



Abstracts

(in alphabetic order of the first author)

O=Oral presentation, P=Poster presentation

USING THE CURVES: A CASE STUDY ON THE ANTARCTIC AMPHIPOD BIODIVERSITY (P)

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Being the coldest, most isolated and inhospitable continent known to man, Antarctic amphipods have been assumed to be lacking biodiversity in comparison to other tropical and less hostile environments. This myth, owing to infrequent sampling and consequently sparse morphological data availability, is being dispelled by using genetic sequencing techniques like DNA barcoding. In fact there are about 4100 invertebrate species on the Antarctic shelf known to science at present, but biodiversity estimates indicate that the true number of species expected to live there may be several fold higher. However, as observed from our own studies on *Lysianassoidea*, *Oedicerotoidea* and *Iphimedioidea*, DNA barcoding for the Amphipods is plagued with problems of tediousness, high costs, low amplification using general primers and pseudogenes. Here we present a cost efficient, fast track, unambiguous and high throughput experimental design using a state of the art technique known as the High Resolution Melting Curve analyses to study the diversity of Amphipods in the Antarctic. Our results show that inter and intra specific genetic distances can be obtained from this technique and also highlight the potential of this technique to resolve population structures of the various taxa, using fast evolving microsatellite markers in addition to the conventionally used barcoding genes (16S, Cytochrome oxidase unit 1 and 18S etc.). To conclude, the data shown, presents a quick and efficient way of assessing the biodiversity of Amphipods in any given habitat and to corroborate the evidence provided by both morphological and molecular studies.

IMPACT OF THE SEASONAL VARIATION ON THE LOCOMOTOR RHYTHM OF THE AMPHIPOD *TALITRUS SALTATOR* FROM BIZERTE BEACH (NORTH OF TUNISIE) (O)

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The locomotor activity rhythm of the supralittoral sandhopper, *Talitrus saltator*, was investigated over four seasons to reveal the impact of environmental variation on this species collected from Bizerte beach (37°19'N-9°51'E). For each season, thirteen adult individuals were collected by hand. These individuals were transferred individually in actographs, equipped with an infra-red recording system. These actographs are placed under two simultaneous experimental regimens (LD and DD) in a controlled environment cabinet able to control photoperiod and temperature (maintained constant at 18±0.5°C). Under LD and DD, Periodogram analysis had shown that *Talitrus saltator* exhibit a circadian rhythm ($\tau \approx 24\text{h}$) with an ultradian component ($\tau \approx 12\text{h}$), whatever the season or the photoperiodic regimen imposed. A seasonal comparison of the various rhythm characteristics showed that the greater mortality was observed in winter (36.6 %); whereas, in summer this rate was equal to zero. Circadian rhythmicity was more important than the ultradian one for all seasons and both under nLD cycle and free running conditions. The maximum of circadian rhythmicity was observed in summer whatever the photoperiodic regimen imposed. The most important ultradian rhythmicity was observed respectively in summer (67%) under entrainment conditions and in winter (50%) in continuous darkness. In addition, the stability of the circadian rhythm

was better defined in spring, whatever the photoperiodic regimen imposed.

INVASIVE GAMMARIDS AS VECTORS OF MICROPARASITES: A CASE STUDY OF *DIKEROGAMMARUS VILLOSUS* AND *CUCUMISPORA DIKEROGAMMARI* (O)

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Parasites play very important role in biological invasions. On one hand we may observe the loss of parasites during invasion process. On the other hand new parasites may pose a danger to naïve hosts in the case of pathogen transition to local fauna. *Dikerogammarus villosus* is one of the most invasive gammaridean species in Central and Western Europe. In many cases its introduction led to outnumbering native amphipods and other macroinvertebrates including earlier colonisers. It is widely distributed nowadays and it hosts intracellular microsporidian parasite *Cucumispora dikerogammari* in its whole dispersal range. The aim of the study was to estimate pathogenicity of the microsporidium for its typical host and possibilities of transfer to novel hosts (i.e. local gammarid species in colonised area). Our study showed that this parasite may be transmitted both vertically and horizontally, but feeding on infected tissues seemed to be more efficient. It did not influence fecundity but infected females starts to breed earlier in the breeding season. The heavy infection resulted in earlier death of infected individuals in comparison to healthy ones. The transmission to other species in the case of *C. dikerogammari* is possible as we found other Ponto-Caspian species being infected with this parasite in the field. We did not find any native gammarid nor other local invertebrates being infected with *C. dikerogammari* in the field, but we were able to infect *G. pulex* and *G. roeselii* in experimental conditions. Thus there is a potential for the pathogen transmission to the local fauna, but apparently there are not proper conditions necessary for the transfer. However, taking into account the dynamics of invasion process we may expect that the parasite may infect local fauna in the future.

LIFE HISTORY OF *CAPRELLA GRANDIMANA* (CRUSTACEA: AMPHIPODA) REARED UNDER LABORATORY CONDITIONS (P)

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Caprella grandimana is a common amphipod species distributed in the Mediterranean Sea and the Atlantic African coast from Cape Spartel to Cape Blanc (Morocco). It is found associated to the algae *Corallina elongata* and *Jania rubens* in low intertidal zone throughout the year. Growth, maturity, and reproduction of 112 juveniles obtained from 26 ovigerous females collected were studied under laboratory conditions at 17°C, and with a 12-h photoperiod. The newly hatched juveniles were transferred to small glass containers and fed with a mixture of diatoms *Phaeodactylum tricornutum* and *Tetraselmis chuii* (1:1). After emerging from the brood pouch, caprellids were

considered as Instar I (1mm length). Sexes were not able to be identified until Instar III; after this, oosteguites on pereonites 3 and 4 in females were increasing until being longer than gill length in the mature stage. Juveniles were moulting successively every 6.4-10.8 days up to Instar IV. The moulting intervals of males gradually increased up to Instar X, producing a final instar which lived significantly longer than the previous one. Female intermoult period remained constant until they died. The body length and flagellar articles increased faster in males than females at each instar. Females reached the mature stage (maturation time) at 38.4 days after emergence from the brood pouch, producing their first brood 10 days later at 49.1 days. The mean of eggs produced by each female and the number of offspring which eventually emerged from the brood pouch was low (7.6 and 4.5 respectively). A positive correlation was found between the number of eggs and offspring and the average length of the female in each instar. In spite of the importance of caprellids in Mediterranean ecosystems, this is the first time in which a Mediterranean species is successfully reared under laboratory conditions. These studies are basic for future ecotoxicological research and aquaculture management.

USE OF AMPHIPODS AS ALTERNATIVE PREY IN CEPHALOPODS AQUACULTURE (P)

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Cephalopods need live prey to be cultured during the first part of their life, Mysids and *Artemia* are the only live prey that promotes better growth. The lack of alternative food to culture early stages is an important bottleneck for cephalopod large-scale culture. Amphipods (caprellids and gammarids) could be a potential alternative prey since they are easy to collect, tend to breed throughout the year and have short life spans. Furthermore, they could be less expensive to be cultured, as they can feed on suspended organic matter. Two experiments were carried out. The first using *Sepia officinalis* hatchlings fed for 21 days with three diets; saltwater gammarids, caprellids, and mysids (control), and the second with *Octopus maya* hatchlings fed for 15 days with saltwater gammarids, freshwater gammarids, and artemia (control). Animals were individually weighted at the beginning and end of the experimental period. Daily growth coefficient (DGC, %day⁻¹) was determined. According to the results obtained in growth rates of *S. officinalis* with mysids and gammarids (6.7±0.4 and 5.7±0.9 % DGC d⁻¹, respectively), marine gammarids could be used as an alternative prey to mysids in the culture of *S. officinalis*. In *O. maya* experiments, marine gammarids were the best diet showing double growth rate than control with artemia (8.4±0.27 and 4.84±0.15 % DGC d⁻¹). This is the first study revealing a successful use of amphipods, mainly gammarids, as alternative prey for cephalopods hatchlings culture.



THE AMPHIPODA COLLECTION AT THE MUSEUM OF COMPARATIVE ZOOLOGY, HARVARD UNIVERSITY, CAMBRIDGE, MASSACHUSETTS (P)

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The crustacean collection housed within the Department of Invertebrate Zoology at the Museum of Comparative Zoology (MCZ) in Cambridge, Massachusetts is one of the largest in the United States and among the most important in the world. Many specimens in the collection originate from early 19th century expeditions and were curated by MCZ Scientists, namely A. Ordway, H.A. Hagen, W. Faxon and F.A. Chace, Jr. Brachyuran crustaceans are the most numerous with 355 genera and over 1000 species; brachyuran primary type material includes the works of E.L. Bouvier, J.D. Dana, A. Milne-Edwards, M. Rathbun, S.I. Smith and W. Stimpson. The Peracarida are also well represented in the collection, with the Amphipoda consisting of over 2300 lots within 48 families. Since the founding of the MCZ in 1859, however, very little original research has been done on the amphipods in the collection – the most significant has been the work of W. Faxon in 1876 that described several *Hyalella* species from Lake Titicaca. E.L. Bousfield visited the MCZ several times in the early 1960's and curated parts of the collection. Unfortunately, nearly 25% of the collection remains unidentified. In January 2008, care of the amphipod collection officially became my responsibility. This poster gives a brief history of the MCZ, overviews the Museum's amphipod collection and outlines the current work on amphipods in the MCZ.

ALIEN AMPHIPODS OF TURKISH SEAS (P)

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Alien species compose a small component of the Mediterranean amphipod fauna. Until now 10 exotic amphipods are reported in the Mediterranean Sea. Five of them known from the Turkish coasts. *Maera hamigera* and *Stenothoe gallensis* is known from Aegean and Mediterranean coasts, *Elasmopus pecteniscrus* and *Gammaropsis togoensis* reported from the Mediterranean coast among the photophilic algae in 2007 and an Atlantic species *Parhyale explorator* determined on gravel and mussel beds in 2008. The individuals of this alien species make up a small percentage of the total fauna where they found but established populations are in stable condition.

ECOLOGICAL DIFFERENTIATION AMONG COEXISTING JASSA-SPECIES (P)

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Species of the marine amphipod genus *Jassa* Leach, 1814 (Ischyroceridae) have frequently been confused or synonymized in the past. High similarities in the species' morphology are reflected by similar life styles as tube building suspension feeders. Also have intraspecific differences, especially in the male reproductive strategies which are corroborated by distinct morphological features, caused taxonomic confusion.

Nevertheless several *Jassa*-species can occur sympatrically in the same habitat. The three species *J. falcata* (Montagu, 1808), *J. marmorata* Holmes 1903 and *J. herdmani* (Walker, 1893) coexist in high numbers around the rocky shores of Helgoland (North Sea, German Bight). Abundances on any kind of hard substrata are known to exceed 500.000 ind./m². To investigate the mechanisms allowing for coexistence, the animal's recruitment in the field, their distribution on three-dimensional structures and different life history traits were analyzed. Recruitment on artificial substrates, exposed to different conditions of turbulence, was studied in the field. Conditions of turbulence had a significant effect on the abundances of *J. marmorata* and *J. herdmani* after one month. In contrast, recruitment of *J. falcata*, the least common of the three species, was not affected at all. Experiments on microhabitat preference showed that *J. herdmani* mainly used the peripheral parts of macroalgae while *J. marmorata* also used the central parts. This difference in distribution is also reflected in the species' escaping behavior. The results suggest that coexisting *Jassa*-species differ in biological and ecological parameters which results in the partitioning of resources and probably facilitates the species' coexistence.

REPRODUCTIVE VARIABLES OF AMPHIPODS (GAMMARIDEA) AS AN ADAPTATION TO DIFFERENT ENVIRONMENTS (O)

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This paper focuses on life-history and reproductive variables of three amphipod species (*Gammarus lacustris*, *Pontogammarus robustoides* and *Gmelinoides fasciatus*) from aquatic systems of different regions of Eurasia. The individual (number of eggs in brood per females at different embryo-stages, % abnormal and dead embryos, fecundity index) and population variables (sex ratio, size of reproducing females, fecundity and reproductive capacity) of these species as an adaptation to water temperature, food conditions, day length, contaminants and predator pressure were analyzed on the base of own observations in 1999-2008 and review of literature data. The reproductive variables relate strongly to female size (growth rate), length of intermoult period and embryogenesis duration; they differ primarily depending on temperature (i.e. between latitudes, seasons and climatically different years). The annual numbers of generations are also temperature-dependant and show a tendency to decrease from southern to northern regions. Distinct seasonal changes in individual fecundity were recorded for multivoltine *P. robustoides* and *G. fasciatus*; this phenomenon is only partly explained by seasonal differences in female sizes, and in different degree by other factors (trophism, length of day, contaminants). The individual fecundity has no significant differences found between latitudes, while the population characteristics as mean clutch size and size of the reproducing females were varied depending on temperature (seasonally and spatially), as well as predator pressure and food conditions. Contaminants can induce disorders in egg development and an increase in % of egg mortality and abnormality; they influence sufficiently on sex-ratio and in general on reproductive success.

ANIMAL STANDARDISATION FOR MIXED SPECIES ECOTOXICOLOGICAL STUDIES: ESTABLISHING A LABORATORY BREEDING PROGRAMME FOR *GAMMARUS PULEX* AND *ASELLUS AQUATICUS* (O)

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Ecotoxicology has become an essential procedure for monitoring the effect of pollutants on the ecology of aquatic environments. By undertaking ecotoxicological studies, it is possible to determine what concentration(s) of a particular substance(s) has a toxic or sub-lethal effect on a range of organisms so that standards for the protection of the aquatic ecosystem can be developed. Although, environmental toxicology can be undertaken with a wide range of fish and macro-invertebrate species, a test animal's toxicological response can be influenced by a variety of parameters such as, its past life history, age, reproductive state, diet and the conditions in which the tests are being performed. Therefore, it is imperative to obtain test animals from an unpolluted standardised environment in order to achieve a response that can be relied upon. *Gammarus pulex* and *Asellus aquaticus* are important components of freshwater ecosystems and are commonly found together throughout the British Isles, Europe and North America. Both species are frequently used as test animals for ecotoxicological studies, as they have differing responses to organic and several classes of chemical pollutants. This paper outlines how to establish a standardised laboratory breeding programme for *Gammarus pulex* and *Asellus aquaticus* for use in ecotoxicological studies. Wild *Gammarus pulex* and *Asellus aquaticus* specimens were captured from an unpolluted river source and used as founder populations for the programme. The *Gammarus pulex* and *Asellus aquaticus* founder populations were permitted to breed randomly and the subsequent offspring (F¹, F² and F³ generations etc.) were available as standardised test animals for mixed species ecotoxicological studies. The husbandry required to maintain laboratory breeding populations of *Gammarus pulex* and *Asellus aquaticus* is outlined and the animals' development cycles are discussed.

EXPLORING MOLECULAR VARIATION IN THE COSMOPOLITAN *CAPRELLA PENANTIS* (CRUSTACEA: AMPHIPODA): RESULTS FROM RAPD ANALYSIS (P)

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Caprella penantis Leach, 1814, a world-wide distributed species of the Caprellidae, is regarded as one of the most problematic caprellids throughout the world. Besides the morphological variation with age and sex, this species also shows considerable intraspecific morphological variation and may be a complex of different species in which it is difficult to understand if this morphological variation is intra- or interspecific. To deal with this taxonomic problem, we used the random amplified polymorphic DNA (RAPD) technique. Specimens of eight populations of *C. penantis*, three of *C. dilatata* and two of *C. andreae*, collected from different sites all over the world, were selected. Thirteen primers were tested, and the phenogram, based on the similarity coefficient of Nei and Li and the UPGMA method, separated clearly *C. dilatata* and *C. andreae* from the populations of *C. penantis*, supporting the validity of these three species, traditionally considered altogether under the old "acutifrons" complex. However, all the

populations of *C. penantis* (including, at least, forms *simulatrix*, *testudo* and *lusitanica*) from Spain, Portugal, Morocco, Brazil and Japan were clustered together in spite of the morphological variations (presence/absence of proximal projection in adult male gnathopod 2 propodus) among them, indicating that, probably, all the specimens of *C. penantis* could belong to the same species. The only population which showed higher genetic differentiation within the *C. penantis* complex was "*C. verrucosa*" (*C. penantis* f. *gibossa*) from Coquimbo, Chile. Additional samples from other world areas and future analysis based on a larger set of molecular markers and techniques (mtDNA, ISSR, 18S rRNA), should be conducted to confirm these results.

ANALYSIS OF MOLECULAR VARIATION IN *CAPRELLA PENANTIS* LEACH, 1814 (CRUSTACEA: AMPHIPODA) BASED ON MITOCHONDRIAL DNA SEQUENCE (P)

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Taxonomic identification of caprellid species (Crustacea, Amphipoda) is a complex process that often demands a great deal of expertise. Most of the difficulties are due to phenotypic variability in morphological characters. This is the case for *Caprella penantis* Leach, 1814, a cosmopolitan species of Caprellidae, which exhibits considerable intraspecific variation. Apart from the morphological variation with age and sex, this species also shows morphological variations in the pleura, gills, gnathopods and robustness, among populations. The aim of this study was to explore this morphological variation using mitochondrial sequence data. Two fragments (around 548bp and 570bp, respectively) of the mitochondrial cytochrome c oxidase subunit I (COI) gene were sequenced in several specimens collected from different localities all over the world belonging to different populations of *C. penantis*, and to some populations of the close species *Caprella dilatata* and *Caprella andreae*. Phylogenetic analyses under the assumptions of maximum likelihood, maximum parsimony and Bayesian analyses were carried out. Our results confirm, on the one hand, the status of *C. penantis*, *C. dilatata* and *C. andreae* as valid and different species, traditionally considered altogether under the old "acutifrons" complex. On the other hand, with regard to *Caprella penantis*, the phylogenetic trees showed a clear geographic structure but, in spite of that fact, the different morphological forms were not clustered separately. Consequently, most of the specimens of *Caprella penantis* could belong to the same species and not to a complex of different species. Existence of the diverse forms (presence *versus* absence of projection in gnathopod 2) in *Caprella penantis* could be explained, therefore, by intraspecific variation.

CAPRELLIDS FROM SANTA MARIA BAY (SAL ISLAND, CAPE VERDE): NATURAL VERSUS ARTIFICIAL SUBSTRATES AT TWO DIFFERENT DEPTHS (P)

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Cape Verde was recently recognised as one of the 10 marine biodiversity hot-spots most threatened by species extinction, encouraging the development of several studies with conservation purposes. The present study aims to compare the abundance and composition of caprellid fauna in the Bay of Santa Maria, Sal Island (Cape Verde) from natural and artificial areas at two different depths (10; 25m). At each depth, two areas were sampled, one natural and one artificial (3 replicates of 0.0625m² in two spatially separated sites within each area). The sampled area was scraped and the material collected with the help of a custom made small airlift to sampling bags of 500µm mesh size. Eight caprellid taxa were identified: *Phtisica marina*, *Hemiaegina minuta*, *Caprella acanthifera*, *Caprella danilevskii*, *Caprella* sp., *Deutella* cf. *aspiducha*, *Pseudaeginella* cf. *biscaynensis* and *Paracaprella* new species. *Phtisica marina* was the only species common to all areas. *Deutella* cf. *aspiducha* and *C. danilevskii* were exclusive from the artificial area at 25m, while *Caprella* sp. was only observed within the natural area at the same depth. On the other hand, *Pseudaeginella* cf. *biscaynensis* was only recorded at 10m depth. At this depth, *Caprella acanthifera* and *Hemiaegina minuta* were exclusive from the natural area. The specimens identified as *Paracaprella* new species during the present study was assigned to the genus *Paracaprella* on the basis of mandible with molar and without palp, pereopods 3 and 4 2-articulate and abdomen with 1 pair of appendages. However, pereopods 5 are 2-articulate in this species instead of 7-articulate as in the remaining species of the genus. Further studies are necessary to explore if these specimens belong to a new species of *Paracaprella* or even to a new genus. On the other hand, *Deutella aspiducha* was recently collected from caves of Bermuda and the present study represents the first record of the species after its original description in 1987.

SPEEDING UP TAXONOMY WITH THE DIGITAL DRAWING METHOD (Workshop)

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The digital drawing method for scientific illustrations using Adobe Illustrator has become a standard method for taxonomic descriptions in many labs. The great advantages of this method lie in increased speed and the possibility to create such smooth lines that would not be possible using traditional free-hand ink drawing. The resulting vector graphics can be directly processed by most online journals and can be used for printing in journals and digital copies (pdf's for proofs and eps files for publication). Using vector paths they are much smaller and have a much higher quality and resolution than bitmap versions. It is also possible to use photos and micrographs as a master for a line drawing. Although the time saved is considerable using the digital drawing method (once mastered), the illustration of complex details like setae still takes most of the time. D'Udekem d'Acoz (pers. comm.) proposed the use of the brushes

function of Adobe Illustrator for such structures. In this talk I also introduce this idea and expand it into a whole system to make libraries for setae and related structures automatically.

THE USE AND POTENTIAL OF DNA BARCODING FOR AMPHIPOD TAXONOMY (O)

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The creation of a universal system for species identification based on short standardized DNA sequences, dubbed DNA barcodes, was originally proposed in 2003. Since then this approach has been gradually implemented in a disproportional way to different taxonomic assemblages of animals, with particular emphasis on vertebrates and some insect groups. Standardization, comparability and ease of interpretation are among the strongest features of this approach. A number of studies have now demonstrated the applicability and use of DNA barcodes for species discrimination among crustaceans. Here we review selected published data that illustrate the utility and potential of DNA barcoding for amphipod taxonomy, with particular focus on a study of the genus *Gammarus*. Use of DNA barcodes in these studies enabled clarification of taxonomic ambiguities, detection of possible past misidentifications, and flagged potential cases of cryptic speciation or undescribed species. On the whole, DNA barcodes perform well in species discrimination of amphipods and offer great promise for contributing to overall improvement of the taxonomic knowledge of this group. However, the highest benefits from DNA barcode data will only emerge when evaluated together with associated data (e.g. morphological and ecological), bringing together total evidence in the establishment of species boundaries and in species descriptions. Hence, successful global implementation of DNA barcoding on amphipod taxonomy depends on a strong coordinated engagement of the amphipodologist community.

POPULATION LEVEL INTEGRATION OF INDIVIDUAL EFFECT MEASUREMENTS FOR *IN SITU* WATER QUALITY ASSESSMENT: A MODELLING APPROACH WITH *GAMMARUS FOSSARUM* (P)

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Multilevel biomarker studies are now a classical approach for the monitoring of contaminated environments. Nevertheless, even if the population constitutes a level of interest for environmental management, the characterization of *in situ* effects of contaminants at this level reminds difficult notably because it also integrates plastic, adaptive and neutral variability related to physical-chemical habitat or phylogeographical constraints. For predictive approaches in chemical risk assessment, the experimental difficulty to assess impacts of toxic compounds at the population scale is currently addressed by modelling techniques. With the environmental relevant species *G. fossarum*, we develop this methodology in a diagnostic framework by coupling population dynamics modelling and *in situ* caging. Hence, we expect to enhance the ecological relevance of *in situ* toxicity assessment and to develop biologically

integrated ecotoxicological indicators. Our approach proceeds in two steps. (i) Population models are developed to mechanistically link life history traits (survival, growth, reproductive activity, fertility) and the dynamics of reference native populations all along a year. For this, we use a dual approach combining laboratory and field experiments. The latter consisting in a demographic follow-up based on monthly population census (densities, size distributions) and an individual approach with field organisms caged *in situ* (reproduction, growth, survival). (ii) Effects of contamination, observed at the organism level through the exposure of transplanted individuals caged in contaminated stations, are projected into the dynamics of these reference populations in order to propose a diagnostic assessment of water quality at the population level.

PREFERENCES OF JUVENILES AND ADULTS OF THE INVASIVE PONTO-CASPIAN AMPHIPOD *PONTOGAMMARUS ROBUSTOIDES* FOR VARIOUS SPECIES OF MACROPHYTES AND ARTIFICIAL ABOVE-BOTTOM SUBSTRATA (O)

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We studied the preferences of an invasive Ponto-Caspian amphipod *Pontogammarus robustoides* for macrophytes (*Myriophyllum spicatum*, *Ceratophyllum demersum*, *Potamogeton perfoliatus*, *Elodea canadensis*) and anthropogenic substrata (artificial Christmas tree branches, smooth polythene foil) differing in the level of structural fragmentation. We checked the gammarid distribution on the studied substrata in the near-shore zone of a dam reservoir, and their habitat preferences in laboratory pairwise-choice tests. Juvenile (<7 mm) and adult gammarids exhibited different habitat preferences. The physical structure of substratum was an important cue for gammarids, which selected habitats with structural complexity corresponding to their body size. In the field, the density of adults on artificial branches was the highest and differed from those found on plants and polythene. The juvenile densities on artificial branches and plants were similar to one another and higher than on polythene foil. In the laboratory, adults did not discriminate between artificial and natural habitats, whereas juveniles preferred all tested macrophytes over artificial substrata. Moreover, juveniles preferred plants with the finest leaf elements: *M. spicatum* and *C. demersum* over the others and *E. canadensis* over *P. perfoliatus*. We found no influence of chironomid larvae, a food source for adult gammarids, on their distribution, nor the effect of adults on the habitat choice by juveniles. In general, juveniles exhibited higher affinity for complex substrata, especially macrophytes, while adults showed more plasticity in their substratum choice. The habitat partitioning between juvenile and adult *P. robustoides* may help them increase their invasive potential by reducing the intraspecific competition and cannibalism.

PHYLOGEOGRAPHY AND SYSTEMATICS OF ENDEMIC BAIKALIAN SPONGE COMMENSAL *DOROGOSTAISKIA PARASITICA* (GAMMARIDEA: ACANTHOGAMMARIDAE) (O)

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Endemic gammaroid species of Siberian Lake Baikal are clearly structured geographically and deeply diverged genetically. This recently discovered fact seems to overturn the classical views on the speciation and the age of the fauna in Lake Baikal. We explored mitochondrial DNA and morphological variation of another symbolic Baikalian acanthogammarid species *Dorogostaiskia parasitica*, an epibiont of Baikalian endemic sponge *Lubomirskia*. Previously, the species was morphologically studied only from the type locality, in southern basin. According to our results, *D. parasitica* consists of three main ca 10% diverged (uncorrected COI distance) lineages: first, in southern and central basins, second, in Maloe More Strait and third, in the north-west Baikal. The first lineage, in turn, includes several more ca 6% diverged mitochondrial geographically isolated clades. Additional geographical structuring was found even within the clades. Morphological differences in the shape of antennae, coxal plates and other structures have been found between *Dorogostaiskia* from different parts of the lake, which corresponded to genetic differentiation. *Dorogostaiskia parasitica* turned out to be a complex of several species. Geographical isolation played an important role for the speciation in *Dorogostaiskia* and generally in Baikalian amphipods.

MORPHOLOGY AND HISTOLOGY OF THE GUT SYSTEM OF *MACARORCHESTIA REMYI* (SCHELLENBERG, 1950) (AMPHIPODA, TALITRIDAE) (P)

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Macarorchestia remyi, living and feeding within beached wooden logs, exhibits a peculiarity in terms of diet compared with other Mediterranean talitrid amphipods. In this context, we investigated its gut regions (foregut, midgut and hindgut) mainly by histology on the transverse sections. Typically, the ectodermal foregut and hindgut regions were lined with cuticle, finely elaborated in various structures. Among these, in the proximity of the distal end of the oesophagus, the lateralialia provided with rows of stout spines. Moreover, the primary filter (PF), including two parallel channels, was ventrally located in the first region of the foregut. Furthermore, the secondary filter (SF) receiving fluids from the PF was detected ventrally in the middle foregut chamber or pyloric stomach. Remarkably, the SF was composed, for each side, of two longitudinal channels covered by dense setae. By examining the hindgut, the lining folded cuticle of the cylindrical epithelium showed longitudinal spines projected posteriorly. As regards the midgut, the fine materials extracted from the upper foregut chambers through the PF and SF systems were conveyed from the ventral channels to two pairs of dorsally located large tubules or hepatopancreas (HP). The HP lobes, surrounding the midgut and partially the hindgut, on their proximal regions were characterised by large vacuolated cells. Also, the midgut caeca included the paired tubular pyloric caeca

located lateral to the SF. Finally, layers of peritrophic membranes in the lumen of the midgut were observed. In summary, all these data suggested that *M. remyi*, although its particular feeding preference, showed no specific difference in the main gut structures with respect to other talitrid species.

ASSESSMENT OF BACTERIA IN THE MIDGUT GLANDS OF TALITRID AMPHIPODS BY FLUORESCENCE MICROSCOPY AND MOLECULAR APPROACHES (P)

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Detritivore crustaceans produce cellulases themselves to digest vegetable detritus but it is still not completely known the contribution of microbial enzymes to hydrolyse lignin and cellulose. In order to clarify this important ecological and evolutionary aspect for talitrid amphipods, we investigated by epifluorescence microscopy their foregut, midgut and hindgut regions for the in situ localization of microbial communities. Thin paraffin-embedded transverse sections (8 µm) of empty gut regions were prepared and subsequently hybridized with the SYBR Green I; hybridizations without the DNA dye served as negative controls. Interestingly, the cuticular and tissue autofluorescence allowed high resolution imaging of internal structures. Here, we provide data on the bacteria present in the hepatopancreas (HP) of *Macarorchestia remyi* (Schellenberg, 1950), collected within logs from sandy beaches along Italian shores. The presence of bacteria was confirmed in the midgut glands, which in adults (mean length of 6 mm) were large tubules measuring 3–4 mm in length and 200–400 µm in diameter. Most of the stained bacteria, spread over the lumen and associated with the HP epithelium, had a rod-shaped morphology (1.5–3 × 0.5–0.8 µm). A phylogenetic analysis based on the 16S rRNA gene sequences from cultivable bacteria isolated from the HP of *M. remyi* showed taxa related to the genera *Photobacterium*, *Vibrio* (γ -*Proteobacteria*) and *Bacillus* (*Firmicutes*). Finally, our ongoing study on the genes encoding endogenous cellulases, the pyrosequencing of the transcriptome from the HP tissues and the metagenomic analysis of the HP microbiota will complete the understanding on the roles of these microbial communities.

SENSITIVITY OF AMPHIPOD ASSEMBLAGES TO SEWAGE POLLUTION (O)

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Shallow soft-bottom non-vegetated areas are subjected to important pressures caused by human activity, such as sewage discharges. In the western Mediterranean Sea, these areas are commonly inhabited by the medium-to-fine sand communities. Order Amphipoda is an abundant and ecologically important component of this benthic

habitat. Benthic amphipods live in direct contact with sediment and are known to have a high sensitivity to contaminated sediments, i.e. organic, metallic and oil spill pollutions. Although the majority of the amphipods are sensitive to pollution, certain species can be more tolerant. In this study we examined the impact of five sewage outfalls, with different flow and treatment level, on amphipods assemblages from Castellon coast (NE Spain). Sewage pollution produced a decrease of abundance and richness in the proximity of the outfalls. Therefore most of the species showed high sensitivity, particularly abundant species such as *Lembos spiniventris* or *Periocoludes longimanus*, whereas *Ampelisca brevicornis* appeared to be tolerant to the sewage input. Results showed that amphipods were highly sensitive to sewage discharges with high flows and only previously pre-treated wastewater. However, treated disposal water, with less contain of nutrients or suspended solids, did not affect this assemblage. Posterior degradation of organic matter could lead a hypoxia situation; though the lower input of nutrients from treated wastewater could avoid it. Response of benthos is largely determined by the availability of oxygen. In fact, hypoxia causes mortality in many invertebrates, being amphipods especially sensitive to this lack of oxygen.

ECOLOGICAL ASPECTS OF THE DOMINANT AMPHIPOD *MONOPOREIA AFFINIS* IN THE INFRALITTORAL ZONE ON THE NORTHEASTERN COAST OF THE SAKHALIN ISLAND (THE SEA OF OKHOTSK) (O)

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It was noticed that *Monoporeia affinis* (Lindstrom, 1855) is the most dominant amphipod species in the infralittoral zone near the Piltun and Chaivo Bays (the northeastern coast of Sakhalin Island) on the depth up to 20 m. The contribution of this species to total amphipod biomass reaches to 60-80%. *Monoporeia affinis* forms swarm on the shallows, which border with lagoons. The summer feeding grounds of gray whales (*Eschrichtius robustus*) are located there. The size structure of the settlement of *M. affinis* was studied in July 2007 and 2008 near the Chaivo Bay. The quantitative samples were collected at 14 stations (7 in 2007 and 7 in 2008) in the range of depth 10-15 m on well sorted fine sand sediments. Three replicates were taken on each station. The mean density of *M. affinis* in 2007 (788 ± 267 ind./m²) differs from density in 2008 (356 ± 162 ind./m²). The settlement of *M. affinis* consisted of two cohorts or size groups in the end of July 2007 and three cohorts in the middle of July 2008. The reasons of instability of settlement of this species in this region are discussed.

TOWARDS TO SYSTEMATIC POSITION OF HAUSTORIID AMPHIPOD SPECIES FROM THE NORTH-EASTERN COAST OF THE SAKHALIN ISLAND (P)

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The species of genus *Eohaustorius* J.L. Barnard, 1957 (fam. Haustoriidae) was found in the process of identification of amphipods from the north-eastern coast of the Sakhalin Island. The species was identified as *Eohaustorius eous eous* (Gurjanova, 1951) in previous work (Demchenko, 2007). During morphometry of this species some

additional characters were found including long stout plumose seta on the second segment of flagellum of antenna 2. According to identification key of E.F. Gurjanova (1962) for species of genus *Eohaustorius* from the far eastern seas, just only *E. washingtonianus* (Thorsteinson, 1941) has such seta. The typical character for *E. washingtonianus* like proximal cusp on the basis of pereopod 7 not found for specimens from our study area. So, the difficulties were found in identification. The main reasons deal with inaccuracy in original descriptions and illustrations. E.L. Bousfield and P. Hoover (1995) suggested that species, which E.F. Gurjanova identified as *E. washingtonianus* (specimens from the western coast of Sakhalin Island) actually is new for science. They named it as *E. gurjanovae* (Bousfield and Hoover, 1995) to honour of E.F. Gurjanova. The main aim of the present research is to compare specimens of species genus *Eohaustorius* from the north-eastern coast of Sakhalin Island with the original description of *E. washingtonianus* (Thorsteinson, 1941) and type material of *E. gurjanovae* (Bousfield and Hoover, 1995). The main tasks of future investigation are to find diagnostic characters for identification of such closely-related haustoriid species.

AMPHIPODS (CRUSTACEA: PERACARIDA) FROM CARIACO TRENCH, VENEZUELA (P)

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Cariaco basin is a depression, located on the eastern continental shelf of Venezuela. This particular basin is anoxic bellow 250 m, due to its restricted circulation and high primary production. Surface (0-140 m) hauls were performed for about 10 minutes. The samples were taken with a bongo twin net (mesh size 0.2 and 0.5 mm) at day time, from a single station located at depression center. Twenty eight collections were made monthly from October 2001 to April 2004. A taxonomic analysis of the amphipods yielded 30 species, three of Gammaridea and 27 of Hyperiidea. For both fractions of sample (0.2 and 0.5 mm), *Lestrigonus bengalensis* and *L. schizogeneios* were the overall dominant species, and represented more than 45% of the amphipod specimens collected from the time series. About 40% of the species only were collected on one month. Amphipods were most abundant on fraction 0.2 mm with an average of 792 org./1000m³. *Stegocephaloides calypsonis* and *Lestrigonus bengalensis* have been the most abundant species for the two fractions, represented more than 80% of total density. *S. calypsonis* have the highest densities on March 2003, April 2003, November 2003 and April 2004, while *L. bengalensis* show lower densities, but domain all time series for both fractions. The amphipod assemblage along the time series is very similar for both fractions, except for the months where *S. calypsonis* showed high densities. These major densities can be caused by migrations of this specie from near the anoxic zone to shallow layers.

STATUS OF KNOWLEDGE OF THE HYPERIIDEA (CRUSTACEA: PERACARIDA: AMPHIPODA) FROM THE VENEZUELAN COAST (P)

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The knowledge of the hyperiid amphipods in Venezuelan waters is quite limited. The estimated number of species currently recognized is near 277; there are 222 known from the Pacific Ocean and 175 from the Atlantic. The number of species reported herein for Venezuelan waters is 59, obtained from samples collected in waters of the Caribbean Sea and the Atlantic front. Over 60,000 hyperiids were sorted and identified from about 215 stations that included a bathymetric gradient from shallow waters to 2,965 m of depth. We reported 2 families, 2 genera and 4 species for the infraorder Physosomata, and 13 families, 33 genera and 55 species for the infraorder Phyocephalata. Twenty one species were only collected on Atlantic waters and 11 on Caribbean. Almost 56% of number of species was collected along the entire Venezuelan coast, including Atlantic and Caribbean waters. The species more disperse along the coast belonging to families Lestrignonidae (*Lestrignonus bengalensis* and *L. schizogeneios*) and Hyperiididae (*Hyperietta parviceps* and *Themistella fusca*). Five species are new records for Venezuelan waters; two of them are collected from Caribbean as well as Atlantic (*Hyperionix macrodactylus*, and *Vibilia pyripes*), two species only from Caribbean (*Parapronoe elongate*, and *Thyropus macrodactylus*) and one specie only from Atlantic (*Oxycephalus piscator*).

SEASONAL VARIATION OF LOCOMOTOR ACTIVITY RHYTHM OF *ORCHESTIA MONTAGUI* IN BIZERTE LAGOON (NORTH OF TUNISIA) (O)

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Locomotor activity rhythm of *Orchestia montagui* has been investigated in a population from the supralittoral zone of Bizerte lagoon. The rhythm was monitored in individual animals over the four seasons under two simultaneous experimental regimens; during the first week the animals were kept in light-dark cycle (nLD) in phase with the natural diel cycle. During the second week, animals were maintained in constant darkness (DD). Results showed that whatever the season, animals exhibited a nocturnal circadian rhythm of locomotor activity with an ultradian component. Under light-dark cycle, circadian period determined by periodogram analysis in four seasons were appreciably equal. While under constant darkness, circadian period was longer in winter ($\tau_{DD} = 25h51 \pm 1h13$) and summer ($\tau_{DD} = 25h53 \pm 53'$) than in spring ($\tau_{DD} = 24h04 \pm 1h56'$) and autumn ($\tau_{DD} = 24h20 \pm 1h55$). In addition, the study of the mean activity times calculated for four seasons under nLD cycle showed the most activity of individuals was observed in spring ($\alpha_{LD} = 11h26 \pm 5h05$) and summer ($\alpha_{DD} = 11h12 \pm 5h31$). Under DD, animals were more active in autumn ($\alpha_{DD} = 11h29 \pm 9h52$) than in other seasons. The variation in these rhythm parameters is considered in relation to changes in environmental conditions prevailing at the site of collection.



DIVERSITY OF AMPHIPODS IN ICHKEUL SYSTEM LAGOON (P)

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Coastal wetlands are characterized by a high biodiversity. In Tunisia, few studies on Crustaceans biodiversity have been done in wetlands. The field work was carried out along transects at two stations belonging to Ichkeul system lagoon during two seasons, autumn and spring. This last is characterized by a seasonal variation of water's level and salinity which mainly determines the ecological originality of this lagoon system. The first station (S1) (N 37°11'12.5"E 009°46'52.3") is the contact point between Oued Tinja and Bizerte lagoon, the second station (S2) (N37°10'10.2"E009°45'26.6") connects Oued Tinja with Ichkeul lagoon. The length of transects is equal to 12m70 (S1) and 14m50 (S2). Different samplings per quadrat were conducted in order to study the variation of fauna diversity, particularly Amphipod settlements. Our results showed that the most important of Amphipod species richness was observed in S1 for two seasons. Then, the highest densities are determined in spring whatever the station. Indeed, at S1, the density is equal to 39.5 ind.m⁻² and 10 ind. m⁻² respectively in spring and autumn. At S2, density is less pronounced; it is equal to 19.3 ind.m⁻² in spring and 9 ind.m⁻² in autumn. Thus, our results showed a positive correlation between densities of Amphipod settlements and salinity of water.

BIODIVERSITY AND DISTRIBUTION OF GROUNDWATER AMPHIPODS IN FRANCE (P)

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Recent synthetic publications through Europe have confirmed the great diversity of faunal assemblages living in ground waters. Crustacean species constitute a substantial part of this richness (>70%) and among them the group of Amphipoda is especially successful and well developed in many aquifers. Groundwater amphipods in France are represented by six families (Bogidiellidae, Niphargidae, Crangonyctidae, Salentinellidae Pseudoniphargidae, Ingolfiellidae), eight genera and reach a total of more than 43 stygobiotic species. They colonise multiple habitats ranging from alluvial sediments (porous aquifers) to consolidated rocks (karstic aquifers). Nevertheless the distribution of records of Amphipoda in France illustrates the biased and fragmentary nature of the present-day distribution. Two main reasons may explain this sketchy knowledge, 1st) the low and uneven sampling effort which considerably favors karstic regions compared to most immense and unexplored porous aquifers, 2nd) the probable high level of cryptic diversity that may increase species richness and reduce the distribution of several species with a present-day wide geographic range such as *Niphargus virei* and *Niphargus rhenorhodanensis*.

WATER SOLUBLE SUBSTANCES AFFECTING THE PHYSIOLOGY AND BEHAVIOUR OF BALTIC SEA GAMMARIDEANS (O)

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The effluents from wastewater treatment plants contain a mixture of various substances. Two of the emerging groups of substances in the effluents are pharmaceuticals and artificial sweeteners, which are constantly dispersed into aquatic ecosystems where flora and fauna are exposed. In the Baltic Sea, the macro algae *Fucus vesiculosus* is one of the most important primary producers, providing food, shelter and breeding habitat for many aquatic invertebrates like the genus *Gammarus*. In a series of experiments gammaridean physiological and behavioural responses to the pharmaceuticals propranolol, diclofenac and ibuprofen and the sweetener sucralose was studied. Eight weeks of exposure to pharmaceutical substances increased mortality and affected the scope for growth (SFG) in the amphipods negatively. These findings were particularly evident for propranolol and diclofenac and especially in high concentrations. After 30 days of exposure increasing concentrations of sucralose affected the mortality of juvenile gammarideans, while no effect on growth was recorded. Pre-copula formation was also unaffected by sucralose. Further studies regarding the effects of sucralose on gammaridean feeding behaviour and mating performance will be performed during spring 2010.

SPATIAL DISTRIBUTION OF THE AMPHIPODS (CRUSTACEA, PERACARIDA) ON THE ZOSTERA MEADOWS OF THE O GROVE INLET (NW IBERIAN PENINSULA) (P)

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Although many studies have been carried out about fauna associated with seagrass meadows, few paid attention to the peracarid crustaceans associated to those habitats. In this work, we study the diversity and patterns of distribution of amphipods in ten sampling sites colonised by two species of *Zostera* (*Z. marina* and *Z. noltii*) at the estuarine inlet of O Grove (Galicia, NW Iberian Peninsula). A total of 5571 individuals belonging to 84 species were found. The best represented family was Aoridae, with 1313 individuals in 8 species, and the least represented family was Lysianassidae, with 10 individuals belonging to two species. The gammarid *Gammarella fucicola* and the oedicerotid *Perioculodes aequimanus* were the most abundant species in the inlet. Multivariate analyses indicated that the distribution of amphipods on the meadows was related to the mean grain size of the sediment and the salinity of the bottom water. Nevertheless, the presence of the seagrasses should have a major influence on the hydrodynamic and sedimentary features of the habitat and utterly the spatial patterns of the assemblages observed.

TEMPORAL VARIATION OF THE AMPHIPODS (CRUSTACEA, PERACARIDA) ON THE ZOSTERA MEADOWS OF THE O GROVE INLET (NW IBERIAN PENINSULA) (P)

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Seagrasses are key elements of the ecosystem and favour the maintenance of high diversities in benthic communities. The seasonal evolution of the seagrasses (with elongation of the leaves and rhizomes in spring-summer) leads on changes in availability of refuge and substratum as well as in food supply for benthic species, influencing the temporal patterns of macrofaunal assemblages. Amphipods are an important component of soft-bottom faunas, including those present in seagrass meadows, and have great importance in the structure of benthic assemblages. In this work, the diversity and seasonal fluctuations of amphipods present in a *Z. marina* meadow at the O Grove inlet is studied during one year. A total of 4004 individuals belonging to 63 taxa were found, pointing out a great numerical presence and diversification of this group on the meadow. Amphipods presented a strong seasonal pattern defined by great fluctuations in the populations of many species. In particular, some of the most abundant species like *Gammarella fucicola* and *Phtisica marina* showed the greatest variations in density; this is probably related to the availability of organic matter (*G. fucicola*) and that of the substratum offered by the seagrass (*P. marina*). Grazers such as Dexaminidae and Amphitoidae reached their greatest abundances after late summer, when the bloom of epiphytic algae occurs. In conclusion, the seasonal variations of the amphipod assemblage in the O Grove inlet is a result of the presence of the seagrass coupled with the life stories of species and seasonal climatology.

THE EPIGEAN GAMMARIDAE (AMPHIPODA) FROM MOROCCAN FRESH WATERS: INVENTORY AND BIODIVERSITY (P)

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Despite their great importance, both quantitative and qualitative, as principal, secondary and tertiary producers in the freshwater macro benthic communities, the Gammaridian amphipod were very poorly studied along Moroccan freshwaters. The present study represents one more contribution to the knowledge of this important group. Many species of gammarids are recorded from Morocco. The genus *Gammarus* is the most dominant freshwater amphipod both by its density and its diversity; at least 7 species have been reported, most of them being endemic: *G. gauthieri* Karaman, 1935, *G. acalceolatus*, Pinkster, 1971, *G. microps* Pinkster & Geodmakers, 1975, *G. rouxi* Pinkster & Geodmakers, 1975, *G. maroccanus* Fadil & Dakki, 2001, *G. rifatlensis* Fadil & Dakki, 2006 and *G. marmouchensis* Fadil & Dakki, 2006. The genus *Echinogammarus* is represented by two species: *E. simoni* Chevreux, 1894 and *E. oujdae* Fadil & Dakki, 2003. The genus *Chaetogammarus* is represented by one specie: *Chaetogammarus saisensis* Fadil et al. 2009.

TALITRUS SALTATOR BEHAVIOURAL ADAPTATION TO DIFFERENT SALINITIES: A COMPARISON BETWEEN MEDITERRANEAN AND BALTIC SHORES (O)

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The species *Talitrus saltator*, due to its opportunistic characteristics, spread from the Mediterranean up to the Baltic. The sea-water of these two environments is characterised by notably different salinity rates, with high salinities in the Mediterranean and brackish water in the Baltic Sea. We compared two different behaviours of two resident *T. saltator* populations from a Mediterranean and a Baltic shore: 1) the burrowing choice of substrate, i.e. the binary choice between substrates with low and high salinities (within the natural range of sea waters); and 2) orientation in water with low and high salinities (same rates as for the substrate choice). To allow a proper comparison, the populations selected for this test were sampled from beaches with the same shoreline orientation. In a preliminary test the two populations were found to display similar performances in terms of precision of sun compass orientation. The results of test 1) showed that *T. saltator* preferred to burrow in the high salinity substrate, irrespectively from its beach of origin; while test 2) highlighted a difference between *T. saltator* populations, with the Baltic population displaying an increasing precision towards the duneward direction with increasing salinity, and the Mediterranean population showing a significant orientation dunewards in the case of high salinity only. Such maintenance and/or difference in behaviour is discussed in an evolutionary perspective, pointing out the environmental effects on different behaviours of the same species. The results may represent a background to interpret behavioural changes capability as a response to climatic changes.

MORPHOLOGY AND MOLECULES: SPECIES IDENTIFICATION IN ANTARCTIC LYSIANASSOIDEA (P)

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Antarctic lysianassoid amphipods are one of the most important taxa in the cold Southern Ocean waters. They are particularly abundant and portray a great species richness and furthermore play an important role in the Antarctic food web (e.g. as scavengers). However, a pervasive problem is that specimens are difficult to determine to species-level without invasive preparation. Furthermore, some described species belong to groups of morphologically indistinguishable, i.e., cryptic species. Correct species identification is of fundamental importance. It is needed for all subsequent studies on the ecology, evolution and biodiversity of members of this group. Hence, strategies to quickly determine specimens to species level are of utmost importance. In our current collaborative project we study Antarctic lysianassoids of the CEAMARC expedition to Terre Adélie using a combined DNA barcoding and morphological approach and show the mutual benefits of having information from both sides. Moreover, we compare the genetic data for ‘confirmed’ species from Terre Adélie to the

same species from other Antarctic and Subantarctic locations. With this we aim at identifying biogeographic connections and barriers among the different Antarctic regions and discuss possible motors of speciation within this taxon. We also discuss specific problems of amplifying and sequencing DNA of these taxa. We strongly argue for the collaboration between genetic and morphologic experts to reliably determine species and hence provide valid information necessary for subsequent studies on the ecology, evolution and biodiversity of Antarctic lysianassoid amphipods.

POPULATION DYNAMICS AND SOME ASPECTS OF REPRODUCTIVE BIOLOGY OF THE *CAPRELLA MITIS* IN THE MAR MENOR LAGOON (SPAIN) (P)

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A one-year study was conducted on the population of the caprellid *Caprella mitis* Mayer, in the coastal lagoon, Mar Menor (Spain). Samples were collected from January 2006 to January 2007, bimonthly, on hard and soft bottoms. To investigate the aspects of population structure, abundance and reproductive biology, number of males, females, ovigerous females and juveniles was registered, recording the length of the body and the number of eggs carried by ovigerous females too. *C. mitis* was almost exclusively found in the inner part of the lagoon, and the resident population was dominated by adult females during the most months of the year. The density of *C. mitis* showed a maximum in late spring, at the same time that high percentages of subadults and brooding females were found.

SEASONAL FLUCTUATIONS OF BENTHIC GAMMARIDEAN ASSEMBLAGES IN MAR MENOR LAGOON (O)

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Coastal lagoons have traditionally been considered as transitional systems between continental and marine domains. These ecosystems have an intra-lagoon variability which has been related to depth, type of substratum and confinement gradient. According to this, four localities are selected in the lagoon, which have different water renewal rates, determined by the distance from the main channel of communication with the open sea, El Estacio, and different influence of ground water with high nitrate levels, provided by the continuous flow of the major watercourse, El Albuñón. In each site were selected the main communities of the lagoon: *Caulerpa prolifera* meadows, *Cymodocea nodosa* meadows and midlittoral and infralittoral rocky habitats. The objective of this study is to analyze seasonal patterns of benthic gammaridean in Mar Menor lagoon, considering these assemblages as a representative sample of the lagoon diversity.

HOW DO AMPHIPODS ASSEMBLAGES RESPOND TO HUMAN IMPACT AND ENVIRONMENTAL CORRELATES? (P)

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Amphipods are known to be very sensitive to environmental conditions and pollution such as hydrocarbon contamination owing to their density, species richness, beta diversity and life traits such as life cycles. Further, they are a promising group in terms of fundamental and applied ecology given their world wide distribution, local and regional importance for the benthic fauna, and their ability to colonize many different habitats. Here, results are presented that show the tight correlation between proxies to the intensity of the perturbation due to oil extraction activities and patterns of distribution of amphipods around four hydrocarbons platforms located off the gulf of Crotona (Italy). We also analyzed the effect of the following key covariables: sample geographical position, distance from the town, distance from the coast-line, depth, substrate typology and protection from trawl fishery. Geographical position *per se* could account for the 2 % of assemblage variation only. Partialling it out, the impact of platforms remained evident and highly significant. Platforms and the covariables depth, town distance and substrate typology accounted for 9 % of assemblage variation and had a significant effect. On the contrary, protection by fishery trawl was not significant, which may eventually depend on fisheries activities conducted without respecting the protection regime imposed in the nearby of platforms. There remains a high amount of unexplained variation that could depend on a multitude of factors including processes such as local population dynamics, which was not accounted for by the sampling design since it operates at very fine scales.

DISTRIBUTION AND DIVERSITY PATTERNS OF AMPHIPODA FROM CONTINENTAL SHELF IN BRAZILIAN SOUTH COAST (P)

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Amphipods play an important role in ecological processes and respond to changes in aquatic environment. Taxonomic knowledge, spatial distribution patterns and fauna associations are important factors to understand coastal ecosystems. The structure and fauna composition of soft sediment Amphipoda from sublittoral on Brazilian south coast were carried out through sediment and macrofauna composition analysis. A total of 805 sediment samples were analyzed distributed from 26°19'S and 27°39'S latitude under sheltered conditions (South Bay and Tijuca's Bay) and exposed sandy beaches (Praia Grande beach, Ingleses beach and Joaquina's beach) between 2002 and 2007. Sand samples were taken from a Van-Veen sampler with 0.025 and 0.042 m² and corer with 0.018 m². The type of sediment varied from silt and clay (South Bay and Tijuca's Bay) to fine and medium sand (Praia Grande beach, Ingleses beach and Joaquina's beach) between 1 and 30 meters depth. A total of 659 specimens were counted and identified distributed among 14 families and 21 species. *Ampelisca paria*, *Cheus* sp. and *Microphoxus uroserratus* were the most abundant species, respectively,

and the first was the one found in all locations. Two distinct Amphipoda associations were found; sheltered places with low density represented by *Pseudoharpinia dentata*, Eusiridae sp., *Maera* sp., *Melita* sp. and *Laticorophium* sp., and exposed sandy beaches with high density represented by *Lembos* sp., *M. uroserratus*, *Cheus* sp., Ischyroceridae sp. and Podoceridae sp.

BATHYAL AMPHIPODS FROM THE LE DANOIS BANK (S BAY OF BISCAY): ASSEMBLAGES, DIVERSITY AND BATHYMETRIC DISTRIBUTION (O)

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Located in the southern Bay of Biscay, the Le Danois Bank ("El Cachucho" Marine Protected Area) was studied within the framework of the multidisciplinary Spanish ECOMARG project (www.ecomarg.net). In this area, suprabenthic communities were sampled at 9 stations between 486 m and 1062 m during two surveys (October 2003 and April 2004). At each station, a daytime sampling was carried out with a multi-net sled towed over the sea floor. From the whole material collected (mainly peracarids), amphipods were represented by 14474 individuals, classified into 121 species and 41 families. Lysianassidae, Oedicerotidae and Eusiridae were the most specious families with 16, 16 and 12 species, respectively. Besides the caprellid *Liropus cachuchoensis* recently described, 18 bank amphipods species are putatively new to science. Both the boreal species *Metambasia faeroensis*, *Stenula rubrovittata* and the Mediterranean "endemics" *Oediceroides pilosus* and *Pseudotiron bouvieri* extend their known geographical distribution to this bank. Three assemblages were discriminated in the study area: a bank top assemblage (486-574 m – fine sands) with the dominant species *Pseudotiron bouvieri* (19.6% of total), an intermediate assemblage (619-829 m - mud) with the dominant species *Rhachotropis faeroensis* and *Chevreuxius grandimanus* (14.6 and 9.2 %, respectively) and a lower assemblage (> 1000 m - mud) with the dominant species *Chevreuxius grandimanus* and *Liropus cachuchoensis* (15.6 and 11.5%, respectively). The highest amphipod abundance was recorded at the top of the bank (2418.6 ind./100 m²), much higher than values previously mentioned at the same bathymetric level in the Bay of Biscay.

SUPRABENTHIC AMPHIPODS FROM RÍA DE LA CORUÑA (NW SPAIN): COMMUNITY STRUCTURE, SPATIAL DISTRIBUTION AND TEMPORAL VARIATION (P)

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A spatial study of suprabenthic communities from ría de La Coruña was carried out in January 2002. Suprabenthos (mainly peracarids) was collected at daytime with a multi-net sled towed over the sea bottom. Sled samplings were taken in 19 stations at depths from 6 to 33 m. One of these stations was monthly sampled during the year to study temporal variation of fauna. Suprabenthic community was mainly represented by amphipods (62 species, 53.5% of total) classified into 20 families. Because of the sedimentary pattern of the study area (very fine sands and lower organic mater

content) and a high ocean exposure, two assemblages of the same amphipod community were defined in the ría. An external assemblage was dominated by *Atylus falcatus* and *A. swammerdami* (23.6 and 13.1% of the total, respectively), and *Megaluropus agilis* and *Perioculodes longimanus* (24.7 and 22.8%, respectively) were the dominant species in the internal one. At the temporal study, 43 amphipod species were recorded where *Apherusa ovalipes* and *P. longimanus* were the dominant taxa. Mean specific richness was 17.2 ± 3.5 species and total density showed a seasonal variation with a maximal value reported in August (1386.4 ind./100 m²).

THE AMPHIPODA OF BERMUDA – A CENTURY OF TAXONOMIC STUDIES (P)

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Prior to B. W. Kunkel's (1910) *The Amphipoda of Bermuda*, biologists knew virtually nothing about the amphipod crustaceans of this group of Atlantic islands. A. E. Verrill, the Curator of Invertebrate Zoology at the Peabody Museum of Natural History at Yale University, had led two collecting expeditions to Bermuda in the ten years before Kunkel's publication. The specimens collected during these expeditions and sundry specimens deposited in the Peabody Museum from the mid- to late-1800s formed the basis for Kunkel's 1910 Monograph. *The Amphipoda of Bermuda* listed, described and illustrated 45 species, including 18 new species. Over 50 years later, E. L. Mills (1964) re-examined many of Kunkel's type specimens, mentioned their poor condition, but nonetheless validated their type status. Since 1985, the current authors have conducted five major collection expeditions and several smaller ones in Bermuda. Today, the literature reports more than 70 species of amphipods from the waters of these islands. This study provides the current taxonomic status of Bermudan amphipods.

COMPARISON OF AMPHIPODA ASSEMBLAGES ON INTERTIDAL HARD SUBSTRATA AFTER THE "PRESTIGE" OIL SPILL IN TWO LOCATIONS OF GALICIAN COAST (NW IBERIAN PENINSULE) (P)

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The "Prestige" oil spill in November 2002 was the greatest catastrophe for the marine environment at the Galician coast (NW Iberian Peninsula). The spill also affected to the Portuguese coast and to that of the Biscay Gulf. This spill was the last in a list including that of the "Polycommander" in 1970, "Urquiola" in 1976, "Andros Patria" in 1978 and "Aegean Sea" in 1992. All those spills had an impact in way or another on the marine environment including the benthic biota. The project RECOSUCO began in February

2004 for monitoring the temporal evolution and eventual recuperation of benthic assemblages inhabiting natural intertidal hard substrata at several localities of the Galician coast. To achieve that, sampling was done between 2004 and 2005 twice a year (summer - winter) in two localities affected by the spill (Caldebarcos, Aguiño) and at one control area (O Segaña). The three localities had a similar wave-exposure and benthic assemblages. Sampling was done at three tidal levels according to the assemblages present there: high (*Chthamalus* spp. level), middle (*Mytilus edulis* level) and low (*Mastocarpus stellatus* or *Corallina elongata* level). Within each level, two sub-levels were defined: high and low. Samples were taken by scraping quadrats of 40 x 40 cm from the rock surface at each date and tidal level. In this communication, a comparison of the temporal evolution of Amphipoda assemblages at two localities, i.e. Caldebarcos and O Segaña, is done from samples collected during the two years the project RECOSUCO lasted.

GAMTOX: A NEW INTEGRATED MULTI-PARAMETER AND MULTI-LEVEL ECOTOXICOLOGICAL TEST FOR WATER QUALITY MONITORING (O)

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Gammarus spp. are widespread, structurally and functionally important key-species in European aquatic ecosystems: they play a crucial role as leaf decomposers in organic matter cycling, they interact with different trophic levels. Gammarids contain a number of species, both freshwater and estuarine/marine, including many invasive species. In several bioassessment schemes they are used as key-bioindicators for good water quality (class II). Due to the amount of ecotoxicological studies, several biomarkers from different biological organisation levels are ready to be developed as ecologically relevant *in situ* multi-metric test system (GamTox), including endpoints like feeding activity, behaviour, development and reproduction, with mode-of-action-based biochemical endpoints and biomarkers. Addressing multiple trophic levels GamTox can be expanded by studying predator prey relationships between *Gammarus* spp. as prey of different fish species in *in situ* enclosures. Such a test system would fill a crucial gap in ecotoxicological assessments, being especially needed in water quality assessment within the EU-WFD as a new ecotoxicological module, where up to now no (*in situ*) ecotoxicological testing has been performed. Moreover, the ratio between native and invasive gammarids might be an additional ecotoxicity indicator, in case of different sensitivities, which still has to be studied. The international *Gammarus* working group will jointly head towards a standardized GamTox test system.

IN SITU BIO-MONITORING OF WATER QUALITY: MULTI-SCALE EFFECT ASSESSEMENT IN GAMMARUS FOSSARUM (O)

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One of the scientific challenges in ecotoxicology is to contribute to the assessment of the biological quality of hydro-systems by providing information about the impact of pollutants at relevant biological levels, e.g. the population. Under field conditions, population level cannot be easily used to establish a direct relationship between contamination levels and toxicity due to multi-factor environmental influence. One promising approach is the use and the integration of individual responses (survival, growth and reproduction) within demographic models. However this approach involves

that robust and reliable *in situ* bio-assays are available. In general, the interpretation of sub-individual and individual markers used within field experiments is confronted with the absence of reference values; consequently *in situ* bioassays are mainly used for punctual comparison between assumed control and impacted sites. The assessment and the knowledge of the spatial and temporal variability of biological markers are essential to propose reference values and thus to increase the relevance of *in situ* bioassays. The aim of this talk is to present our multi-scale approach in the widespread species *Gammarus fossarum* and particularly 1 - methodological development for the assessment of reproductive and feeding rate impairments in *in situ* exposed organisms 2 - our demarche to propose reference values for these biological responses 3 - how these biological responses could be interpreted in term of impact on population, with population dynamics models and finally 4 - the relevance of this approach for the water quality bio-monitoring through one case-study.

PHYLOGEOGRAPHY OF *GAMMARUS ROESELII* GERVAIS, 1835 (CRUSTACEA, AMPHIPODA) IN EUROPE (O)

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Gammarus roeselii is distributed throughout the western and central Europe, western Balkan Peninsula and Asia Minor. However the species was described from France, hypothetically it originated from the Balkan Peninsula and has spread north in recent times aided by man-made network of navigable canals. Based on the samples covering the species entire distributional range in Europe we have analyzed geographic variability of COI and 16S rRNA gene fragments. High genetic variability, mosaic distribution of haplotypes and divergent populations were observed in the southern Balkan Peninsula, opposed to highly reduced and relatively uniform variability pattern in populations sampled in western and central Europe. To some extent the results were congruent with observed variability pattern of morphological traits. Our proposed scenario of *G. roeselii* phylogeographic history in Europe implies presence of glacial refugium in the Balkan Peninsula with speciation centre in its southern part and cryptic species present in the area. A significant gene flow was observed among waterbodies in the north part of the peninsula. Evidently, populations inhabiting northern part of the refugium were the source for recent colonisation of the other parts of Europe. Mysterious remains the position of *G. roeselii* from Asia Minor. Distribution pattern of the species with a gap in the eastern Balkans suggests that the Asian population may represent another phylogeographic unit and different glacial refugium as observed in several other animal species.



MONITORING OF ALIEN AMPHIPODA IN POLAND – LESSONS FROM DIFFERENT FIELDS (P)

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Since the end of XIX century Poland has faced numerous invasions of alien crustaceans in coastal and inland waters. However casual observation were made for years, the regular monitoring of spread and effect of aliens, particularly amphipods, on native benthic communities has been conducted continuously since 1998. During this period, a complete list of alien species has been given and every new species is detected within a year since its appearance in Polish waters. Invasion routes and gateways as well as biology and ecological interactions of the aliens with other freshwater species have been studied, including potential impact upon native fauna, role of alien amphipods in fish diet and as vectors of alien parasites. An online service devoted to invasion of alien crustacean species is being prepared, including interactive maps of distribution, data on biology and repository of literature available for public. The history and main outcomes summarizing the decade-long program will be presented.

FEEDING HABITS AND DIGESTIVE ENZYME ACTIVITY IN THE WOOD-BORING AMPHIPOD *CHELURA TEREBRANS* (O)

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The wood-boring amphipod *Chelura terebrans* is often found in association with the wood-boring isopod *Limnoria*. The impacts on the wood of these two species are quite different. *Limnoria* are aggressive borrowers and create long tunnels within the wood whereas *Chelura* are a browsing feeder, creating troughs in the wood surface as well as expanding *Limnoria* burrows. This study suggests that although *Chelura* are less aggressive feeders they digest wood more effectively than *Limnoria*. Indeed, comparative analysis of faecal pellets of the two organisms using plane-polarised light and X-ray diffraction demonstrates that those of *Chelura* lose a greater degree of crystallinity in the cellulose arrays. *Chelura* are unusual amphipods inasmuch as they are one of a small number of animals – the Limnoriids among them – capable of wood digestion without the aid of symbiotic gut flora. An examination of the anatomy using scanning electron microscopy found no evidence of resident gut flora in the digestive apparatus. The hepatopancreas of *Chelura* has two pairs of blind-ending lobes that appear to be the site of lignocellulolytic enzyme secretion. Preliminary enzyme assays probing for phenoloxidase and laccase activity in hepatopancreas and hindgut extracts using an in-gel technique to separate proteins in the samples provided evidence of both mono- and diphenoloxidase activity, suggestive of endogenous lignin-degrading capability. No laccase activity was observed. Additional enzymatic assays, both in-gel

and *in vitro*, to probe for cellulolytic activity are ongoing. Moreover, initial *in situ* hybridisation assays targeting putative enzyme genes are in progress.

DISTRIBUTION PATTERNS OF INTERTIDAL AND SHALLOW WATER CAPRELLIDS ASSOCIATED WITH MACROALGAE ALONG THE IBERIAN PENINSULA (P)

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Abundance patterns of caprellids associated with macroalgae from the intertidal and shallow waters (0-5 m) of the Iberian Peninsula were studied. Nineteen stations were selected and 250 samples of algae were collected including 46 species (22 intertidal and 24 subtidal). Eleven caprellid species were found associated to these macroalgae with *Caprella penantis* and *C. acanthifera* being the most abundant species. *Caprella acanthifera*, *Phtisica marina* and *Pseudoprotella phasma* were distributed along the whole Peninsula, *C. danilevskii*, *C. equilibra*, *C. fretensis* and *C. penantis* showed Atlantic distribution, whereas *C. grandimana*, *C. hirsuta*, *C. liparotensis* and *Deutella schieckei* were restricted to the Mediterranean sites and Strait of Gibraltar. Subtidal substrates contained higher number of caprellid species than intertidal ones. The highest number of caprellid species was found on the algae *Stypocaulon scoparium*, *Cystoseira* spp., *Corallina elongata*, *Jania rubens*, *Codium vermilara*, *Cladostephus spongiosus* and *Asparagopsis armata*. Caprellid abundances were very high, both in the intertidal and shallow subtidal, reaching 12200 ind/ 1000 ml alga. In fact, caprellids are one of the dominant groups of associated fauna along the intertidal in comparison with other taxa. In spite of the high densities, caprellid diversity (in terms of number of species) along the intertidal and very shallow bottoms of the Iberian Peninsula is very low (11 species) in comparison with total caprellid diversity including deeper areas >5 m (ca. 40 species). Canonical Correspondence Analysis showed that temperature and conductivity were the environmental variables which better explained the caprellid distribution showing a clear gradient Atlantic-Mediterranean.

VERTICAL DISTRIBUTION AND SEASONAL FLUCTUATIONS OF INTERTIDAL CAPRELLIDS FROM TARIFA ISLAND, SOUTHERN SPAIN: 2 YEARS OF STUDY (P)

Guerra-García J.M., Baeza-Rojano E., Cabezas M.P., Pacios I., Díaz-Pavón J.J., García-Ordóñez A.L., González-Paredes D., López-Alonso M.M., Jiménez-Herrera M.J., García-Valero R., Dugo-Cota A., Flores-León A.M., Burgos V., Ros M., Soler M.M., Ruiz-Tabares A. & García-Gómez J.C.

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The Straits Natural Park (Parque Natural del Estrecho) was declared a protected area in 2003. It is a maritime-terrestrial park along 54 km of coastline in Southern Spain and includes highly diverse and structured marine habitats. Inside the Park, Tarifa Island is considered as marine reserve, and constitutes the most interesting enclave of the park. Fluctuations of intertidal macroalgae and associated caprellids during two years (December 2005 to December 2007) were studied at the most southern point of Tarifa Island (Punta Marroquí, 36°00'00.7"N, 5°36'37.5"W). Five algal belts were

distinguished, and samples (three replicates of quadrats 20 x 20 cm) were taken every two months from the five levels. Water temperature and salinity were also measured. The main intertidal algae of Tarifa Island showed a perennial behaviour, although maximum values of biomass were registered during spring and beginning of summer for most of the algae. Intertidal caprellids showed a clear tidal zonation showing three assemblages: (1) *Caprella penantis*, *C. liparotensis* and *C. equilibra* were exclusively distributed in the low intertidal levels dominated by *Gelidium corneum*, (2) *Caprella grandimana* and *C. acanthifera* were found in the intermediate levels of *Corallina elongata*, *Jania rubens* and *Gelidium* spp., and (3) absence of caprellids in the upper intertidal levels dominated by *Fucus spiralis*. The caprellid species reproduced continuously during the whole year and their seasonal fluctuations (with peaks of abundance in April-June) were directly related to seasonality of the main seaweed in which they are associated to. Further experimental studies are still needed to understand other factors (such as competition, predation and weather conditions) causing zonation of caprellids and seasonal changes in their abundance.

FIRST RECORD OF THE INVASIVE *CAPRELLA SCAURA* TEMPLETON, 1836 IN THE STRAIT OF GIBRALTAR (P)

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Caprella scaura Templeton, 1836 is a native species to the western Indian Ocean. It was first described from Mauritius and later reported from several regions of the world. During the last decade the species spread out of the Adriatic Sea and last 2005 *C. scaura* were found also in Gerona (North-eastern coast of Spain), indicating that it is probably invading the whole Mediterranean. During a sampling survey of the harbours along the Strait of Gibraltar (Dec 2009), we found an important population of *C. scaura* associated to the bryozoan *Zoobotryon verticillatum* Della Chiaje, 1822 from Chipiona and Barbate harbours, Cádiz, Southern Spain. The native *Caprella equilibra* Say, 1818 is being displaced by *C. scaura* in both harbours. A total of 216 individuals of *C. scaura* were collected: 73 males with a length of 13.7 ± 2.6 mm, 74 mature females (7.1 ± 0.7 mm), 17 premature females (5.8 ± 1.0 mm) and 52 juveniles (7.4 ± 1.5 mm). The number of eggs per female was determined (24.4 ± 11.7 eggs per brood pouch) and measured (0.26 ± 0.01 mm). No significant correlation was found between female size and number of eggs, and the eggs' size did not varied with the female body size. Morphometric relation length/width of the second gnathopod was also calculated and compared between sexes. Larger males presented longer gnathopods. The correlation was significant for males ($r=0.78$, $p<0.001$) but not for females. The most probable introduction vector of this species is shipping; in fact, the Strait of Gibraltar is characterised by an intense shipping traffic. The introduction patterns of this species in the Mediterranean (through Suez Channel or the Strait of Gibraltar) are being explored through mitochondrial DNA analysis of several Atlantic and Indo-Pacific populations. The other non-native species, *Caprella mutica* Schurin, 1935, recently introduced to temperate coasts between latitudes of 25 and 70° N, has not invaded yet the Strait of Gibraltar or other coasts of the Iberian Peninsula.

INCONGRUENCE BETWEEN MOLECULAR PHYLOGENY AND MORPHOLOGICAL CLASSIFICATION IN AMPHIPODS: A CASE STUDY OF ANTARCTIC LYSIANASSOIDS (P)

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In the Southern Ocean, the superfamily Lysianassoidea is one of the most important amphipod groups, both in terms of species number and abundance. Dominant members of this superfamily are species belonging to the orchomenid genus complex. The first molecular phylogenetic analysis on Antarctic species of these orchomenid genera is presented here, providing a framework for a systematic revision of these taxa. The current classification of the orchomenid genera is mainly based on mouthpart morphology. The validity of these morphological characters was assessed by resolving the phylogenetic relationships using nuclear 28S rRNA and mitochondrial cytochrome oxidase subunit I sequences. The molecular data rejected most of the previously proposed taxonomic subdivisions within this complex. The genera *Abyssoorchomene* and *Orchomenella* as well as the subgenus *Orchomenopsis* appeared to be non-monophyletic. This implies that the diagnostic characters in this group are likely a result of convergent evolution. Further, our results indicated the necessity of a revision of the family-level systematics.

DNA BARCODING REVEALS CRYPTIC DIVERSITY IN ANTARCTIC SPECIES OF ORCHOMENE SENSU LATO (AMPHIPODA: LYSIANASSOIDEA) (P)

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Recent molecular analyses revealed that several so-called “circum-Antarctic” benthic crustacean species appeared to be complexes of cryptic species with restricted distributions. In the Southern Ocean, the superfamily Lysianassoidea is one of the most important amphipod groups, both in terms of species number and abundance. In this study we used a DNA barcoding approach based on mitochondrial cytochrome oxidase I gene sequences in order to detect possible cryptic diversity and to test the circumpolarity of some orchomenid species. This gene fragment performed as a powerful barcoding marker, showing a clear barcoding gap between intra- and interspecific divergences of well-identified species. In several species, a genetic homogeneity was found even among specimens from remote sampling sites which indicates a possible circum-Antarctic and eurybathic distribution. In other species, genetically divergent lineages and possible cryptic taxa were revealed. Results might be explained by the different dispersal and gene flow capability of these amphipods as well as by the generally insufficient knowledge on the biodiversity of the Antarctic fauna related to species identification. Based on these observations, our current view on the species richness and distribution of the Antarctic lysianassoids may have to be modified. As polar regions are more affected by climate change than others, biodiversity assessment studies are of particular importance since they may serve as a basis for monitoring and conservational efforts. In this context, DNA barcoding can thus be a useful and cost-effective tool.

AN INTRODUCTION TO TALITRIDS (AMPHIPODA : TALITRIDAE) FROM COAST OF OMAN SEA, IRAN (P)

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Marine amphipods of Iran are very poorly known. Previous studies were carried out on Iranian freshwater amphipods and brackish water of Caspian Sea, but amphipods of Persian Gulf and Oman Sea haven't been investigated yet. This study provides new information on the taxonomy and distribution of terrestrial amphipods of Oman Sea. This investigation carried out on amphipods from Iranian coast of Oman Sea. The specimens were collected from sandy beaches of Chabahar city. Chabahar is located in the last Southeastern part of Iran, near Pakistan Border, in Sistan- va- Balouchestan Province along the cost of Oman Sea. The specimens were preserved in 70% alcohol. The main morphological characters from different parts of body (antennae 1 & 2, eye, mouth parts, pleosomes, preopods, pleopods, uropods, telson) were considered. Amphipods of these coastal regions belong to the superfamily Talitroidea and Talitridae family. It seems that for a comprehensive faunistic study on amphipods of Oman Sea there's a need to extensive field expedition, accurate morphological study, comparing with type materials and populations of adjacent regions and of course molecular investigations to identify the probable new taxa, records and morphological variations.

TAXONOMY AND MORPHOLOGICAL VARIATIONS OF AMPHIPODS FROM IRAN (P)

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We have examined the freshwater amphipods of east and northeast of Iran, Northern and Southern Khorasan and Khorasan Razavi Provinces and also western parts of Iran including Ghazvin, Zanzan, Hamedan, Kermanshah and Ilam provinces were studied. Sampling carried out during July 2007 to September 2008 from freshwater habitats (river, spring and "Ghanat"). The amphipods were collected from 85 out of 180 sampling stations. Using available identification keys, most of the identified specimens belonged to genus *Gammarus* including *Gammarus anodon*, *G. komareki* and *G. parthicus*. In addition, two new species were identified. Furthermore, some underground amphipods belonging to genus *Niphargus* were found in one station. High inter- and intrapopulation morphological variations were observed in all species. The most variable characters were found to be the shape of the third epimeral plate and third uropod, number and length of setae and spines and the setosity of second antenna. It seems that Zagros Mountains provides geographical barriers, many water resources and various habitats in the west of Iran and this is the main reasons for high diversity of amphipods in western areas. In contrast, the limited diversity of amphipods in the eastern parts of Iran is caused by limited water resources, higher temperatures, high salinity of land and some water resource.

PRELIMINARY NOTES ON BAITED TRAP AMPHIPOD COLLECTIONS FROM THE DIVA-3 CRUISE (P)

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The expedition M79/1 DIVA-3 (Deep-Sea Biodiversity and Seamounts in the Atlantic) took place from July 10–August 23, 2009 aboard the German research vessel *R/V Meteor*. This field project is a component of CeDAMar (**C**ensus of the **D**iversity of **A**byssal **M**arine Life) within the Census of Marine Life. The major goal of this cruise was to document benthic species diversity at abyssal depths in the southwest Atlantic along a latitudinal gradient, starting from 45° south to the equator. The possible effect of biogeographical barriers, such as the mid-Atlantic ridge could then be examined through faunal comparisons to the previously sampled deep-sea basins in the southeast Atlantic. For the first time in the DIVA program, an autonomous baited trap system was employed to sample the mobile, necrophagous organisms at abyssal depths. The free-fall trap was used successfully at 3 stations, once in the Argentine Basin and twice in the Brazilian Basin. There have been few if any published reports of baited trap collections taken in these basins, so these data will yield vital information on amphipod species biogeography and distribution. Sampling depths ranged from 4480–5093m, with bottom times ranging from approximately 29-56 hours. Trapsets were successful at all stations with amphipods recovered in very high numbers. Estimates of numbers collected were in the tens of thousands. Peculiarly, no other invertebrate taxa were collected except amphipods. The following families and species have been tentatively identified from the traps, but more are to be expected when all the material has been completely examined: Alicellidae- *Alicella gigantea* Chevreux, 1899, *Paralicella caperesca* Shulenberger & Barnard, 1976 and *P. tenuipes* Chevreux, 1908; Eurytheneidae- *Eurythenes gryllus* (Lichtenstein, 1822); Lysianassidae- *Abyssororchomene* spp. (2-3) *Orchomenella gerulicorbis* Shulenberger & Barnard, 1976 and *Cyclocaris* sp.; Scopelocheiridae- *Scopelocheirus* sp.; Stegocephalidae- *Euandania gigantea* (Stebbing, 1883) and Valettiopsidae- *Valettietta gracilis* Lincoln & Thurston, 1983. All are known scavengers, with the exception of the meso-bathypelagic stegocephalid *Euandania gigantea*, which has been very rarely taken in baited traps. Quantitatively, our data clearly show that necrophagous amphipods in the Argentine and Brazilian Basins are very numerous, but with so few trapsets used, considerable caution should be noted.

SCAVENGING AMPHIPODS OF THE MID-ATLANTIC RIDGE (P)

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Large food-falls are estimated to account for 10-30 % of the annual particulate organic carbon, and consumption of these food-falls is carried out by a specially adapted fauna comprised largely of amphipods and fish. Amphipods that attend food falls can be captured in large numbers by means of baited trapping. Baited freefall amphipod traps have been deployed during ECOMAR cruises in 2007 and 2009, and are planned for the current 2010 cruise to the Mid-Atlantic Ridge. ECOMAR is a major project aimed at understanding how physical and biogeochemical factors influence the distributions and structure of deep-sea communities. The project focuses on the Mid-Atlantic Ridge at 4 sites in different environmental settings (North and South of the

Charlie Gibbs Fracture Zone and East and West of the Ridge). The Fracture Zone coincides with the position of the sub-polar front which separates warm, oligotrophic (nutrient poor) water to the south from cold, eutrophic (nutrient rich) water to the north. The cold surface waters to the north are more productive, providing a higher food supply for organisms living on the deep-sea floor. Using these localities we are investigating the effects of topography and currents on the distribution of the fauna, as well as the effects of varying organic input (food supply) to the deep-sea floor in two different biogeochemical settings. This poster reports on the current findings (species composition and abundance) of scavenging amphipods.

THE CIRCUM-AUSTRALIAN AMPHIPOD PROJECT (CAAP) (O)

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The Circum-Australian Amphipod Project (CAAP) is a biodiversity study aiming to identify and describe the dominant shallow-water benthic amphipods for Australia and its external territories. Focusing on 30 genera, the project has tracked the distribution of ~ 500 species in Australian waters. Museum collections have formed the basis for material identified. Field work has also taken place in remote, little-studied areas of Torres Strait, One Tree Island (Great Barrier Reef), Norfolk Island (Tasman Sea), Cocos (Keeling) Islands and Christmas Island (Indian Ocean). To date, the project has provided 5,000 identifications of lodged museum specimens, with over 120 new species of amphipod recognised. This project forms an important foundation for research in ecology, biogeography and the management of shallow-water ecosystems.

AMPHIPOD ASSEMBLAGES OF THE ANTARCTIC SHELF IN ADMIRALTY BAY, KING GEORGE ISLAND, SOUTH SHETLAND ISLANDS (O)

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Amphipod crustaceans are among the most species-rich groups of Antarctic invertebrates. In the Antarctic *sensu stricto*, south of Antarctic Convergence, over 500 species were hitherto noted. Most studies on Amphipoda of Admiralty Bay focused on shallow sublittoral and subtidal zone; the knowledge on the diversity and structure of amphipod assemblages of deeper sublittoral was insufficient. The present analysis is based on 100 quantitative samples collected in 1984-86, from wide depth range, 20 m to 500 m in the central basin of Admiralty Bay and in Ezcurra Inlet, its inner shallow part, influenced by subglacial streams. These data were also supplemented by the results of already published quantitative analyses of shallow sublittoral. In the whole material 116 species have been identified. The mean density of Amphipoda clearly decreased with depth, whereas the highest number of species was observed at the depths 50-100 m. Cluster analysis of the material allowed to distinguish 9 assemblages depending on depth and site. Using Canonical Correspondence Analysis (CCA) the relations between the most abundant species and environmental factors were estimated. The work was supported by a research grant 51/N-IPY/2007/0 from the Ministry of Science and Higher Education and by the SYNTHESYS Project which is financed by the European Community Research Infrastructure Action under the FP6 "Structuring the European Research Area Programme".

ADMIRALTY BAY – DIVERSITY HOTSPOT OF AMPHIPODA IN THE ANTARCTIC (P)

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Benthic diversity of Admiralty Bay, a fiord embayment of King George Island, South Shetland Islands, is one of the most comprehensively studied in the Antarctic. Former studies of amphipod fauna in this basin resulted in the list including 117 species of these crustaceans. The present study summarizes the results of more than 30-years investigations of Amphipoda in Admiralty Bay. It is based on already published results from both quantitative and qualitative studies. These data were supplemented by 142 quantitative samples collected in 1984-86 and in 2007, from wide depth range (20-500 m) in central basin of the bay and in Ezcurra Inlet, its shallower inner part. The material analysis allowed to add 47 newly recorded species to the existing list. After supplementing the amphipod list with unpublished Brazilian data it consists now of 172 benthic and 5 pelagic species. It is a high number, similar to the numbers from other Antarctic regions known from their high biodiversity: Weddell Sea and South Georgia. This high species number from a small basin allows to treat this place as a diversity hotspot for this group of crustaceans. The analysis of similarities of amphipod faunas from different Antarctic regions shows close affinities between Admiralty Bay amphipod fauna and those from West Antarctic and Weddell Sea. The work was supported by a research grant 51/N-IPY/2007/0 from the Ministry of Science and Higher Education and by the SYNTHESYS Project which is financed by the European Community Research Infrastructure Action under the FP6 “Structuring the European Research Area Programme”.

BIOGEOGRAPHY OF GAMMAROID CRUSTACEANS IN CENTRAL EUROPEAN INLAND WATERS (O)

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The recent (only ca. 12,000 ya) retreat of ice cover from Central Europe resulted in low level of gammaroid diversity and endemism, particularly if compared to such areas as Balkan or Iberian peninsulas. However, gammaroid fauna in the area is interesting for several reasons. One of them is post-glacial shaping of native *Gammarus* species distribution limits including *G. pulex*, *G. fossarum*, *G. varsoviensis* in the lowlands as well as *G. balcanicus* and *G. leopoliensis* along the Carpathians. Interesting is the distribution of *G. roeselii* – species of Balkan origin that colonised Central Europe in historical times. Another is the mass inflow of several alien Ponto-Caspian and one North American species that in the recent decades contributed significantly to the faunal change in the area. The aim of our study was to present the biogeography of native species in Central Europe, particularly within the Baltic drainage area, as well as to estimate the contribution and impact of the alien elements upon the local gammaroid fauna. Our review of long-term distributional data has shown clearly that range of the natives has not changed during the last 50 years. On the other hand, habitat segregation occurs between the native and the alien species. The latter conquered successfully the flow of big rivers. In these considerably polluted waterbodies the natives were already extinct or poorly represented, so the invaders arrived to an “empty niche”. In α -oligohaline estuaries, lagoons and in some inland lakes the pollution resistant and euryhaline alien gammaroids have outcompeted the native *Gammarus*

species. In affluents of main rivers, i.e. in non-polluted streams and smaller rivers, alien gammaroids still do not appear and natives thrive safely in such refuges. Physiological limits, anthropogenic vectors as well as main invasion pathways resulting in the present state of the Central European gammaroid fauna will be discussed thoroughly.

DEVELOPING A METHOD FOR VITELLOGENIN QUANTIFICATION TO INVESTIGATE THE REPRODUCTIVE INVESTMENT IN GAMMARIDS (P)

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Reproductive success of organisms is related to the quantity and quality of eggs produced by females. Vitellogenin (Vtg), precursor molecule of vitellin that is the energy available for embryonic development in oviparous organisms, could be proposed as an indicator of maternal reproductive investment. Numerous strategies, such as enzyme-linked immunosorbent assays have been developed to characterise and quantify this protein in vertebrates. On contrary, in invertebrates as non-decapod crustaceans few methods are available. These gaps mainly result from the low transferability of available antibodies in relation to phylogenetic distance and molecular divergence accumulated by proteins through animal evolution. This poster presents the development of a quantitative assay of vitellogenin in a widespread amphipod, *Gammarus fossarum*, using liquid chromatography tandem mass spectrometry (LC/MS/MS). This method offers the possibility to identify and quantify Vtg, based only on the quantification of specific peptides containing from 5 to 15 amino-acids. Our results show that LC/MS/MS is a robust and sensitive method for Vtg measurement in *G. fossarum*. Vtg changes in oocytes and embryos, in relation to the reproductive cycle and the development, have been characterized. Moreover, partial conservation between homologous proteins in different evolutive lineages can persist. Therefore it should be possible to take advantage of peptidic motifs conservation to propose a transferable method across species. The present study showed that some peptides selected for Vtg measurement in *G. fossarum* could be equally used in other gammarid species, currently found in French aquatic ecosystems.

ENDEMISM IN THE FAUNA OF AMPHIPODA ON BALKAN PENINSULA (P)

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Balkan Peninsula is a combined area of 550,000 km². The very complicated geological and geomorphologic events in the past, and the present richness of epigeal and subterranean waters in this area, the continental fauna of Amphipoda on Balkan Peninsula is very rich and highly endemic. Epigeal endemic genera [*LAUROGAMMARUS* G. Karaman 1984 (typ. gen.: *Carinogammarus scutarensis* Schäferna 1922); *FONTOGAMMARUS* S. Karaman 1931 (typ. gen.: *Fontogammarus dalmatinus* S. Karaman 1931); *JUGOGAMMARUS* S. Karaman 1953 (typ. gen.: *Gammarus kusceri* S. Karaman 1931)] as well as subterranean endemic genera [*ACCUBOGAMMARUS* G. Karaman 1974 (typ. gen.: *Typhlogammarus alger* G. Karaman 1973); *ALBANOGAMMARUS* Ruffo 1995 (typ. gen.: *Albanogammarus*

inguscioi Ruffo 1995); *CARINURELLA* Sket 1971 (typ. gen.: *Karamaniella paradoxa* Sket 1964), *KARAMANIELLA* Sket 1962 (typ. gen.: *Karamaniella pupetta* Sket 1962); *METOHIA* Absolon 1927 (typ. gen.: *Metohia carinata* Absolon 1927); *NIPHARGOBATES* Sket 1981 (T. sp. *Niphargobates orophobata* Sket 1981); *Pontoniphargus* Dancau 1970 (typ. gen.: *Pontoniphargus racovitzai* Dancau, 1970); *TYPHLOGAMMARUS* Schäferna 1906 (typ. sp.: *Gammarus (Typhlogammarus) mrazeki* Schäferna 1906)]. Many endemic epigeal and subterranean species are present on Balkan belonging to other genera: *NIPHARGUS* (*N. jugoslavicus*, *N. skopljensis*, etc.), *SYNURELLA* (*S. longiflagellum*, etc.), *GAMMARUS* (*G. albimanus*, *G. parechiniformis*, etc.), *ECHINOGAMMARUS* (*E. acarinatus*, etc.), *HADZIA* (*H. fragilis*, *H. drinensis*, etc.), *BOGIDIELLA* (*B. serbica*, etc.), *INGOLFIELLA* (*I. acherontis*, etc.), etc. Each of these endemic genera has very different origin and settlement of present area (tertiary, glacial relicts, marine origin, etc.).

AMPHIPOD (CRUSTACEA) OF THE KERMADEC TRENCH (P)

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The Kermadec Trench north of New Zealand is the fifth deepest trench in the world with a maximum depth of 10,047 metres. At its southernmost point cold Antarctic water spills into the trench making the Kermadec Trench one of the coldest in the world. Amphipod samples were collected from the trench in the 1950's via sleds and grabs by the Danish *Galathea* and the Soviet *Vityaz* expeditions. More recently, deployment of baited traps within the trench has contributed significantly to known fauna. A total of 22 species belonging to 9 families of gammaridean amphipods are now known from abyssal and hadal depths of the trench. Here we present an overview of the current knowledge of the Kermadec Trench amphipod fauna, and suggest future research directions.

FINDING OF A NEW FRESHWATER GAMMARID (*GAMMARUS GAGEOENSIS*) FROM SOUTH KOREA

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Gammarus gageoensis n. sp., a new species of Gammaridae Amphipoda, was collected from Gageodo Island, South Korea. This new species is characterized in terms of its morphology by the flagellum of antenna 2 with calceoli, the pereopods 3 and 4 with numerous long curled setae on the posterior margins, the terminal article of the outer ramus in uropod 3, which is longer than the adjacent spines, and the presence of both rami with long simple setae. The morphological characters of the new species that are different to related species are presented in the text. This paper also compares new species to related species by the partial sequence of the mitochondrial cytochrome c oxidase subunit 1 (CO1) gene. The sequence difference, consisting of a

39-44 % difference relative to closely related species, is also large enough to allocate this gammarid as a different species from those of other freshwater gammarid species. This is the first finding of a new species of Korean freshwater gammarid since 1992. Adding this new species, a total of 10 species are known to Korea.

TWO NEW GENERA AND SPECIES OF THE FAMILY OEDICEROTIDAE (CRUSTACEA: AMPHIPODA) FROM KOREA

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Two new genera belonging to the family Oedicerotidae were collected in the shallow waters of Korea from 2001 to 2008. These new genera appear to be closely related to the *Synchelidium* group, which have small body size, subcheliform gnathopod 2 and reduced molar. The first new genus however is characterized by the separated inner lobes of the lower lip, the greatly enlarged spine-tooth on the outer plate of maxilla 1, the short carpus of gnathopods 1–2, the transverse palms of gnathopods 1–2 and the reduced dactyli on pereopods 3–6. The second new genus has an acute lateral cephalic lobe, short flagellum on antenna 2, broadened meri on pereopods 3–4 and enlarged coxa 5. These new genera each with monotypic species are described and illustrated and compared with related *Synchelidium* group species. A key to the North Pacific genera of the *Synchelidium* group with subcheliform second gnathopods is provided.

PREFERENCES OF PONTO-CASPIAN AND NATIVE GAMMARIDS FOR HABITATS FORMED BY A PONTO-CASPIAN ZEBRA MUSSEL (*DREISSENA POLYMORPHA*) (O)

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We investigated associations of two invasive Ponto-Caspian gammarids (*Dikerogammarus haemobaphes*, *Pontogammarus robustoides*) and a native European species (*Gammarus fossarum*) with habitats formed by a Ponto-Caspian bivalve *Dreissena polymorpha*. We tested their preferences for living mussels, empty shells and stones, presented in various pairwise combinations to single gammarids. The position of an animal in an experimental tank after a 1-day exposure was regarded as its habitat choice. *D. haemobaphes* preferred living mussels over empty shells and these two habitats over stones. It responded to shell shape, preferring shells coated with nail varnish (neutralizing the surface properties) over varnished stones (the same surfaces, different shapes). It also responded to shell surface properties, preferring clean mussels and shells over their varnished counterparts (the same shapes, different surfaces). Gammarids did not discriminate between varnished and clean stones, showing the neutrality of the varnish to their behaviour. *D. haemobaphes* discriminated neither between varnished living mussels and empty shells (the same shapes and surfaces, different activity) nor between shells with and without added byssal threads,

indicating that mussel activity (byssus production, valve movements, exudates) did not affect its habitat preferences. *P. robustoides* did not discriminate among the offered substrata. *G. fossarum* preferred shells, but not living mussels, only responding to shell shape and not to its surface. Zebra mussel colonies increase substratum heterogeneity, form shelters and provide food, thus constituting valuable habitats for gammarids. The ability to find and select such habitats may be beneficial for invasive gammarids and help them establish populations in non-native areas.

ESTIMATING METHOD OF *GAMMARUS LACUSTRIS* POPULATIONS FISHING LIMITS (P)

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Gammarus (Rivulogammarus) lacustris G.O.Sars belongs to number of widespread species and lives in small eutrophic salty lakes of Asia, Northern America, Eastern and the Western Europe. This species is well enough adapted for oxygen deficiency during the winter period. Gammarids individuals reach the size of 20-25 mm in small lakes of Western Siberia southern part (Russian Federation) during life cycle (12-13 months). In ecosystems it can be detritus feeders or predator at different trophic levels. At the subsequent trophic levels it is food for fishes, a bird and water insects larvae (about 10 % of a biomass of population *G. lacustris*). The yield of gammarids is conducted only in May-June when in populations prevail generative individuals. Definition of fishing limits is spent in March when the population most part is concentrated under ice directly. Population density is calculated taking into account the horizontal distribution of individuals *G. lacustris* in the reservoir during the study. In the laboratory the results of processing the samples is calculated biomass and productivity of populations using the P/B-coefficient 2,0 for gammarids populations in Western Siberia. It takes into account both trophic links in the ecosystem, and the fact that the growth of individuals is possible only from April to September. Gammarids growth stops in winter. The value of exemptions should not exceed 50% of the biomass of the population, taking into account seasonal products in determining the *G. lacustris* fishing limits. Calculation of annual gammarids fishing limits conducted according to the formula: $L = BSG \cdot 2,0 \cdot 0,5$ (L – fishing limit; B - the average population biomass; S – lake surface; G - the proportion of generative individuals in the population; 2,0 - P/B-coefficient; 0,5 - quantity of biomass removal (50%). For the organization established a fishery quota, not to exceed the limit. For natural resources use are charged at 25 euro per ton.

GAMMARUS CHEMICAL COMPONENTS IN DIFFERENT MODERN TECHNOLOGIES (P)

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Gammarus lacustris is a source of different chemical compounds. The gammarus body contains inorganic matters (26% of organism dry weight), fats (8 %), carbohydrates (16 %) and easily acquired proteins (56 %) on our data (for lakes of the southern part of West-Siberian plain) and data of other authors. Among proteins components prevail cyclic amino acids (arginine – 5 %; glistidin – 2 %; cysteine, methionine, tirozine, tryptophan – less than 1.5 % of total protein). *G. lacustris* carapaces contain of 5-12 %

of calcium and 3-7 % of chitin (dry weight). The carapaces of these crustaceans are a source of biologically active matter – chitozan. Its small maintenance in body *G. lacustris* is compensated by simplicity of a pure chemical product manufacture. This chemical matter is used as the biological additive in the food industry, veterinary and a fishing industry. Chitozan, received from crustacean carapaces, is applied in devices to transportation and storage of live fish. It finds wide application in agrobiolgy (the modulator of virus stability and a regulator of plants growth), cosmetics (antimutagen and antioxidizing systems) of medicine (haemostatic means for wounds, a radio protector and immunoregulator), pharmaceutics (pharmacocorrector of heavy metals concentrations in organism, anticoagulant and a sorbent, a basis of functional food products manufacture) and biochemistry (enzymes immobilization). From the *G. lacustris* biomass, fishing in small lakes of Kurgan region (south part of West Siberian plain), annual manufacture can make to 5-8 tons of chemically pure chitozan. These amounts well increase economic efficiency of gammarids biological resources use in lakes of investigated region.

NEW DATA ON THE GENUS *JASSA* LEACH (AMPHIPODA, ISCHYROCERIDAE) (P)

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The genus *Jassa* until now is exclusively known from marine habitats. It is widespread and contains at the moment 22 species, most of them with a body size between 6 and 11 mm. Thus it seems worth publishing two localities with members of this genus which are absolutely surprising: 1) In a Sicilian cave of about 90m length, the Grotta Conza at the northern end of the Conca d'Oro (175 m above sea level and 1 km distant from the sea), pitfall traps were placed and among other animals also one male and one ovigerous female of 2.5mm length collected, which clearly belong to the amphipod genus *Jassa*; 2) In the center of Sardinia the thermal waters of Fordongianus were investigated, already used as thermal spring in Roman times. This water emerges at a temperature of 58-54° and contains chlorine and carbonates. Together with one single amphipod of 2.2 mm, belonging to *Jassa*, several harpacticoids were collected, also belonging to a strictly marine genus. All animals were hidden among dense filamentous algae. While the latter can only be described, but not named, as it is not adult, the former is without doubt a new species. Within the rich collection of the Verona Museum additional undescribed Sicilian material could be found collected from coastal dunes, which demonstrate that specimens may enter from there the water veins going inland and also higher up.

AMPHIPODS OF THE NORTHWESTERN BLACK SEA (O)

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The northwestern Black Sea is characteristic with environmental conditions for amphipods. Salinity varies from 1 to 18 ‰. The sediments are made up of silts with shells or sand. Firm sediments occur in the coastal zone. In the past decade 36 amphipods species, 34 Gammaridea and 2 Caprellidea have been recorded here. The

highest diversity of amphipods has been noted in overgrowths of communities on firm substrates. In loose sediments, usually *Ampelisca diadema* and *Bathyporeia guilliamsoniana* occur, lower than the spray zone – *Pontogammarus maeoticus*, and in the spray zone – *Orchestia bottae*. Representatives of Gammaridea as *A. diadema*, *Amphitoe vaillanti*, *B. guilliamsoniana*, *Stenothoe monoculoides*, *Perioculodes longimanus*, *Synchelidium maculatum*, *Apheruza bispinosa*, *Atylus guttatus* (syn. *Nototropis guttatus*), *Cardiophilus baeri*, *Gammarus insensibilis*, *G. aequicauda*, *G. suptypicus*, *Melita palmata*, *Dikerogammarus villosus*, *Marinogammarus olivii*, *P. maeoticus*, *P. obesus*, *P. crasus*, *Dexamine spinosa*, *O. bottae*, *Orchomene humilis*, *Hyale perieri*, *Coremapus versiculatus*, *Microdeutopus gryllotalpa*, *M. damnoniensis*, *M. stations*, *Microprotopus minutus*, *Jassa ocia*, *Erichtonius difformis*, *Corophium bonelli*, *C. chelicorne*, *C. crassicorne*, *C. volutator*, *C. runcicorne* have been discovered. Of the Caprellidea representatives *Caprella acantifera* and *Phtisica marina* occur which do not cause mass aggregations. The most numerous amphipods occur in the overgrowths near Zmeiny Island 181900 ind·m⁻² and in Odessa Bay 71450 ind·m⁻². Their maximum biomass is 326.0 g·m⁻² and 112.5 g·m⁻², correspondingly. The highest biomass indices have been noted in Tiligul Liman – 497 g·m⁻².

BENTHIC AMPHIPODA (CRUSTACEA) FAUNA OF BANDIRMA AND ERDEK GULFS AND ENVIRONMENTAL FACTORS AFFECTING THEIR DISTRIBUTION (O)

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This study was carried out to determine amphipod species in Bandırma and Erdek Gulfs (Marmara Sea) and environmental factors affecting their distribution. The seasonal samples were collected from 16 stations between the depths of 0.5-30 m, between the years 2007 and 2008, by using scoop net at 0.5 m and by Van Veen grab at other depths. A total of 66 amphipod species belonging to 20 families were identified during the course of this study. One of these [*Bathyporeia elegans* Watkin, 1938] was first record from the Turkish Seas whereas 32 species from Marmara Sea. Primary hydrographic conditions, such as temperature (6.6-27 °C), salinity (21.32-36.03 ‰), dissolved oxygen (3.67-13.26 mg l⁻¹) and pH (8.00-8.38) were recorded on each sampling occasion. Moreover, mud percentage (1.38-95.65%) total organic carbon (0.07-4.42%), total calcium carbonate (0.88-84.82%) and total phosphorus (376-12740 µg g⁻¹) contents of sediment samples were determined.

THE DOMINANT AMPHIPOD SPECIES FOUND ON THE COAST OF THE MARMARA ISLAND (MARMARA SEA) (P)

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The dominant amphipod species in the coast of Marmara Island (Marmara Sea) and some of their ecological properties were determined in this study. Samples were collected from 6 stations at May and November 2008 from 0.5 m depths, by using scoop net. As a result of this preliminary study, 16 amphipod species were identified as dominant. Primary hydrographic conditions, such as temperature (14.9-17.5°C), salinity

(21.2-24.2 ‰) and dissolved oxygen (8.92-12.98 mg l⁻¹) were recorded for each sampling.

VARIATIONS OF AMPHIPODA ASSEMBLAGES ON PHYTOTREATMENT BASINS OF A LAND BASED FISH FARM LOCATED IN THE ORBETELLO LAGOON (P)

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In the Orbetello lagoon basin (Tyrrhenian Sea, Italian West Coast) there are some intensive fish farming facilities whose can cause environmental impact. Local policies in the Orbetello area imposed the construction of phytotreatment ponds in order to abate organic loads. These phytotreatment ponds base their buffer function on spontaneous growth of primary producers, mainly macroalgae and on benthic processes. The present study was conducted in one of this. The lagooning of the fish farm wastewater involves the use of 4 ponds arranged in series and having of 10451 m² and accounting for up to 79% of the volume of the intensive fish farming section. The purpose of this study is to evaluate quali-quantitative composition and the assemblages of amphipoda into the phytotreatment ponds. In particular amphipoda showed a quali-quantitative composition directly connected with macroalgae development. In the periods with high *Ulva laetevirens* Areschoug biomass the amphipoda *Corophium insidiosum* Crawford, 1937, *Microdeutopus gryllotalpa* Costa, 1853 and *Gammarus insensibilis* Stock, 1966 rule the assemblage and their abundance were found as connected to the total amount of algal biomass because they use the alga as food and as a solid substratum to build tubes and to live on them. During the warm season macroalgae underwent degradation processes and this caused the almost total disappearance of Amphipoda. Moreover the amphipoda showed different assemblages composition related to the diverse organic compounds concentrations measured in the four ponds: the first showed minimum amphipoda abundance and maximum organic load whereas the last ponds showed the opposite.

ECOLOGICAL ANALYSIS OF AMPHIPODA ASSEMBLAGE IN A POLLUTED COASTAL AREA OF THE SOUTHERN TYRRHENIAN SEA: THE CASE OF BAIA (GULF OF NAPLES – ITALY) (P)

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The purpose of this study was to analyze the spatial distribution of soft-bottom amphipoda occurred in the coastal area of Baia (Southern Tyrrhenian Sea). This area is characterized by different impact sources (e.g. heavy metals, PAH, presence of wrecks) and it is included into the national interest reclaiming site “Litorale Domiziano Flegreo e Agro Aversano”. Samplings were carried out in 17 stations at depths ranging from 3 to 30 m. Granulometric and chemicals analyses of superficial sediments were also performed. Data were investigated with univariate (total number of individual, species richness and diversity indices) and multivariate statistical (Cluster analysis) analyses. The analysis of amphipoda assemblage highlighted high values of species richness and diversity indices although chemical analyses showed widespread contamination of the area (high concentration of PAH and high values of heavy metals such as mercury, copper and lead). Cluster analysis showed that both depth and granulometric distribution of sediment were the chief factors in faunal similarity.

TROPHIC STATUS OF ARCTIC AMPHIPODS – A MULTI-METHOD APPROACH (O)

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In Svalbard waters (Arctic, 74°-81°N) amphipods are among the most speciose groups of marine macrozoobenthos. Their habitat preferences have been extensively studied, but the feeding ecology and trophic niches are still poorly recognized. This study provides information on feeding biology of more than 20 common Arctic species of amphipods inhabiting sublittoral. Amphipods were collected in several fjords off West Spitsbergen, with main sampling effort in Kongsfjorden (79°N). Sampling covered a wide range of habitats including: muddy bottom of glacial bays, rocky bottom overgrown with macroalgae and soft bottom of the deep fjordic basins. Samples were taken from various depths by different gears: dredges, grabs and baited traps, both during the summer (July 2008, 2009) and winter (March 2009) seasons. Combined analyses of fatty acids, stable isotopes and digestive tract content gave overview of their trophic position. Carrion, remains of polychaetes and harpacticoids, diatoms frustules and cysts of protists were the most common food items determined during a microscopic examination of the guts content. The fatty acids composition was characterized by a high level of monounsaturated 18:1 (n-9) and 16:1 (n-7), followed by saturated 16:0 and polyunsaturated 20:5 (n-3) and 22:6 (n-3). There were significant differences in the $\delta^{15}\text{N}$ signatures of different functional groups with the highest $\delta^{15}\text{N}$ values in predators/scavengers followed by suspension and deposit feeders. Apart of elucidation feeding modes and ecofunctional roles, of the dominant amphipod, winter materials created an unique opportunity to study potential seasonal dietary shifts in some lysianassoid species.

SODIUM REGULATION IN CAVE AND SURFACE LIVING *GAMMARUS PULEX* (P)

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The freshwater amphipod *Gammarus pulex* is widely distributed in streams and rivers. In addition, some isolated cave populations also exist. Since cave environments are often food limited, organisms that inhabit them may have physiological mechanisms to reduce their energy expenditure. The loss of exoskeleton pigment observed in the cave *G. pulex* used in this study indicates that at least some adaptation to the cave environment has occurred. Osmoregulation is an energetically expensive mechanism by which *G. pulex* can live in fresh water. The aim of this comparative study was to determine if sodium regulation is altered in cave populations of *G. pulex*. It was found that hypogean *G. pulex* had a significantly lower haemolymph sodium concentration than epigeal *G. pulex*, but that sodium influx and gill Na^+ , K^+ ATPase activity were not significantly different. An increase in haemolymph volume was considered to be the underlying mechanism for the observed fall in haemolymph sodium concentration of hypogean *G. pulex*.

BIOCHEMICAL COMPOSITION OF THE AMPHIPOD *GONDOGENEIA ANTARCTICA* (AMPHIPODA: EUSIRIDAE) IN SHALLOW WATERS FROM KING GEORGE'S ISLAND, ANTARCTIC (P)

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The aim of this study was to determine the biochemical composition of *Gondogeneia antarctica*, to reveal information on the bioenergetics strategies and trophic relations of them. The samples were collected in shallow waters at Tanks' Bay (62°11'8.34"S/58°56'2.02"W), King George's Island, Antarctic in February 2009. Organisms were selected by similar size to determine the total proteins, carbohydrates, lipids and fatty acid markers. The water content was 92% of amphipod wet weight. Proteins were the dominant compounds (60-74% amphipod dry weight), whereas carbohydrates were a very small fraction (1-3% amphipod dry weight). This high concentration of proteins and low of carbohydrates are very common for almost all crustaceans groups. Lipid concentrations of *G. antarctica* were measured between 28-72% amphipod dry weight, higher than reported for other polar amphipods from zooplankton and deep zones. Fatty acid composition revealed the dominance of 22:6(n-3) macroalgae marker (42%), according to diet for this species. Other markers show the presence of unicellular algae, like diatom [20:(n-9), 29% and 16:1(n-7), 8%] and haptophytes/cryptophytes [18:4(n-3), 3%] in the diet of the amphipod, the rest were less than 2%. The higher biomolecules percentages determined in this species may be due to the habitat differences between *G. antarctica* and the other amphipods habitats where this kind of analysis had been done. These results demonstrated the herbivore behavior of *G. antarctica* in Tanks' Bay.

NEW ZEALAND AMPHIPODA (O)

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The New Zealand marine and estuarine amphipod fauna comprises nearly 400 species. The total diversity of the New Zealand marine amphipod fauna is likely to comprise at least five times the presently known species. Of the known marine fauna, about 50 % of the species and 18 % of the genera are endemic to New Zealand. An overview of what is happening in amphipod research in New Zealand is provided. A focus will be on the first national sampling approach using small meshed gear during the Ocean Survey 2020 program; baited traps in abyssal and hadal depth and links of the New Zealand fauna to the Ross Sea.

WORLD CHECKLIST/CATALOGUE OF THE AMPHIPODA (O)

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By editing electronic copies of major monographs I have compiled a list of 'all' amphipod species. I have been updating it by checking the *Zoological Record* and Wims catalogues. Parts of this checklist have been amplified into a catalogue. The list is currently in a large doc file, but it is in the process of being converted into an Access database. From this database we can track amphipod taxonomy, produce catalogues, etc. Although I have got the list to this stage it is too much for one person to handle. I am hoping to persuade a set specialists editors to control sections of the catalogue.

MORPHOLOGICAL DIFFERENTIATION OF *GAMMARUS BALCANICUS* SCHÄFERNA, 1922 IN THE CARPATHIAN ARCH (P)

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Gammarus balcanicus is a species distributed widely from the southern foothills of Alps through the Balkans and Carpathian region to Asia Minor. It is found predominantly in montane/submontane streams and springs. The species is characterised by high level of morphological diversity across its distribution range. This resulted in descriptions of large number of forms, subspecies and species synonymised at some point to *G. balcanicus*. The aim of our work was to analyse morphological variability of populations from several regions along the Carpathian Arch and compare it to toptypical population from the Balkan Peninsula. Morphometric studies encompassed 231 individuals (males, ≥ 7 mm long) from 9 sampling sites located in Southern, Eastern Carpathians and in the Dobrogea Plateau as well as one toptypical sample from Bjelasica Mts. (Montenegro). Altogether 40 morphological features were measured, 7 of which significantly varied (Kruskal-Wallis test) across populations and were used for further statistical analysis (PCA, ANOVA). The analysis enabled us to define four main morphological types within the analysed samples. All populations from the Carpathians and Dobrogea were significantly different from the toptypical one. This suggests their high level of taxonomic distinctness. Besides, three different morphological types could be differentiated among in Eastern and Southern Carpathians what may suggest some allopatric speciation. The results obtain with morphometric methods will also be verified with use of molecular markers.

CHECKLIST OF THE MARINE GAMMARIDEA AND CAPRELLIDEA (CRUSTACEA: PERACARIDA: AMPHIPODA) FROM THE VENEZUELAN COAST (P)

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The current knowledge of the amphipod in Venezuela is poor, but at the present time, efforts aimed at the taxonomy, ecology, and biology are underway. This work represents a review on the current state of the group. Over 145,000 amphipods were sorted and identified from about 425 stations that included different habitats and a bathymetric gradient from the intertidal zone to 1,485 m of depth. This review was based on samples collected from 1968 to 2010. We reported 36 families, 91 genera and 174 species of Gammaridea (Ampeliscidae, Amphilochidae, Ampithoidae, Anamixidae, Aoridae, Aristiidae, Bateidae, Bogidiellidae, Cheluridae, Colomastigidae, Corophiidae, Cyphocarididae, Dexaminidae, Eusiridae, Gammaridae, Hyalidae, Haustoriidae, Isaeidae, Ischyroceridae, Leucothoidae, Liljeborgiidae, Lysianassidae, Megalurotopidae, Melitidae, Melphidippidae, Neomegamphopidae, Oedicerotidae, Phliantidae, Phoxocephalidae, Platyischnopidae, Podoceridae, Sebidae, Stegocephalidae, Stenothoidae, Synopiidae, and Talitridae). Caprellidea comprises 5 families, 8 genera and 12 species (Caprellidae, Caprellinoididae, Pariambidae, Phtisicidae and Protellidae). Eighteen species are new records for Venezuelan waters, *Ampelisca holmesi*, *Gitana dominica*, *Hourstonius templadoi*, *Anamixis vanga*, *Bemlos macromanus*, *Aristias captiva*, *Boca campi*, *Colomastix heardi*, *Monocorophium acherusicum*, *Apohyale perieri*, *Haustorius mexicanus*, *Photis longicaudata*, *Leucothoe laurensi*, *Dumosus atari*, *Elasmopus elieri*, *Melita leiotelson*, *Hornellia tequestae* and *Podocerus lazowasemi*. The soft bottoms were the most abundant habitat (23.3%). Eight families were found in at least 8 of the 10 substrates evaluated. Some families and genera live preferentially on one type of habitat (27.0%). The maximum number of species was found in 0-34 m (78.7%). Two of thirteen ecoregions described for Venezuelan coast have no record, so we have to do efforts to sample herein.

AMPHIPODS ASSOCIATED TO THE MACROALGAE *IRIDAEA CORDATA* AND *ADENOCYSTIS UTRICULARIS* AT THREE LOCALITIES IN KING GEORGE'S ISLAND, ANTARCTICA (P)

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The intertidal benthic amphipod composition (>500 µm) associated to the macroalgae *Iridaea cordata* and *Adenocystis utricularis* was studied at three locations from King George's Island in February 2009 (n=22 samples per algae per site). The localities sampled were Mareographer Beach (1M) near the Uruguayan Artigas Scientific Base, Tanks' Bay (2R) and Ardley Bay (3R), in front of the Russian Base. *I. cordata* was found at sites 1M and 2R (~10-13% of the substrate), while *A. utricularis* was found at

all (~63-100% of the substrate). For the first, the complete individual was detached from the substrate, while for the second, a surface of 10x10 cm was scraped. Collection depth varied between 10-50 cm. A total of 7,939 amphipods were found associated to macroalgae, 56.51% on *A. utricularis* and 43.79% on *I. cordata*. We identified 10 families, 14 genera and 13 species of amphipods. Amphipods densities varied between macroalgae and localities. The highest amphipod densities were at 3R on *A. utricularis* (34.26 ± 31.01 org/dry weight algal biomass). The most abundant species collected for *A. utricularis* was *Orchomenella (Orchomenella) ultima*, and for *I. cordata* was *Gondogeneia antarctica*. The amphipod assemblage differed significantly between the 3 sites. The species *O. ultima* was responsible of the dissimilarity between 3R and the other two sites (>78%) for *A. utricularis*, while the dissimilarity between 1M and 2R was responsible by *Paramoera edouardi*. On the other hand, the dissimilarity between 1M and 2R for *I. cordata*, was the higher density of *G. antarctica* on the first site.

FUNCTIONAL MORPHOLOGY OF THE GAMMARIDEAN MANDIBLE, WITH SPECIAL REFERENCE TO THE LACINA MOBILIS (O)

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The functional morphology of the gammaridean mandible is still far from being fully understood. This is true not only for amphipods but also for all peracarids. The origin of the different structures of the mandibular gnathal edge, with the major elements pars molaris, lacinia mobilis and pars incisivus, is also still under dispute. One major problem is the accessibility of the structures during action on the live animal. Only the action of the incisors can be observed, whereas the laciniae mobiles, the setal rows and molars are hidden between paragnaths and labrum, and the entire region is also covered by the other mouthparts. Accordingly, neither has the movement been described in full detail, nor were functional aspects considered sufficiently. Since movie documentation seems difficult if not impossible, we have started to investigate the mandibles of native and non-indigenous gammarideans inhabiting German inland waters using light- and scanning electron microscopy. Different positions of the mandibles are documented from different individuals and assembled to receive sequences of movement. The aim of our work is to get a better picture of the functional requirements and to understand the capabilities and limitations of the mandibular structures under the main issues "do the structures really do what they are supposed to do?" In order to get a better understanding of the movements and interactions of the two opposing asymmetrical laciniae mobiles with each other and with other structures of the gnathal edge, we also applied computerized 3D-modeling. First results of our investigations are presented here.

VISUAL ECOLOGY OF TALITRID AMPHIPODS FROM MEDITERRANEAN AND ATLANTIC COASTS (O)

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Eye morphology and responses to various visual stimuli were comparatively investigated in different populations of talitrid amphipods from Mediterranean and

Atlantic coasts. Three species were studied: *Talitrus saltator*, *Orchestia gammarellus* and *Talorchestia spinifera*. The responses to a directional artificial light (phototaxis) and to a black boundary (scototaxis) appeared tuned to orient talitrids downshore or, alternatively, to shelters according to their activity phase. In addition, Mediterranean *T. saltator* showed a peak of spectral sensitivity in the blue light, the most abundant wavelength over the sea (450 nm), and this appears to be an effective device to orient seawards and avoid dehydration. In *T. spinifera* the disposal of a particular vesicular structure in the lenses of the ommatidia appears suited to amplify the horizontal light reflection of the sea surface, thus achieving a similar orienting device on an anatomical instead of physiological basis. In sum, compound eyes of talitrid amphipods have a common basic structure, but show a variety of morphological and/or physiological features, each suited to optimize vision under very different optical conditions and to adapt the animals to the environments they inhabit and behaviours they express.

IMPACT OF GRAZING BY AMPHIPODS ON THE DYNAMICS OF THE EPIPHYTIC COVER OF THE *POSIDONIA OCEANICA* LEAVES: AN IN VITRO EXPERIMENT (O)

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It is now established that several species of amphipods associated to Mediterranean *Posidonia oceanica* meadows consume the epiphytes present on the leaves of the seagrass. However, little or no work has been undertaken to quantify this interaction. Here, we present the results of an *in vitro* experiment that used seagrass mimics to estimate the impact of grazing by the amphipods *Apherusa chierighinii*, *Dexamine spiniventris* and *Gammarus* spp. on the dynamics of the epiphytic cover. All species reduced epiphyte biomass in a significant way, and grazers preferentially fed on erected algae. Assimilation of epiphyte-derived carbon and nitrogen was monitored using stable isotopes (¹³C and ¹⁵N) labelling, and was obvious in the three taxa. Moreover, grazing activity of amphipods seemed to influence epiphyte physiology, notably by increasing nitrogen uptake by the erected algae. These results shed light on trophic interactions between the amphipods from *Posidonia oceanica* meadows and the seagrass epiphytic cover, and thus enhance our understanding of the role of these grazers in the functioning of the meadow as an ecosystem.

AMPHIPODA DISPERSAL IN ESTUARY HABITATS OF CASPIAN SEA IN NORTHWEST OF IRAN (P)

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More than 74 amphipod species have been listed for the Caspian Sea while 20 species have been identified in the southwest of Caspian Sea shore at different depths. A considerable remark is the domination frequency of *Pontogammarus maeoticus* in this region. In this work we have studied samples collected from winter 2009 until autumn 2009 at 18 river estuaries in southwest of Caspian Sea. Totally, species belonging to 17 groups of macro-invertebrates were identified. Amphipoda varied from 1 to 92 % of

total population, which also included Cumacea, Chironomidae, Cardiidae and Oligocheata. Although *P. maeoticus* showed the highest density in the coast (with more than 1000 ind/m²) *Stenogammarus compersus* was widely distributed between 5-10 m depth (with densities up to 836 ind/m² in spring). The species of *Paraniphargoides motasi*, *Niphargogammarus borodini* and *Cadiophilus baeri* exist in this region with a limited distribution and densities ranging from 44 to 176 ind/m². The use of some ecological indices together with contamination studies could contribute to the knowledge of amphipods as bioindicator.

CHEMICAL COMPOSITION OF *PONTOGAMMARUS MAEOTICUS* AS A LIVE FOOD IN COMMON CARP CULTURE (P)

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Pontogammarus maeoticus presents high abundance and is widely distributed in Caspian Sea. Collection of this species to be use as live food was conducted. In this survey, *P. maeoticus* from Caspian Sea shore was used as a live food versus the artificial food pellets for carp culture which prolonged about 140 days in fiberglass tanks. Growth rate, chemical composition and fatty acids were measured and compared with natural situation in aquaculture ponds. Despite of significant different between chemical composition of diets, the present findings showed no difference in three kinds of carps, in which the protein, lipid and ash contents were about 17.5, 2 and 1% respectively. The protein content of *P. maeoticus* was about 2 times more than artificial food, while amphipod lipid was lower. It was concluded that the better growth of carps with *P. maeoticus* diet was about 0.021 gr/day versus 0.007 gr/day growth with the artificial pellet. Lipid analysis showed that the n-3 fatty acid (EPA) was the most abundant for *P. maeoticus* specimens and the ratio of n-6 to n-3 was significantly lower for *P. maeoticus* and carps with amphipod diet of approximately 1:3.5 and 1:2 respectively. Fatty acid DHA was measured more in carps fed by artificial pellets than other treatments and the ratio was about 1:1. The use of amphipods caused the better growth and higher quality with complete fatty acid profile in fish meat.

AMPHIPODS AND OTHER PERACARIDA INHABITING INTERTIDAL MUSSELS BEDS ON NATURAL ROCKY SHORES AND SEAWALLS AT THE RÍA DE FERROL (NW IBERIAN PENINSULA) (P)

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Increasing urban development in coastal areas is leading to a proliferation of artificial structures in intertidal areas, such as seawalls and breakwaters. These new structures were demonstrated to provide a novel habitat for a number of taxa, but recent experimental work have shown that the composition of benthic assemblages differ

between seawalls and natural rocky shores. Nevertheless, those patterns have not been tested yet in the Atlantic coast of the Iberian Peninsula and, therefore, neither in the Galician rías. In fact, the coastline of the latter are being altered extensively by the construction of seawalls, harbour facilities and marinas, which results, in turn, in a fragmentation and alteration of natural intertidal habitats. Mussel beds in natural habitats are known to support a large suite of taxa but it was pointed out that mussels on artificial habitats, such as seawalls and pontoons, might support different assemblages. In addition, more attention has been paid to molluscs when studying differences in assemblages between seawalls and natural habitats than to other taxa, such as peracarids, which are an important component of intertidal assemblages as well. In this communication, the peracarid assemblages present on vertical seawalls, horizontal and vertical natural rocky shores are studied after sampling done at the Ría de Ferrol (Galicia). Sampling was done at different spatial scales to test hypotheses about differences in composition of assemblages and abundance and presence of taxa according to the nature (artificial vs. natural) and inclination (vertical vs. horizontal) of substrata.

AMPHIPOD ASSEMBLAGES (PERACARIDA: AMPHIPODA) AT DIFFERENT TYPES OF SUBTIDAL SEDIMENTS OF THE ENSENADA DE BAIONA (GALICIA) (P)

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Amphipods (Crustacea: Peracarida) are an important component of soft sediment faunas and are good indicators of the conditions of marine sediments. Amphipods also play an important role in the structuring of benthic assemblages and are a source of food for many benthic animals and a number of fishes of commercial importance. Little is, however, known about the diversity and distribution of amphipod assemblages on the shallow subtidal sediments of the Galician Rías (NW Spain). The Ensenada de Baiona is a small inlet located in the mouth of the Ría de Vigo and shows a variety of subtidal sediments, ranging from gravel to mud, at depths of between 2 and 12 m. Most of the subtidal bottoms of the inlet are sandy; muddy sediments are restricted to the harbour of Baiona which is sheltered by an extensive breakwater. In this communication, we describe the diversity and spatial distribution of amphipod assemblages inhabiting these sediments by means of quantitative sampling. A total of 3,412 individuals belonging to 67 species were determined. Analyses of classification and ordination of samples showed differences in the composition of amphipod assemblages. Those differences were mainly related to the granulometric features of the sediment. On the other hand, muddy sediments around the harbour of Baiona had a poor amphipod assemblage. This is due to the increase in the content of silt/clay after the construction of the harbour breakwater; those alterations translated in an impoverishment of the amphipod fauna originally present in the fine sand sediments.

PHYLOGEOGRAPHY AND RATES OF MOLECULAR AND MORPHOLOGICAL CHANGES IN THE PONTO-CASPIAN AMPHIPOD *PONTOGAMMARUS MAEOTICUS* (SOWINSKY 1894) (O)

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The Ponto-Caspian region includes the Black, Azov and Caspian Seas and had undergone a number of dramatic geological changes throughout its history. From 5.8 to 5 million years before present the Black Sea and Caspian Sea depressions became separated and the fauna in each basin evolved independently. Among the crustaceans found in the area, amphipods constitute a major group. *Pontogammarus maeoticus* is the most abundant and widely distributed amphipod along the Iranian coast of the Caspian Sea. Its distribution is not limited to the Caspian Sea, but includes also the Black and Azov Seas, thus embracing the entire Ponto-Caspian area. The species can therefore be considered an optimal guiding organism to test the competing hypotheses available in the literature on the evolution of the Ponto-Caspian fauna. The aims of this study were: to derive an exhaustive phylogeographic hypothesis for *P. maeoticus* across its entire distribution range with the aid of both molecular and morphological data and to determine whether the phylogeographic architecture of the species reflects the geological evolution of the Ponto-Caspian area. Thirteen locations along the southern shorelines of the Caspian Sea, two sites along the western shorelines of the Black Sea and one site from Azov Sea were sampled for the study. A total of 103 individuals were screened for sequence polymorphism at two mitochondrial loci (COI and ND5, 622 and 657 bp, respectively) while 74 individuals were sequenced for the nuclear EF 1 alpha gene (234 bp). The molecular screening was coupled with a morphometric analysis of twenty-three selected characters. Analyses on molecular data defined a total of 53 haplotypes for the two mitochondrial genes and 27 haplotypes for the nuclear marker. Monophyly of the individuals from each basin was always well supported in a variety of phylogenetic searches. Both morphology and molecules were concordant in identifying major phylogeographic breaks corresponding to the sampled basins. This is in remarkable agreement with what already known for a variety of taxonomically unrelated groups from the same area and highlights the geological evolution of the basins as a major force in determining patterns of biodiversity.

VARIATION OF THE LOCOMOTOR BEHAVIOR OF AMPHIPODS ACCORDING TO THE ENVIRONMENTAL FACTORS (O)

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The endogenous activity of sandhoppers (Talitrid family) has been investigated in a populations collected from exposed and non exposed beaches in Tunisia. Locomotor activity rhythms were recorded in grouped and individual animals, under LD cycle, continuous darkness or constant light at a temperature of $18^{\circ}\pm 1^{\circ}\text{C}$. This study aimed to extend our knowledge of the relative strength of light as zeitgeber for amphipods locomotor activity rhythms. The animals were found to exhibit a nocturnal circadian rhythm of locomotor activity with an evidence of a ultradian component of 12h. The variation of the rhythm parameters (rhythmicity, circadian periods, activity time, stability...) is considered in relation to changes in environmental conditions prevailing at different sites collection.

DIFFERENTIAL ISOTOPIC TURNOVER (C AND N) DETECTED IN ANTARCTIC SCAVENGER AMPHIPODS (P)

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Metabolic activity is positively related to temperature, inversely to body mass and is a function of taxon specific life style features. Therefore, the isotope signal transfer velocity is expected to be lower in cold environments and in larger as well as less active organisms. We compare experimentally the velocity of stable isotope signal transfer from prey to consumer in three lysianassoid amphipods, *Waldeckia obesa*, *Abyssororchomene plebs* and *Pseudorchomene coatsi*. They have similar alimentation, but different size and lifestyle. Those species also differ significantly in size and are good representative of scavenger trophic guild on Antarctic shelf. After being starved, amphipods were kept by species and fed with fish during fifty days. Individuals were sacrificed weekly for isotopic analysis. At the end of the 7-week incubation with standardized food, rank correlation of $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ against time did not show any consistent trend for *A. plebs* neither for the species *W. obesa*. By contrast, for *P. coatsi*, correlations were highly significant ($p < 0.0001$). The linear regression illustrated a clear increase of isotopic ratios all along the experiment. This metabolic discrepancy between species is probably a size-mass effect. Furthermore, for this species, ANCOVA of the individually measured isotopic ratios provided evidence for significant effects of the parameter "isotope" on isotopic temporal evolution. Indeed, the $\delta^{13}\text{C}$ values evolve much faster than the $\delta^{15}\text{N}$ ones. According to data, it would take double time for *P. coatsi* to balance its nitrogen isotopic signature than its carbon isotopic ratio when changing food.

FEEDING RATES AND FOOD PREFERENCES OF THE AMPHIPODS PRESENT ON MACROALGAE *ULVA* SP. AND *PADINA* SP. (P)

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Differences on algae palatability and food preferences of herbivores play an important role on the algae biomass, being the amphipods and gastropods the most abundant mesoherbivores. The aim of the study was to determine the feeding rate and food preferences of the amphipods present on *Ulva* and *Padina*, with emphasis on *Ampithoe ramondi*. We took 3 samples of each alga with 10x10cm quadrats to determine the amphipod assemblage. Fifteen amphipods were placed between 0.3 and 1.0cm in 5L tanks for each treatment. About 2gr of fresh algae was placed in each tank and left for 8 days. We make 3 treatments (*Ulva*, *Padina* and both). In the first trial, four replicates were performed for each treatment and randomly placed the 5 most representative species of amphipods on field. For the second one, 3 replicates were carried out with *A. ramondi*. In field, *A. ramondi* was the most abundant specie on *Padina* and *Hyale pygmaea* on *Ulva*. The feeding rate was higher on *Padina* than *Ulva* for the first trial (0.010 – 0.013gr algae wet weight/amphipod/day vs. 0.003 – 0.005gr algae wet weight/amphipod/day, respectively). For the trial 2, there was an also higher feeding rate on *Padina* than *Ulva* (0.009 - 0.013gr algae wet weight/amphipod/day vs. 0.003 -

0.007gr algae wet weight/amphipod/day, respectively). Feeding rates were similar in both trials, suggesting that *A. ramondi* probably have more impact than others. When offered both algae, *Padina* was preferred, although brown algae were considered unpalatable to many herbivores due the presence of chemically-induced defenses.

PARASITE DIVERSITY AND PREVALENCE IN GAMMARIDEAN HOSTS IN PRIMARY PART OF CENTRAL MIGRATION CORRIDOR (P)

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The central migration corridor covers the route covering Dnieper River, Vistula River, Oder River, Elbe River and Rhine River. It is one of the major routes for invasive hydrobionts of the Ponto-Caspian origin colonising the inland waters of Western and Central Europe. It is also a possibility for the parasites to spread out together with their hosts outside the native range. The aim of the study was to detect the role of central migration corridor for Ponto-Caspian invasive gammarids (Amphipoda, Gammaroidea) in the range extension of their parasites. We studied the diversity of the parasites in Ukrainian and Byelorussian part of the central migration corridor. Fourteen species of gammarids, examined for parasite presence, were sampled at 16 sites including Black Sea and its limans, the Dnieper River and its tributaries, the Prypyat and the Bug rivers as well as the Prypyat-Bug Canal. Our study showed that central migration corridor is an important route for parasites infecting Ponto-Caspian hydrobionts. Apicomplexa and Microsporidia are dominant parasites of gammarids in the studied part of central corridor. High prevalence of unicellular parasites (19.5%) was maintained along the whole studied area. However the highest prevalence of infection with parasites (P) was observed in the Dnieper Estuary and it was: Apicomplexa (P38.0%), Microsporidia (P17.4%), Acanthognatha (P19.1%), Nematelminthes (P3.4%) and the highest diversity was noticed in limans of the Black Sea where five phyla of parasites were recorded: Apicomplexa (P19.7%), Microsporidia (P4.8%), Platyhelminthes (P0.6%), Nematelminthes (P1.1%), Acanthognatha (P2.7%). This may suggest that the natural source of Ponto-Caspian invasive gammarids and their parasites are Black Sea Limans.

AN OVERVIEW OF GAMMARUS (AMPHIPODA) SPECIES DISTRIBUTED IN TURKEY, WITH AN UPDATED CHECK-LIST AND ADDITIONAL RECORDS (P)

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The genus *Gammarus* Fabricius, 1775 was represented by 38 taxa (37 species and a subspecies) both in freshwater and marine habitats of Turkey. Only four of them distribute in marine or brackish habitats and the remaining ones can be approved as purely freshwater species. Among the represents of the genus *Gammarus*, some of

them adopted to live in extreme habitats, such as wells, cave waters etc. An updated check-list of *Gammarus* taxa was presented in this study in addition to some supplementary records from Turkish inland waters.

DISTRIBUTION OF THE PONTO-CASPIAN AMPHIPODS IN TURKISH FRESH WATERS: AN OVERVIEW (P)

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To date, 10 peracarid species were reported from Turkey as the representatives of ponto-caspian fauna. Previous records and current distributional patterns of ponto-caspian amphipods in Turkish inland waters were investigated. Two new localities were revealed as one of the southernmost point in general distributional area of *Pontogammarus robustoides* (Sars, 1894). All the localities reported to date were indicated in a map for each species. Probable reasons affected the existence of the representatives of the complex are discussed.

AMPHIPODS ASSOCIATED TO THE INVASIVE SEAWEED *ASPARAGOPSIS ARMATA* ON TARIFA ISLAND AND ALGECIRAS BAY, SOUTHERN SPAIN (P)

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Asparagopsis armata is a non-native, red seaweed widely distributed along western Mediterranean coasts. First found in Australia and New Zealand, it was introduced naturally through the Strait of Gibraltar and rapidly spread out. A one-year spatio-temporal study (Feb 08-Feb 09) of intertidal rocky assemblages was carried out in Algeciras Bay (1 station) and Tarifa Island (three stations with different wind exposure: east, west and south respectively). It was aimed to characterize the associated fauna, as well as to compare biodiversity and abundance of individuals between a contaminated area (Algeciras Bay) and another with no environmental stress (Tarifa Island). Bimonthly samples were collected and also physicochemical parameters were measured in both areas. Algeciras Bay showed lower oxygen concentration than Tarifa Island which could determine the presence of different fauna in both areas. In total 25 amphipod species were identified and maximum values of abundances were registered on summer in all stations. Amphipods were different between Algeciras Bay and Tarifa Island. The caprellid *Caprella penantis*, traditionally associated to non-polluted areas, was more abundant on Tarifa Island than in Algeciras. The gammarid *Podocerus variegatus* was dominant in Algeciras Bay while on Tarifa Island *Hyale schmidtii* and *Apherusa mediterranea* were the most abundant. This is the first study describing the associated amphipods to *A. armata*. Very little is known about the influence of *A. armata* on altering marine communities, so complete faunistic studies of associated organisms are necessary to manage programmes dealing with this invasive species.

LIFE CYCLE AND GENETIC STRUCTURE OF *MACARORCHESTIA REMYI* (TALITRIDAE) (O)

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Here we present data on life cycle and genetic structure of the talitrid species *M. remyi* (Schellenberg, 1950). The species is strictly associated to rotten woods stranded on beaches and is known for a few scattered Mediterranean localities. The study focused on three populations (one from the Tyrrhenian and two from the Adriatic coast). We analysed the life cycle of the Tyrrhenian population by monthly samplings over one year. We found intersexes in each sampling but one; sex ratio was always female-biased. Breeding peaked twice; females carried from 3 to 19 eggs in the brood chamber. Three cohorts per year were identified, with a lifespan of 12-13 months. We assessed levels of genetic divergence among the three sampled populations (208 individuals) by sequencing a fragment of the mitochondrial DNA (mtDNA) coding for the Cytochrome Oxidase I gene. We also included in the analysis a single individual from Corfù Island (Greece). We identified 19 haplotypes sorted in two halpogroups separated by a deep phylogeographic break. The haplogroups corresponded to Tyrrhenian and the Adriatic locations with no sharing of haplotypes between them. The two Adriatic populations shared only one haplotype out of the nine identified for the area. The individual from Corfù Is. carried the most common haplotype found in the Tyrrhenian population. Results are discussed in terms of dispersal possibilities and habitat isolation.

TALITRID AMPHIPODS ASSOCIATED TO THE “BANQUETTE” OF *POSIDONIA OCEANICA* (L.) DELILE ON A ROCKY SHORE IN CENTRAL ITALY (P)

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Talitrid amphipods are typical colonizers of coastal environments and, given their role as decomposers of organic debris stranded on the seashore, they occupy a central position in this system. *Posidonia oceanica* (L.) Delile, is a seagrass endemic to the Mediterranean Sea, whose dead leaves and rhizomes, commonly referred to as “banquette”, are often deposited on the beach after the storm events. Thus, in the present work we focused on the talitrids of the banquette on a rocky shore in the Tyrrhenian Sea (Italy). Pitfall traps were positioned according to width and depth of the banquette. Three species were identified: *Orchestia gammarellus* (Pallas, 1766), *O. montagui* (Audouin, 1826) and *O. mediterranea* (Costa, 1853). The three species showed a maximum capture frequency in winter and in deeper layers, according to favourable temperature and moisture values. *O. gammarellus* was the most abundant species and gathered deeper in the banquette, *O. montagui* was more superficially distributed, while *O. mediterranea* was barely present. Sex ratio was statistically significant and female biased. Temperatures probably favoured a long reproductive period, which was observed throughout the year. A seasonal different distribution was observed according to the abundance of talitrids, and differences in depths were grouped according to slight different distribution of classes. The coexistence of the

three species may be explained in terms of availability of space and food, trophic diversity and temporal segregation.

LIFE CYCLE OF *ORCHESTIA* SP. CF. *CAVIMANA* (AMPHIPODA, TALITRIDAE) (P)

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Orchestia sp. cf. *cavimana* (Heller, 1865) is a widespread talitrid species along European riverbanks and lake shores. A study on its life cycle was conducted on a lake shore in Central Italy. Monthly samplings (October 2007-September 2008) with pitfall traps showed a continuous activity of the species along the year. Maximum abundances (June/October) were related to high proportion of juveniles after two breeding peaks. Females bearing eggs were recorded in spring and late summer, and 5 to 20 eggs were found in the brood pouch of females. In addition, the total body length recorded for egg-bearing female was positively correlated with the number of eggs on they can carry. Sex-ratio, when significantly different from 1:1 was in favour of females. Minimum abundances were assessed in the winter, when temperatures dropped to 4-5°C. A positive relationship was found between abundance of the species and both temperature and sediment moisture values. Four cohorts per year were identified and lifespan of the species was about 12-15 months.

COMPARISON OF PHYSIOLOGICAL RESPONSES OF THE FRESHWATER INVADER *DIKEROGAMMARUS VILLOSUS* AND THE NATIVE *GAMMARUS PULEX* TO CHANGES OF WATER TEMPERATURE (O)

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During the last twenty years, the Ponto-Caspian amphipod, *Dikerogammarus villosus* has been one of the most successful invaders of large European rivers and lakes. The reason of this success is partly determined by differences in physiological tolerance of the invading species to the environmental conditions. In this study we compared the physiological response to changes of temperature of *D. villosus* and the widespread native species *Gammarus pulex*. For each species, impacts of temperature (0 - 30 °C) on the survival, the oxygen consumption, the locomotory and ventilatory activities, the polar lipid content, and the intermediary and energy metabolism were experimentally studied in acclimated individuals. *D. villosus* and *G. pulex* can be both characterized as eurythermal organisms: they exhibited important survival times and conserved their performance optimum throughout a large range of temperature. However, at low temperatures (≤ 20 °C), the metabolism and activity of *D. villosus* was reduced in comparison with *G. pulex*, allowing the allocation of more energy to its other needs. For higher temperatures, the energetic cost of the metabolism of *G. pulex* increased less than *D. villosus*, which did not survive to temperature higher than 25 °C. Such differences of survival and performance patterns in the two species indicate that the invasive potential of *D. villosus* is maximal at low temperatures but it is strongly reduced for temperature higher than 20°C.

PRELIMINARY RESULTS OF THE AMPHIPOD TAXOCOENOSIS ON HARD SUBSTRATS OF NORTH CRETAN SEASHORE (O)

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A biodiversity study of hard-substrate faunal assemblages was carried out at two sampling sites at a Cretan seashore within the framework of the international project NaGISA. At each site replicate samples were collected at 1, 5, 10, 15 and 20 m depth using the NaGISA standard protocol. Analysis of the macrofauna revealed that in terms of abundance, crustaceans were the third group, after mollusks and polychaetes. Among the crustaceans, amphipods were the dominant taxon. New elements of the amphipod fauna biodiversity are discussed in relation to the environmental status of the study areas.

NEW RESULTS OF THE AMPHIPOD PILOT SPECIES PROJECT (AMPIS) (O)

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The Amphipod Pilot Species Project (AMPIS) is now in its third year and a number of new findings regarding the functional morphology, behaviour, physiology and ecology of the species *Dikerogammarus villosus* Sowinsky will be presented. This will include video footage of a number of experiments with this species and several *Gammarus* species.

DNA BARCODING FOR MARINE AMPHIPODS: IDENTIFICATION TOOL AND BEYOND (O)

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DNA barcoding based on a small fragment of mitochondrial DNA from the 5'-end of cytochrome c oxidase 1 was proposed as an identification tool across species from the entire animal kingdom. In the marine environment, a DNA-based approach would have multiple applications, such as: reliable diagnosis across all life stages, permanent species tags unchanged during taxonomic revisions, detection of invasive species and processed seafood substitutions or estimation of stock size of harvested species based on larval abundances. DNA barcodes are rapidly accumulating and, as such, their implications for various types of research are growing. For instance, a large database could be useful to gain insights into molecular evolution, cryptic speciation or comparative phylogeography of various groups. Here we present results from a regional-scale approach to barcoding marine amphipods from North Atlantic and Arctic waters. Morphological species were usually resolved as clusters of highly similar sequences and with at least 10 × greater divergence between than within species. Cases of deep intraspecific variation (3.5-15%) were considered as potential cryptic species. Major genetic breaks were found when comparing Gulf of St. Lawrence with

Gulf of Mexico (e.g., talitrid amphipods) or Arctic Canada (e.g., *Gammarus oceanicus*). At smaller spatial scales, dispersal abilities shape the genetic structure of various amphipod species. Since amphipods are direct developers, dispersal of juveniles and adults has major implications for population connectivity, hence speciation rates. This study highlights the importance of including geographic aspects during sampling to uncover the extent of intraspecific variation and the role of DNA barcoding beyond species identification.

GAMMARIDS OF TUNISIAN INLAND WATERS (P)

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Gammarid fauna of North African inland waters remains poorly studied. In Tunisia, the distributional data come from some 12 localities only, explored more than three decades ago. Altogether 5 species were recorded from the country. One of them, *Gammarus gauthieri*, was reported without any localities and no solid data supporting its occurrence in Tunisia could be found in literature. Remaining species belong to *Echinogammarus*: *E. afer*, *E. tacapensis*, *E. simoni*, *E. dactylus*. All but the first one were described based on materials from Tunisia. The last one is known so far from the type locality only. Our aim is to update the data upon distribution and taxonomy of gammarids from Tunisian inland waters, based on the literature data and material collected during the three week long expedition to Tunisia organised in March/April 2010. Gammarids were found in 17 localities, including *loci typici* of species described from Tunisia. Eight localities were in southern part of the country. Among them three samples were collected from small springs in oases (Chebika, Hallouff, Lalla) and further five from small rivers. In the steppe area from Sfax to Kairouan no gammarids were found. Two samples were collected in rivers of the Maktar upland region. Seven sampling sites were located in North-Western Tunisia, mostly in streams and small rivers of Teboursou and Medjerda mountains. The poster will present results of our study upon this recently gathered collection.

ARE THE LIMPETS' SHELLS A SURROGATE HABITAT FOR AMPHIPODS? (P)

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Cymbula nigra (Gastropoda: Patellidae) is an endangered limpet species commonly present in the intertidal rocky shores of the Strait of Gibraltar. Its vertical distribution is that of a typical low intertidal gastropod, where juveniles are located in the upper areas and where the largest adults are immersed in the *Corallina elongata* belt. Previous studies determined the presence of peracarids under the limpets' shells. The objectives of this study were to determine what species are associated with *C. nigra* and infer on the type of association between them. During the present study, limpets were classified (by their maximum shell length) in size classes of 1-centimetre intervals. A total of 3 limpet individuals per size class (when possible) were monthly lifted at low tide with the help of a spatula. Peracarids under their shells were collected using a waterproof aspirator. Limpets were then returned to their home scars, and the associated fauna was fixed in ethanol and preserved for further identification. Additional parameters such

the limpets' height over water level, shell length, height and morphological type were also measured. Three *C. elongata* samples were also taken seasonally using a 20x20cm quadrat. Results showed that 97% of the individuals found under shells were gammarids, and 95.6% corresponded to *Hyale perieri*. The highest abundance values were recorded during summer months (June-September). Furthermore, tanaids were only present under morphotype 3 shells (usually present in the *C. elongata* belt). Isopods were positively correlated with the limpets' height over water level. All species found under shells were also found in the seaweed samples except for *H. perieri*. This species is usually present in the *Fucus spiralis* (on higher belts) but was not observed on the bare rock either. *C. nigra* shells could be acting as a surrogate habitat in the absence of the natural ones (*Fucus* belt) and the presence of these limpet individuals could locally enhance species diversity. Moreover, they were recorded regardless the limpets' height over water level or shell length. Results could be indicating that *H. perieri* individuals find under these limpets' shells their own habitat, which would additionally help preventing desiccation during the summer months.

INFLUENCE OF MEDITERRANEAN-ATLANTIC GRADIENT ON SEASONAL FLUCTUATIONS OF INTERTIDAL CAPRELLIDS ASSOCIATED TO THE INVASIVE ALGA *ASPARAGOPSIS ARMATA* (P)

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Caprellid fauna associated to *Asparagopsis armata* along the axis Mediterranean-Atlantic from the Strait of Gibraltar was studied bimonthly (Feb08-Feb09). Samples were collected (three replicates of 20x20 cm) and water temperature was measured at five stations. Eight species were found: *Caprella acanthifera*, *C. danilevskii*, *C. equilibra*, *C. grandimana*, *C. hirsuta*, *C. liparotensis*, *C. penantis* and *Pseudoprotella phasma*. *Caprella hirsuta* was the most discriminating species between Mediterranean and Atlantic stations, reaching high abundances only in the strictly Mediterranean localities. The seaweed biomass showed higher values in April-June while water temperature was higher in August-October. Maximum caprellid densities were found in April-June (Mediterranean stations) and August-October (Atlantic stations) showing a clear gradient along the spatial axis. Optimal seasonal environmental conditions for caprellid cycles are reached sooner in the Mediterranean than in the Atlantic and this pattern could explain the differences in caprellid abundance.

THE POSSIBLE USE OF SANDHOPPERS AS BIOINDICATORS OF ENVIRONMENTAL STRESS ON SANDY BEACHES (O)

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Several studies have addressed the biology and behavioural adaptations of sandhoppers, common and widespread inhabitants of sandy beaches in temperate areas. The increasing stress (both natural and anthropogenic) to which beaches are subject around the world has posed the question of the choice of good indicators to monitor changes in sandy beach ecosystems and propose management options for their conservation. Sandhoppers carry out their whole life cycle on the same beach throughout the year, so they may integrate the effects of environmental changes over a

yearly time scale in population features. Moreover, throughout their life cycle, sandhoppers occupy various sectors of the beach, from the intertidal zone up and behind the dunes, integrating the local spatial scale under concern. Comparisons among populations from beaches subject to different stressful factors have been conducted over a wide geographical scale (that of the species distribution) and a large base of data exists. Population characteristics, such as seasonality of the life cycle, age structure, sex ratio and genetic variation, as well as behavioural and physiological traits, have shown a potential for their use as suitable bioindicators of mechanical stress on beaches. However all these traits may vary depending on population abundance and sampling strategy used, so meta-analyses of data from different areas and research groups are of difficult application. Estimates of behavioural traits (e.g., orientation) have been proposed as early warning bioindicators of habitat changes. On the other hand, sandhoppers are robust with respect to chemical pollution and adapt easily to changing ecological conditions.

CRUSTACEAN AMPHIPODS FROM THE SEAGRASSES *ZOSTERA MARINA*, *CYMODOCEA NODOSA* AND *POSIDONIA OCEANICA* IN THE ADRIATIC SEA (ITALY): A FIRST COMPARISON (P)

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In the framework of a wider research programme aimed at identifying the functioning and the temporal dynamics of seagrass ecosystems along the Italian coasts of the Adriatic Sea, crustacean amphipods were studied in *Zostera marina*, *Cymodocea nodosa* and *Posidonia oceanica* beds. Data on *Z. marina*, which is very rare in the Mediterranean Sea and is scarcely studied as it concerns amphipods, are of particular interest. Samples were collected by hand-net and air-lift sampler in *Z. marina* (- 0.5 m) and *C. nodosa* (- 1.2 m) at Grado (northern Adriatic Sea), and in *P. oceanica* (- 6.5 m) at Otranto (southern Adriatic Sea). First data from ten samples collected in February and May 1997 are given. Fifty-five species (*Z. marina*: 24; *C. nodosa*: 29; *P. oceanica*: 31) in 41 genera and 25 families belonging to 7324 individuals were identified. The cluster and nMDS analyses showed the presence of different assemblages in the three seagrasses. The lowest average dissimilarity was present between *Z. marina* and *C. nodosa* (43.13: air-lift sampler; 51.66: hand-net) and the higher between *Z. marina* and *P. oceanica* (81.36: air-lift sampler), and between *C. nodosa* and *P. oceanica* (77.41: hand-net). The species which are dominant and/or characterize each assemblage are *Dexamine spinosa*, *Periocolodes aequimanus* and *Gammarus insensibilis* in *Z. marina*, *Metaphoxus fultoni*, *Ampithoe helleri* and *Caprella acanthifera* in *C. nodosa*, and the small sized *Apolochus neapolitanus*, *Peltocoxa marioni* and *Cressa cristata* in *P. oceanica*. The importance of the features of the sampling sites, the plant structure, the season and the sampling method in defining assemblages is discussed.

WHAT WE KNOW ABOUT THE MARINE BRAZILIAN AMPHIPOD FAUNA? – A BIOGEOGRAPHIC APPROACH (O)

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Since the publishing of the Catalogue of Crustacea of Brazil in 1998, where 136 species of marine gammaridean and caprellidean amphipods were recorded for the Brazilian waters, much has been done in the increasing of the knowledge of this fauna. More sampling efforts in the northeastern and southeastern Brazilian coast, especially in the slope, have resulted in several amphipod new records and new species to science. Nowadays, 236 amphipod species are known from the Brazilian coast, which represents an increase of about 75% in the Brazilian amphipod diversity. To try to understand the biogeographic patterns on the Brazilian coast a PAE (Parsimony Analysis of Endemism) was performed. The list of the 236 marine species used in this analysis was compiled from the literature and from personal data of the authors. The coastal area between 5°N to 35°S latitude on the southwestern Atlantic was divided into squares of 5°, where the species were plotted. Also, areas below 200 m were considered apart to check the bathymetric influences in the analysis. Brazilian islands as Rocas Atoll, Fernando de Noronha and Trindade were also treated apart as well as the Banks of the Northern Chain. The program PAUP 4.0 was used to run the analysis. The Brazilian coast is divided in three large provinces – North Brazil Shelf; Tropical Southwestern Atlantic and Warm Temperate Southwestern Atlantic and the results clearly follow this division. To compare in a broad sense the Brazilian amphipod fauna with the Argentina, a correlation between these areas were made, where 31 families, 20 genera and 18 species were found to be in common.

ROCKY-BOTTOM CRUSTACEA FAUNA OF SINOP (BLACK SEA, TURKEY) COAST (P)

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This study was carried out to determine Crustacea fauna of rocky substrates along the Sinop Peninsula coast of Black Sea. The samples supra, medio and upper infralittoral zones from 7 stations as investigation region were chosen. Samples were collected seasonally. As a result of qualitative analyses of samples, a total of 66 species and 26777 specimens belonging to 40 genera, 30 families and 6 orders were found. The Isopods *Exosphaeroma pulchellum* (Colosi, 1921), *Idotea pelagica* Leach, 1815, *Armadilloniscus littoralis* Budde-Lund, 1885, *Halophiloscia couchi* (Kinahan, 1858), *Ligia italica* Fabricius, 1798, *Jaera hopeana* Costa, 1853 and *Jaera italica* Kesselyak, 1938 represent new records for the Crustacea fauna of the Turkish Black Sea coast. The most frequent species in all samples were the amphipods *Hyale crassipes* (93%), *Erichthonius brasiliensis* (89%), the tanaid *Tanais dulongii* (82%) and the isopod *Idotea balthica* (82%) are the species that have the highest frequency index values. The 82% of taxa were Atlanto-Mediterranean species.

SUBLITTORAL BENTHIC AMPHIPODS OF TURKISH AEGEAN SEA COAST (O)

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This study was carried out to determine amphipod species distributing along the coasts of the Turkish Aegean Sea. A total of 101 stations were chosen from the sublittoral zone located between the northern Enez (Edirne) (including Saros Bay, Gökçeada and Bozcaada) and southern Marmaris province. Benthic samplings were performed from different biotopes and depths (4-183 m). As a result of analyses of samples, a total of 169 species and 7215 specimens belonging to 71 genera, 31 families and 2 suborders were recorded. In the study area *Phtisica marina*, *Dexamine spinosa*, *Harpinia dellavallei* and *Caprella acanthifera* are the species that have the highest frequency index values. 71.6 % of recorded species were the species of Atlanto-Mediterranean origin.

REVEALING A HIDDEN SPECIES AMONG THE INDIVIDUALS TENTATIVELY IDENTIFIED AS *AMPITHOE TARASOVI* (CRUSTACEA: AMPITHOIDEAE) IN KOREA (P)

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Ampithoid amphipods are herbivorous amphipods living in algae and seagrass worldwide. They are known as tube-building species. Members of this group have their important taxonomic traits on their second gnathopods. However, the identification of ampithoid amphipods through morphology is difficult because their appendages show strong sexual dimorphism and variation during developmental stage. *Ampithoe* Leach, 1814 is the most speciose group among the ampithoid amphipod genera. *Ampithoe tarasovi* Bulycheva, 1952 is one of the common herbivorous amphipods in Korea. In this study, we found that morphological differences exist among individuals tentatively identified as *A. tarasovi*. We used a short DNA sequence, a 658 base-pair fragment of the 5' end of the mitochondrial cytochrome c oxidase subunit 1 (COI) gene, to see genetic variation among these individuals. Our results showed that the individuals tentatively identified as *A. tarasovi* were divided into two clusters in which both morphological difference and genetic variation were observed. The results raise the possibility that a hidden species may exist among the individuals tentatively identified as *A. tarasovi* in Korea.

DEEP SUPRABENTHIC AMPHIPODS FROM THE BELLINGSHAUSEN SEA, SOUTHERN OCEAN – BENTART 2006 CRUISE (P)

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During the austral summer BENTART 2006 cruise in the Bellingshausen Sea, 12 stations along the pack-ice margin were sampled with a suprabenthic sledge (3 superimposed nets, 0.5 mm mesh size), at depths ranging from 431 to 3280 m. The material collected (mainly peracarid crustaceans) with this gear was sorted on board into major taxonomical groups. On the whole, amphipods (numerically dominant at 9 stations) represented 50.4% of the total of individuals. They were classified on board at family level: Gammaridea: 22 families; Corophiidea: 5 families; Hyperiidea: 3 families. Four groups of stations were discriminated by the multivariate analysis carried out on these taxa: group A (116 ind./100 m²; dominant taxa: Lysianassoidea, Melphidippidae and Synopiidae), group B (69.5 ind./100 m²; dominant taxa: Lysianassoidea, Stegocephalidae, Urothoidae), group C (63.1 ind./100 m²; dominant taxa: Eusiridae, Stegocephalidae) and the deeper station (2.0 ind./100 m²; only 3 taxa: Lysianassoidea, Oedicerotidae and Pardaliscidae). Amphipods from station TS34 (620-612 m) were subsequently studied at genus/species level. The 2040 individuals examined in this sample belong to 23 families and a minimum of 47 species. Synopiidae is the most specious family (2 *Syrrhoe* and 4 *Syrrhoites*). The numerically dominant species are the Melphidippidae *Melphidippa antarctica* (28.7% of total), the Lysianassidae *Lepidepcreum urometacarinatum* (18.1%) and a Synopiidae *Syrrhoites* sp. (6.2%) probably new to science. As usually observed elsewhere, the amphipod fauna was concentrated close to the bottom (respectively 85.8%, 9.8% and 4.4% of individuals in the 10-50 cm, 55-95 cm and 100-140 cm water layers sampled by the sledge).

THE ROLE OF FISH PREDATION IN THE STRUCTURE OF AMPHIPOD COMMUNITY ASSOCIATED WITH *POSIDONIA OCEANICA* SEAGRASS MEADOWS (O)

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Despite the major ecological importance of *Posidonia oceanica* seagrass meadows in the Mediterranean Sea, little attention has been given to community structuring forces by predators in this ecosystem. To better understand the mechanisms by which fishes affect amphipod community structure associated to *P. oceanica* beds, experimental manipulations of predation intensity (enclosure and exclusion cages) were set up in the Tavolara-Punta Coda Cavallo Marine Protected Area (Sardinia, NW Mediterranean). In totally protected area, where high abundance of predatory fishes is recorded, we have performed exclusion experiment. Total amphipod abundance increased at the end of the experiment, but diversity and specific composition were unaffected. At the species taxonomic level, significant increase in abundance between treatments appeared only for *Caprella acanthifera*. In partially protected area, where fish abundance is lower and amphipod abundance higher, individuals of the carnivorous fish *Coris julis* (Labridae)

were enclosed in cages to provide an estimate of the potential for this species to impact on amphipod community. There was a small but measurable effect on amphipod abundance between enclosures and unmanipulated controls. A few dominant amphipod species responded to fish predation by significant decrease in abundance. These results suggest that fish predation may determine the relative abundances in the community of some amphipod species and to some degree, through an untested link with habitat complexity, determine the spatial distribution of amphipod abundance within *P. oceanica* beds. Moreover, patterns observed at the species level, suggest parallel complex interactions probably mainly related to ecological behaviour of amphipod species.

THE BEGINNINGS OF A PHYLOGENETIC ANALYSIS OF THE STENOThOID GENUS *METOPA* (O)

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The Stenothoid genus *Metopa* includes 53 described species. It is one of the catch-all-genera of Stenothoidae and has been considered paraphyletic for a long time. We have studied the morphology of the described species, based on re-descriptions of the type material of 23 species, three new species from Krapp-Schickel and the literature available on the remaining 26 species (one *nomen nudum*). The 14 species of the genus *Stenula* were included in the analysis on the basis that the diagnostic character separating these two species (articulation of the mandibular palp) was shown to be ambiguous within these two genera. Our results indicate that the group *Metopa-Stenula* divides into two main groups (A and B), both containing species at present in both genera. We have erected the new genus *Glaciometopa*. New characters, especially on the mouthparts, have been found, and some molecular work (18S and CO1 for select species of *Metopa*) will be presented.

A NEW AMPHIPOD FROM THE LOKI'S CASTLE HYDROTHERMAL VENT FIELD (P)

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Deep-sea hydrothermal vents are usually associated with a highly specialized fauna, and since their discovery in 1977 more than 400 species of animals have been described. Specialized vent fauna includes various animal phyla, but the most conspicuous and well known are annelids, mollusks and crustaceans. The newly discovered deep-sea hydrothermal vent field "Loki's Castle" is located at 2400m depth at 70°N on the Knipovich Ridge north of Iceland. This black smoker field holds a unique fauna clearly distinct from the fauna from vent sites along the Mid-Atlantic Ridge. A new Melitid amphipod is among the most characteristic and dominating invertebrates

encountered. These are found in cracks and crevices on the chimneys as well as in areas with more diffuse venting along the base of the chimneys.

Here we present morphological as well as molecular data on this new amphipod. Stable isotopes and molecular data also provide information on the role of microbial symbionts in this apparently highly specialized amphipod.

SPATIAL DISTRIBUTION AND ECOLOGY OF SOFT BOTTOM AMPHIPODA ASSEMBLAGES IN THE CENTRAL AND SOUTHERN TYRRHENIAN SEA (O)

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The aim of this study was to investigate the composition and the distribution of soft bottom amphipoda assemblages in order to analyse the major environmental factors controlling the distribution and relationships patterns. The study areas, located in the Central and Southern Tyrrhenian Sea (Western Mediterranean Sea-Italy) were: Torvaianica (Central Tyrrhenian Sea), Terracina (Central Tyrrhenian Sea) and Baia (Southern Tyrrhenian Sea). Benthic samples were collected at 5, 10, 20 and 30 m depth by a van Veen grab (sampling surface 0.1 m²) in each area. At the same areas superficial sediments were also collected and grain-size analyses were performed. Univariate (species richness, evenness and diversity indices) and multivariate analyses (Multi Dimensional Scaling) showed qualitative and quantitative differences between the amphipoda assemblages of the three areas. Between 5 and 10m depth the most abundant species occurred in Terracina were exclusive of the well sorted fine sand biocoenosis (e.g. *Bathyporeia guilliamsoniana* and *Ampelisca brevicornis*) instead in Torvaianica and Baia were typical of muddy-sandy bottom (e.g. *A. diadema*). At 20 and 30 meters depth amphipoda assemblages were typical of mixed sediments (sand and silt) (e.g. *Siphonoecetes dellavallei* and *Urothoe grimaldi*) in all the areas. The difference observed between the amphipoda assemblages of the three areas were related to both the different grain-size distribution of sediments and the local edaphic conditions (e.g. the presence of *Posidonia oceanica* meadow in Terracina) as well as to the geographical distribution of the species.

BATHYAL AMPHIPODA FROM THE SHELF OFF THE GOLFO ÁRTABRO (GALICIA, NW IBERIAN PENINSULA) (P)

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Amphipods are one of the most important groups of marine crustaceans, inhabiting a variety of habitats from intertidal zones to abyssal plains. The knowledge of deep-sea crustacean fauna, in general, and of amphipods in particular, is scarce in the Galician coasts. Two oceanographic expeditions were done in September 2002 and 2003 within the DIVA ARTABRIA I project. The aim of these expeditions was to describe the composition and ecology of the bathyal fauna in the continental shelf and the upper slope off the Golfo Ártabro (Galicia). Three different gears were used to collect the samples (Agassiz Trawl, Naturalist dredge and Epibenthic sledge) in a transect covering a depth range of between 150 and 1140 m. Preliminary results are presented in this communication about composition and distribution of amphipods, from samples

taken at the continental shelf at depths of between 150 and 400 m. 14 different families were identified in samples; multivariate analyses showed differences in amphipod composition according to bathymetry.

ECOLOGY OF AMPHIPODS *GAMMARUS LACUSTRIS* IN A STRATIFIED MEROMICTIC LAKE (O)

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The dynamics of abundance, size structure, and space distribution of *Gammarus lacustris* were studied in lake Shira (Russia, Khakasia) for two growth seasons. Distribution of *G. lacustris* in the littoral zone was investigated over the central transect using vertical plankton net hauls. Fine vertical structure of population in the pelagic zone was studied with the underwater video recording system. The seasonal development of population resulted in marked changes in both size structure and space distribution. The young instars (5mm long) became more abundant in the littoral zone in the middle of summer (from 200 to 850 individuals per m²) while large animals (9-13mm) moved to the deeper part of lake (8, 12 and 22m). We found high adaptation of *G. lacustris* to the pelagic way of living in lake Shira. Videodata revealed the peak densities in the metalimnion, up to 150 animals per m³, which strongly correlated with the depth of the thermocline. The pelagic part of the *G. lacustris* population appeared to be unrelated to the bottom as the zone below 12m is anoxic. The results of 20-day enclosure experiment in the lake confirmed that *G. lacustris* can completely switch to the plankton food. The absence of predators, high concentration of oxygen, optimum temperature (16°C) and high concentration of seston in the metalimnion are the most probable combination of factors that favors the stable peak of *G. lacustris* in the metalimnion. The work was supported by grant RFBR No. 08-04-01232 and integration project of SB RAS No. 95.

CONTRIBUTION TO THE KNOWLEDGE OF EUROPEAN LILJEBORGIIDAE, WITH SYSTEMATIC REMARKS ON THE FAMILY (P)

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A revision of the European Liljeborgiidae is used for various systematic considerations. The systematic position of the Liljeborgiidae amongst non-calceolated gammaromorph amphipods is re-examined, and affinities with the Cheirocratidae and the Megaluroipidae are suggested. The Liljeborgiidae can be recognized by the palmar ornamentation of the gnathopods and their first antennae. Furthermore, with the notable exception of *Sextonia*, the family exhibits a reduced, non-triturative, and strongly setose mandibular molar process. It can be subdivided into an idunellan group (*Idunella*, *Listriella* and *Sextonia*), where the carpus of the gnathopods is basal, and a liljeborgian group (*Liljeborgia* sensu lato), where the posterior border of the carpus of the gnathopods is produced into a long lobe. Characters previously proposed for separating *Listriella* from *Idunella* (relative dominance of the gnathopods) proved to be unsatisfactory and the validity of *Listriella* has sometimes been questioned. The morphology of the outer plate of the maxilliped is here proposed as a new character for

separating these two genera. *Sextonia* proves to be very similar to *Idunella* but departs from all other known Lilljeborgiidae by its unmodified mandibular molar process. It is also proposed to subdivide the genus *Lilljeborgia* into three subgenera: *Lilljeborgia*, *Lilljeborgiella* and *Isipingus*. The two first subgenera are speciose, widely distributed in the world oceans and well represented in European waters. They can be separated from each other by the setation of the maxillipedal palp and the spination of the peduncle of the first uropod. The third subgenus is inadequately known and absent from European waters.

FORTY YEARS OF AMPHIPOD NEWSLETTER (O)

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The first issue of the Amphipod Newsletter, entitled: 'An Amphipod Newsletter, a feasible idea?' came out in January 1972; the idea was born during a meeting of the contributors to the Mediterranean Amphipod Monographs in Verona, Italy, the year before. Reactions were positive and many colleagues subscribed to the mimeographed newsletters, produced by Wim Vader in Tromsø, the first years with the assistance of Zootaxa in Sweden. A group of regional editors helped collecting the subscription money. Since then 34 issues have appeared, originally in mimeographed form, in later years online, on the Amphipod Website. In addition to Wim Vader, who has been involved in all issues, several colleagues have assisted in the production: Les Watling (Maine), Jim Lowry (Sydney) and Kathy Conlan (Ottawa), while George Crawford (Northampton) has been of great help in the production of an index to all amphipod species described since 1974. The present editor of AN will probably soon be unable to continue this work, and the conference needs to discuss, whether an Amphipod Newsletter still is 'a feasible idea', or whether it no longer is of much use in these days of much easier information retrieval. If AN is to continue, it will need a new editor before long.

MORPHOLOGICAL STUDY OF GAMMARUS SPECIES IN GUILAN PROVINCE, NORTHERN IRAN (P)

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Amphipods of the genus *Gammarus* occur abundantly in a wide variety of freshwater habitats throughout the northern hemisphere. Gammarid diversity in Iranian inland waters has still been poorly studied taking into account the large country area. Most of the already discovered species belong to the *Gammarus pulex*-group. Guilan province located in the northern Iran is characteristic for its temperate humid climate and mountainous forest areas rich in streams and rivers. Our aim was to study the morphological variability of *Gammarus* species collected at 9 stations in 3 rivers of Guilan province. Gammarids were collected from aquatic plants or beneath small

stones and fixed in 70% ethanol. Specimens were studied morphologically under stereomicroscope. Our study revealed three species of *Gammarus*, including *Gammarus komareki* previously recorded from Iran and 2 presumably new taxa: *Gammarus* sp1 and *Gammarus* sp2 showing affiliation respectively to *Gammarus komareki* and *Gammarus pulex pulex* but different in the armature of antenna 2, position of gland cone to the third peduncular segment, armature of gnathopods, shape of epimeral plates, size of uropod 3 branches and armature of telson. To study the morphological variability 44 characters (40 metric and 4 meristic) were measured for 20 specimens (10 male, 10 female) of *G. komareki* from 2 rivers (Masuleh and Siahmezgi). Apart of the usual sexual dimorphism within populations, the CVA analysis revealed that while in Masuleh river all *G. komareki* were morphologically uniform, those collected in Siahmezgi showed substantial variability suggesting some level of differentiation.

IMPORTANCE OF DETRITUS FOR AMPHIPODS IN SHALLOW WATER HABITATS: A FIELD EXPERIMENT (P)

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Detritus plays an important role as a trophic resource for marine invertebrates, since it serves as a main trophic pathway of the marine ecosystem, and is one of the most important features of habitat structure in vegetated habitats. Studies have indicated that amphipods do not consume algal biomass directly, but feed on associated material such as detritus, rather than utilising the plant substratum as food. Since it has been demonstrated that amphipods can actively choose a substratum, the main aim of the present study was to address the question: "to what extent is detritus stock important for amphipods in habitat selection?" To address this question, field experiments on habitat selection by amphipods were undertaken in the field. Mesh bags that represented two different treatments were deployed in the field: artificial substratum (high habitat complexity) and empty mesh bags (no habitat complexity) as controls. For each treatment, three different levels of detritus were provided: (i) high, (ii) low, and (iii) no detritus; 5 replicate samples for each treatment and detritus level were used. The bags were placed on a rocky substratum at a water depth of 6 m for a period of 14 days, after which they were collected and the amphipod fauna assessed. The experiment was replicated at two localities (Malta and Spain), and within two sites per locality. The results showed that amphipod species richness and abundance was higher in Malta. In general, an interaction of artificial substrate and detritus was evident, since detritus seems to enhance the contributing effect of habitat complexity by adding structural heterogeneity. At the species level, different results were obtained, for example, the amount of detritus appears to be an important factor for habitat choice by *Elasmopus brasiliensis* and *Microdeutopus* spp. but not for *Caprella acanthifera*.

EFFECT OF TEMPERATURE ON THE COEXISTANCE OF *DIKEROGAMMARUS BISPINOSUS* AND *GAMMARUS ROESSELI* (P)

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Dikerogammarus bispinosus, together with other omnivorous gammarids of Ponto-Caspian origin such as *Dikerogammarus villosus* and *Echinogammarus ischnus*, negatively impacts the autochthonous fauna in big European streams like the Danube. However, Ponto-Caspian gammarids never invaded tributaries where native gammarids (e.g. *Gammarus roeseli*) managed to survive. Furthermore, observations from Lake Constance show that the abundance of Ponto-Caspian invaders decreases in littoral zones during winter. Therefore we hypothesized that temperature has an impact on the survival of native gammarids when facing invasive gammarids. To evaluate this hypothesis, we conducted a series of 1:1 predation trials in a temperature and light controlled environment. For this purpose, microcosms – each containing 0.5l of fluvial water – were supplied with aeration, substratum and food. Combinations of one specimen of *D. bispinosus* and one specimen of *G. roeseli* were observed for 5 days each (n=135). To check whether death of *G. roeseli* was caused by predation, a series of trials with microcosms containing only a single specimen of *G. roeseli* was conducted (n=135). Each time one *G. roeseli* died or was consumed, another specimen was replenished. These trials were repeated at three different temperatures: 22°C, 12°C and 2°C. The results show that *D. bispinosus* proved to be a very strong predator consuming *G. roeseli* in all three temperature treatments. There were no significant differences between treatments at 12°C and 22°C; however, predation at 2°C turned out to be significantly lower when compared with the other treatments. Hence, it can be concluded that natural populations of *G. roeseli* experience less predation by *D. bispinosus* during seasons or within habitats dominated by low temperatures.

GLYPTOGIDIELLA OMANICA, N.GEN., N.SP., AN INLAND GROUNDWATER BOGIDIELLID FROM OMAN WITH ENLARGED COXAL PLATE V (AMPHIPODA, GAMMARIDEA) (P)

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Nine specimens of a new Bogidiellid were retrieved from the hyporheic flow of a dry wadi in the Barka region, and in one case from an open well in the vicinity of the city of Nizwa, both localities situated in the North of Oman. The specimens are characterized by an exceptionally large coxal plate of the fifth pereopod.

Earlier investigations in the stygobiont crustaceans of the same groundwater expedition in 1996 revealed new species of Bogidiellidae that were placed in two separate new genera. Now, partially from the same locality as one of these genera, another new species and genus is described. The new species is found, as were the previous discoveries, in almost purely freshwater conditions.

CRYPTIC DIVERSITY WITHIN *GAMMARUS PULEX* AND *G. FOSSARUM*: A STUDY COMBINING PHYLOGENETIC, MATING AND MORPHOLOGICAL DATA (P)

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The results presented here are part of a project aiming at combining three concepts of specific status: typological (based on morphology), phylogenetic (based on DNA sequences) and biological (based on reproductive isolation). Around 250 specimens including both *Gammarus pulex* and *G. fossarum* were sampled from 4 river basins (Loire, Rhin, Seine, Rhone) around Dijon, Burgundy, and sequenced for both COI (mtDNA) and 28S (nrDNA). Applying different molecular divergence thresholds (eg 3% k2p distance, patristic distance...) allowed identifying cryptic diversity, with up to 7 "phylogenetic species" within a typological species. Morphological features described in the literature proved to be of little help. Two "phylogenetic species" of *G. fossarum* were present in the sample sampling site. *In natura* couples in mate guarding were sampled and identified for their phylogenetic status. Out of 60 couples, none was combining individuals from two different phylogenetic lineages. This illustrates the fact that one individual belonging to one phylogenetic species is able to recognise and choose specifically its sexual partner *in natura*. This pre-zygotic barrier to cross-species reproduction is recognised as one key feature defining a biological species.

COMMUNITY STRUCTURE OF AMPHIPODS ON SHALLOW *POSIDONIA OCEANICA* MEADOWS OFF TUNISIAN COASTS (O)

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Posidonia oceanica, endemic magnoliophyte species in the Mediterranean Sea, is the most abundant and widely distributed seagrass species along the Tunisian coasts. Its meadows constitute a very important ecosystem for benthic communities thus providing habitat, protection and trophic resources for many amphipods species. To study the structure, diversity and spatial distribution of the amphipod fauna associated with *Posidonia oceanica* meadows in the Tunisian coasts, samples were collected in nine different meadows at 2 m depth. A total of 44 species belonging to 12 families were collected, among them, two indo-pacific amphipods species were recorded for the first time in Tunisia. The most common species in terms of abundance were *Ampithoe helleri*, *Hyale comptonix* and *Erichthonius punctatus*, representing also the constants species. The highest values of abundance and species richness and the lowest values of diversity and equitability were recorded in meadows exhibiting a high epiphyte biomass. Multivariate analyses of data indicated that epiphyte biomass and geographic position were the major determinants of the distribution and composition of amphipod assemblages in shallow *Posidonia oceanica* Tunisian coasts. This study shows that the presence of indo-pacific amphipods species can deeply alter the population structure.

MORPHOLOGICAL ADAPTATIONS OF FRESHWATER *GAMMARUS* IN STRESSFUL WARM ENVIRONMENTS OF SOUTHERN ZAGROS, IRAN (O)

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Increasing setation in gammarids can improve the animals' respiratory functions at conditions of higher temperature and salinity. Length and density of the setae was measured in first and second antennae, gnathopod 1, and pereopod 7 in 6 *Gammarus* species inhabiting central to southern Zagros region. Setation increased from northern to southern species on pereopod 7, and to a lesser extent on second antenna. Gnathopod 1 and first antennae showed no significant differences among the populations. Increased setation of pereopod 7 and second antenna positively correlated to increase of temperature, electrical conductivity, and salinity, and decrease of dissolved oxygen. These findings can be explained by ventilating activity of appendages which improves the respiratory efficiency of the animal. This adaptation is most visible in pereopods and can be explained by their closer distance to the gills. Bent shape of second antenna makes it more effective, while first antenna and gnathopod 1 have neither configuration nor functional relation to respiration.

FRESHWATER *GAMMARUS* IN THE ZAGROS MOUNTAINS (P)

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Although the first records of Iranian freshwater *Gammarus* date back to 1930s, very few extensive studies were performed up to date. Until now 14 species of the genus have been recorded from Iran, among them 10 are probably Iranian endemics. Large country area, landscape, climate and habitat variety suggest that there are possibly more species yet to be discovered. The 1600 km long chain of the Zagros Mountains extending along the Iranian western border seems to be a speciation hot-spot for many taxa. Previous studies in this region revealed presence of 12 *Gammarus* species new to science. Our investigation adds four new species to this list: *Gammarus sepidannus*, *G. zagrosensis*, *G. shirazinus* and *G. loeffleri*. All of them belong to *G. pulex* – group. The first two inhabit cold waters ($\leq 13^{\circ}\text{C}$) of low ionic content ($\leq 410 \mu\text{S}\cdot\text{cm}^{-1}$) in small alpine springs at high altitudes (1900-2350 m asl). The latter two occur in lower altitudes (1100-1800 m asl) in streams and springs of higher temperatures ($\leq 25^{\circ}\text{C}$) and ionic contents ($\leq 1800 \mu\text{S}\cdot\text{cm}^{-1}$). Morphological characteristics and variability, ecology and distribution of the species will be discussed.

DISTRIBUTION OF EPIGEAN FRESH AND BRACKISH WATER SHRIMPS (AMPHIPODA: GAMMAROIDEA) (P)

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Distribution of 17 epigean gammarid species of the families Gammaridae and Pontogammaridae was established in Croatia by examination of samples from 420 sites and using all available literature data. The most widespread species are *Gammarus fossarum* and *G. balcanicus* which were dominant species distributed in the Black Sea (BSD) and the Adriatic Sea (ASD) drainage basin, respectively. *G. roeseli* was recorded only in the BSD at 42 sites. Among nine species of the genus *Echinogammarus* that were recorded, only species *E. acarinatus*, *E. pungens*, *E. thoni* and *E. veneris* are more widespread. Distribution of four endemic species, *E. acarinatus*, *E. cari*, *E. thoni* and *Fontogammarus dalmatinus* was established. Species *E. cari* is restricted only to 15 km of the Gojačka Dobra River and its tributaries Ribnjak and Bistrica streams, and after the finish of HPP Lešće in 2010, 60% of its present areal will be destroyed, and the species will become endangered. Presence of four alien species from the family Pontogammaridae was established in the Danube, Sava and Drava Rivers. *Dikerogammarus bispinosus* and *Obesogammarus obesus* were recorded only in Danube. *D. haemobaphes* was found in lower course of Sava up to the mouth of the Una River (524 km upstream) and on two sites in Drava (175 and 195 km from the mouth). *D. villosus* is dominant gammarid in the whole Croatian course of Danube and in Drava up to the site of 175 km from the mouth. Records of *D. villosus* at two upstream sites in Drava in low numbers indicate that the species is spreading further upstream.