are one of the most abundant and diverse metazoan phyla in terms of species richness and are found in a lot of different environments. This project is focusing on the flexibility and adaptation of the nematode *Halomonhystera disjuncta*. The nematode has been observed at different shallow water habitats and has been reported as a dominant species at the Håkon Mosby Mud Volcano (HMMV, SW Barents Sea slope, 1,280m). This mud volcano is characterized by the seepage of methane-containing waters together with fluidized (H_2S) muds through the seabed, generating a continuous energy (chemosynthetic) and carbon supply for the benthic community. The second environment of interest is the Paulina polder tidal flat, located in the lower part of the turbid, nutrient-rich and heterotrophic Westerschelde Estuary. To elucidate the flexibility and adaptation strength of *H. disjuncta*, its transcriptome (from both environments) will be analyzed. In addition to this analysis, the lipid composition of the nematode in both environments and the survival rate and CO_2 production (metabolic rate) of *H. disjuncta* under different environmental parameters (temperature, sulfides, oxygen,…) will be analyzed in the hope to correlate these results to the previously obtained transcriptomic dataset.

Keywords: *Halomonhystera disjuncta*, deep sea, adaptation, transcriptomics, extreme environments.

ANTARCTIC DEEP-SEA MEIOFAUNA AND BACTERIA REACT TO DEPOSITION OF PARTICULATE ORGANIC MATTER AFTER PHYTOPLANKTON BLOOM

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During a FS 'Polarstern' cruise to the Southern Ocean and the Weddell Sea in 2007/2008, sediment samples were taken during and after a phytoplankton bloom at 52°S. The station located at 2960m depth was sampled for the first time beginning of December 2007 and revisited end of January 2008. Fresh phytodetritus from the previously observed phytoplankton bloom had reached the sea floor by this time.
Abundances of bacteria and most major meiofauna taxa did not change considerably between the two sampling dates. In the copepods, the second most abundant meiofauna taxon after the nematodes, the favourable changes in the environment did not lead to a visibly increased reproductive effort during the experimental time.
However, a strong migration tendency of meiofauna towards the sediment surface could be observed after the decaying phytoplankton reached the sea floor. Horizontal shifts in meiofauna distribution between December and January perfectly matched changing porewater oxygen concentration and pigment profiles measured during our study. Higher oxygen consumption after the phytoplankton bloom has to be attributed to an enhanced respiratory activity of the living benthic component, as neither meiofauna nor bacteria reacted with an increase in individual numbers to the food input from the water column. From our results we have to assume that low temperatures and ecological strategies especially prevented benthic deep-sea copepods from quickly reacting to the new situation. Before visible responses in terms of eggs and larvae can be detected, copepods need more time to incorporate nutrients and produce eggs.

Keywords: deep-sea meiofauna, bentho-pelagic coupling, Antarctica.

BIODIVERSITY OF MARINE NEMATODES IN THE SOUTH AMERICAN COAST

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This study analyses the biodiversity of marine nematodes in the South American coast taking into account country (Brazil and Argentina), habitat (rocky shore, estuary and sandy beach) and latitudinal variations (0-15°N, 0-15°S, 15-30°S, 30-45°S, 45-60°S). The genus and species records of nematodes from the Brazilian and Argentinean coast available until December 2009 in PhD theses, MSc dissertations, undergraduate papers and other manuscripts were used to construct a uniform data set with presence/absence data as the basis for comparisons. As a first result, it was found that by the end of 2009 a total of 308 genera of nematodes had been recorded for marine environments on the South American coast. The nematofauna composition in the environments is similar to other places sampled worldwide, with the families Chromadoridae and Xyalidae as the most representative. Comparing the habitats, it was determined that only estuary and sandy beaches were significantly different in composition at genus level (ANOSIM, Global R=0.497, p=0.0001). Furthermore, no significant differences were found to latitudes (ANOSIM, Global R=0.195, p=0.001) and neither to the genera composition of Brazil compared to Argentina (ANOSIM, Global R=0.270, p=0.001). The Chi-square test did not detect differences between the frequency of habitats studied between Brazil and Argentina (χ^2=3.95, p>0.05). The results above point out that the latitudinal factor does not affect the genera composition. In the South American coast, only habitat influences the Nematoda generic composition.
Support: CAPES, CNPq and CONICET.

Keywords: marine Nematoda, biodiversity, South American coast.

TAXONOMIC COMPOSITION AND ECOLOGY OF COPEPODA HARPACTICOIDA FROM SEDIMENTS OF CAMPOS BASIN (SOUTH ATLANTIC, BRAZIL)

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The taxonomic composition and ecology of Copepoda Harpacticoida from sediments of Campos Basin slope are the focus of this study. A total of 44 stations along nine transects organized into North and South areas of Campos Basin were sampled during two campaigns, considering five different depths (750, 1050, 1350, 1650 and 1950m) and two sedimentary *strata* (0-2 and 2-5cm). The Shannon-Wiener diversity and Pielou evenness indexes were calculated. The non-parametric ANOVA Kruskal-Wallis was applied to the number of individuals of Harpacticoida to test for differences between *strata*. The Bray-Curtis was used as the similarity index to determine ecological patterns of the Harpacticoida community through a non-metric multi-dimensional analysis (MDS), considering the factors: campaign, areas, depths and *strata*. The significance of factors was tested by ANOSIM. The faunal composition of Copepoda Harpacticoida found at Campos Basin has shown similarities with other areas as the Angola Basin, nevertheless, a high percentage of new taxa was found at Campos Basin (10 new genera and 78 new species). The values of density were low compared to other deep sea studies. The diversity presented a tendency to decrease with depth, with high values occurring at different stations within studied areas. According to previous literature the most superficial *stratum* showed significantly higher values of density and diversity. The community has shown similar ecological patterns using different taxonomic level analysis. Nevertheless, the use of low taxonomic levels significantly improves our knowledge of marine biodiversity.

Keywords: deep sea, harpacticoids, Atlantic Ocean, continental slope.

NEW AND KNOWN SPECIES OF *PROMESOSTOMA* (PLATYHELMINTHES, RHABDOCOELA, PROMESOSTOMIDAE) – A REVISION

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The taxon *Promesostoma* is very species-rich, with more than 30 representatives from all over the world, occurring in all types of marine and brackish water habitats. In this contribution, another five new species of *Promesostoma* are described, bringing the total number on 38 species, which are all morphologically very similar, but are clearly recognisable by the detailed structure of their stylet. Two of the new species, *Promesostoma calcareum* n. sp. and *P. justinei* come from New Caledonia, whereas *P. alexanderi* n. sp. and *P. corsicum* occur in the Mediterranean Sea. *P. lincolni* n. sp. is a species from Florida, USA. Furthermore, new distribution data are given for *P. ensifer*, *P. hymanae*, *P. kergroixense* and *P. maculosum*. The new species are discussed within a larger framework, trying to identify species groups within this large taxon, mainly based on the organisation of the male genital system.

Keywords: Turbellaria, Typhloplanoida, taxonomy, biodiversity, systematics.

MASTAX MUSCULATURE OF *BRYCEELLA STYLATA* (MILNE, 1886) (ROTIFERA: PROALIDAE)

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The cuticularized pharyngeal jaw elements, referred to as trophi, are one of the most conspicuous features of rotifers being characterized by an enormous plasticity. The trophi are being used for food uptake and can be moved against each other by means of muscles spanning between them or between trophi elements and the pharyngeal epithelium. According to morphology and feeding strategy, different mastax types can be distinguished (e.g. malleate, ramate, virgate and forcipate type). Owing to numerous light and scanning electron microscopic studies, the morphology of the trophi is well known but only few attempts, most of them in the early 20th century, have been made to analyze the morphology and functionality of the mastax as a whole. Particularly, the complex muscular system which connects the individual trophi elements was disregarded in the past. We analyzed the musculature of the modified malleate mastax of the proalid rotifer *Bryceella stylata* using a combination of transmission electron (TEM) and confocal laserscanning microscopy (CLSM). We identified a total number of six paired and two unpaired mastax muscles and suggest a hypothesis on the movement of the trophi associated to the individual muscles. With the successful reconstruction of the mastax musculature in a species that small (mastax length in *B. stylata*: ~20µm), we could show that CLSM is a very useful technique and on principle useful for revealing the mastax musculature in all rotifer species, independently from their size. We hope that our revealed data will be valuable for future phylogenetic analyses of the rotifer mastax and help to clarify the evolution of the different mastax types.

Keywords: Rotifera, Proalidae, mastax, confocal laser scanning microscopy.

MUSCULATURE OF *SQUATINELLA ROSTRUM* (MILNE, 1886) (ROTIFERA: LEPADELLIDAE) AS REVEALED BY CLSM

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In the early 20th century, a few investigations dealing with the mastax musculature of different rotifer species have been carried out on the basis of histological sections. As recently as in the last years, different authors have revealed new data regarding this subject matter by the use of confocal laser scanning microscopy, transmission electron microscopy or a combination of both microscopical techniques. Due to the general lack of appropriate morphological studies across Lepadellidae, we reinvestigated the species *Squatinella rostrum* with different microscopical techniques among them confocal laser scanning microscopy (CLSM). Based on the revealed data sets, we analyzed and reconstructed the mastax musculature as well as the somatic musculature in order to broaden our knowledge of the rotiferan muscle system. Five paired longitudinal muscles (musculi longitudinales I-V) and nine circular muscles (musculi circulares I-IX) were identified, among them the musculus longitudinalis ventralis, the musculus longitudinalis dorsalis and the musculus circumpedalis. Compared to other species, *S. rostrum* is characterized by the absence of several longitudinal and circular muscles (e.g. musculus longitudinalis capitis, corona sphincter and pars coronalis). A reconstruction of the mastax musculature revealed a total number of seven paired and two unpaired mastax muscles. These set of muscles is similar to those found in other species with malleate or modified malleate mastaxes.

Keywords: Rotifera, Lepadellidae, mastax, body musculature, confocal laser scanning microscopy.

THE MASTAX MUSCULATURE OF *PLEUROTROCHA PETROMYZON* AND *PROALES TILLYENSIS*

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In an ongoing comparative investigation, different mastax types of rotifers are studied. The mastax, a masticatory apparatus, is located in the head region, behind the ventral mouth opening, showing a complex structure of muscles, nerves, glands and epithelial tissue associated with cuticular jaw elements, the so called trophi. According to different arrangement and function of the trophi, different basic mastax types are distinguished in literature.
In our study, the two as virgate (working with a pumping/sucking action) assumed mastaxes of the species *Pleurotrocha petromyzon* and *Proales tillyensis* have been examined by means of TEM, CLSM and SEM for a reconstruction and comparison of the mastax musculature.
Our preliminary conclusions indicate that the two mastaxes display a more or less different arrangement of musculature whereas *Proales tillyensis* lacks the so-called mastax receptor retractor (also known as hypopharynx muscle) that was said to be responsible for the sucking/pumping action in the virgate mastax.

Keywords: Rotifera, mastax musculature, mastax types, TEM, CLSM.

A FIRST APPROACH TOWARD A CYCLOPIDAE (COPEPODA: CYCLOPOIDA) PHYLOGENY INFERRED FROM PARTIAL 18S RIBOSOMAL DNA, WITH SOME COMMENTS ON OITHONIDAE AND CYCLOPINIDAE STATUS

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This study is the first subfamilial level phylogenetic analysis of cyclopid copepods. Among Cyclopoida, cyclopids are notable for their success in having successfully invaded freshwaters. We included Cyclopinidae and Oithonidae as outgroups, which are almost exclusively marine taxa. Taxon sampling emphasized the speciose freshwater Cyclopidae and included all four subfamilies. Analyses employed partial sequences of the 18S rRNA gene. The hypothesized homologies of nucleotide positions were based on a model of the secondary structure of this gene. Parsimony, maximum likelihood and Bayesian analyses yielded similar topologies. Monophyly of the putative basal cyclopoid family, Cyclopinidae, is rejected, which supports recently published morphological analyses that have hypothesized a paraphyletic relationship. Monophyly of both Oithonidae and Cyclopidae is strongly supported. The predominantly brackish Halicyclopinae is hypothesized to be the most basal lineage in the Cyclopidae while the marine Euryteinae is hypothesized to be the sister group to a clade comprising Eucyclopinae and Cyclopinae. Together the predominantly freshwater Eucyclopinae and Cyclopinae form a strongly supported group, but the relationship between these two subfamilies remains unresolved. Freshwater invasions occurred independently at least three times: in Oithonidae (*Limnoithona* in China, some *Oithona* in the Amazonian/Orinoco Basin), Halicyclopinae (some *Halicyclops*) and Cyclopinae/Eucyclopinae clade (except by the oligohaline *Apocyclops*).

Keywords: Phylogeny, Cyclopidae, Cyclopoida, RNA secondary structure.

NEMATODA ASSEMBLAGES IN THE CONTINENTAL SHELF OFF THE SANTOS ESTUARINE COMPLEX, SE BRAZIL

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Nematode assemblages were studied at six stations along two crossed transects in the continental shelf off Santos estuarine complex, in SE Brazilian coast, in August 2005. Three stations were located parallel to the coast, around 20m depth, and three other were located from 17 to 94m depth offshore to investigate the influence of the Santos bay/estuarine waters on nematodes along the shelf. Three sediment samples per station were collected with a box corer and meiofauna samples were taken with a corer of 4.9cm^2 and 10cm height. Sediment phytopigments, organic matter, and grain size were also analyzed. Nematodes comprised about 95% of total meiofauna and mean densities ranged from 571 to 4,737 ind.10cm^{-2}, the lowest being found at the two deeper stations. Nematodes were identified to genus level and 158 genera and 29 families were found. The hierarchical clustering analysis for families and genera revealed two main groups of stations. One group was formed by shallower stations (except station 6, the more distant from the estuarine complex), with higher densities and the dominance of *Microlaimus* (Microlaimidae), *Parachromadorita* (Chromadoridae) and *Molgolaimus* (Desmodoridae). The other group was composed by the deeper stations and station 6, and had low densities with the dominance of *Sabatieria*. BIOENV analysis did not reveal any correlation with environmental variables, but chlorophyll-a concentrations in the sediment overlaid on the MDS analysis showed that the first group, with the highest abundances of epistratum feeders nematodes (2A), had the highest values of chlorophyll-a. The results suggested that the waters from the estuarine complex enriched the microphytobenthos in the shallower stations closer to the system and, consequently, the nematodes community reflected the higher availability of this food source. (Financial support by FAPESP process 2003/09932-1, CNPq scholarship to LEY and CNPq grant to TNC).

Keywords: Nematoda, chlorophyll-a, sediment, continental shelf, SE Brazil.

TAXONOMIC STUDY OF KINORHYNCHA IN HOKKAIDO, JAPAN

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Seven species of kinorhynchs are described and illustrated from Hokkaido, northern Japan, for the first time, of which four are new to science. These are *Echinoderes oshoroensis* sp. nov., *E. suturata* sp. nov., *Cephalorhyncha asiatica* (Adrianov, 1989), *Condyloderes soyoae* sp. nov., *Pycnophyes sagittarius* sp. nov., *P. tubuliferus* Adrianov, 1989, and *Kinorhynchus yushini* Adrianov, 1989. *Echinoderes oshoroensis* sp. nov. is distinguished from the other *Echinoderes* species by the (1) trunk length, (2) middorsal spines on the segments 4–8, with each spine being shorter than corresponding segment, (3) laterodorsal spines on the segment 10, (4) lateroventral spines on the segments 5–9, (5) ventrolateral spines on the segment 2, (6) presence of the midventral patches of cuticle hair on the segments 3–10, within the hair on segment 3 being most developed, and (7) shape of tergal terminal extension. *Echinoderes suturata* sp. nov. is characterized by the (1) middorsal spines on the segments 4–8, (2) lateroventral spines on the segments 6–9, and (3) presence of incomplete separation on the midventral surface of the segment 2. *Condyloderes soyoae* sp. nov. is distinguished from the congeners by (1) the cuspidate spines on the sublateral position of segments 2, 4, 7, and 9, (2) lateral accessory position of the segment 8, and (3) ventrolateral position of the segment 5. *Pycnophyes sagittarius* sp. nov. is characterized by the (1) presence of middorsal patches of minute cuticular hair on the segments 2–9, and (2) pairs of midventral thickenings on the segments 6–10. *Cephalorhyncha asiatica* (Adrianov, 1989) is reported from Japanese waters for the first time.

Keywords: Kinorhyncha, taxonomy, new species, Japan.

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