



## **PROGRAMME & ABSTRACTS**

**Edited by Ilona B. Muskó**



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### Welcome and information

#### Welcome

The Organizing Committee welcomes you to the 13th International Colloquium on Amphipoda (13th ICA) hosted by Balaton Limnological Research Institute of the Hungarian Academy of Sciences, Tihany, Hungary from 20 to 25 May 2007.

The International Colloquia on Amphipoda are held every three-four years, the earlier ones were:

- 1st Colloquium in Verona, Italy, 1969 (Ruff and Krapp);
  - 2nd Colloquium in Lyon, France, 1973 (Ginet and Roux),
  - 3rd Colloquium in Schlitz, Germany, 1975 (Husmann and Meijering);
  - 4th Colloquium in Blacksburg (Virginia) USA, 1978 (Holsinger and Buikema);
  - 5th Colloquium in Lodz and Chestochowa, Poland, 1981 (Jazdzewski);
  - 6th Colloquium in Ambleteuse, France, 1985 (Stock and Pinkster);
  - 7th Colloquium in Maine, USA, 1990 (Watling);
  - 8th Colloquium in Lodz, Poland, 1994 (Jazdzewski and Konopacka);
  - 9th Meeting ('Amphipod chat-shop') in Kronenburg, Germany, 1998 (Krapp and Vader);
  - 10th Colloquium in Heraklion, (Crete), Greece 2000 (Plaiti);
  - 11th Colloquium in Tunis, Tunisia, 2003 (Charfi);
  - 12th Colloquium in Cork, Ireland, 2005 (Myers).
- Three unofficial meetings and chat-shops were also held:
- 1970: Karlsruhe, Germany;
  - 1992: Jerry Barnard Memorial Symposium in Washington DC, USA (James D. Thomas);
  - 2001: Unofficial chat-shop in Tasmania, Australia (Bradbury and Richardson).

Like the previous Colloquia, the 13th ICA will be devoted to study of the Amphipoda, and will bring together scientists from around the world to discuss any aspects of the Amphipoda.

We hope you enjoy the programme, but also that you have the opportunity to see Tihany, this jewel of Hungary. For more information about Tihany see: [http://www.tihany.hu/docs/Tihany\\_2006\\_eng.pdf](http://www.tihany.hu/docs/Tihany_2006_eng.pdf)

## **General information**

### **Getting around**

Tihany is 8 km away from Balatonfüred, to where trains and buses arrive from Budapest. After arriving at the Airport Ferihegy, Budapest, it is necessary to go to either Déli Pályaudvar (South Railway Station), or to the Central Bus Station in Népliget. Buses and trains travel to Balatonfüred (the final station of the railway is Tapolca). The distance to Balatonfüred from the airport is 150 km, and will take approximately 2,5- 3 hours by train and bus, 1,5 hours by car. There are frequent buses from Balatonfüred to Tihany (the Bus Station is in front of the Railway Station, choose stop No 3, and get out of the bus at Tihany Hajóállomás (Ship station). The colloquium venue is 300 m from the bus stop. For more information: <http://www.blki.hu/BLRI.htm> under the title: Access path. In case of any problem the cellphone of Csilla Balogh is: 36 20 490 2703.

### **The colloquium venue**

The Colloquium will be held in the 80 year old Balaton Limnological Research Institute of the Hungarian Academy of Sciences, Klebelsberg K. str. 3.

<http://www.blki.hu/BLRI.htm>

The Institute was opened on September 5, 1927 as the Hungarian Biological Research Institute. "In 1951 the Institute was attached to the Hungarian Academy of Sciences (HAS) under the name of Biological Research Institute of the HAS. As a result of the continuous deterioration of the Lake's hydrobiological state and the recognition of the degree to which research could provide real assistance in preservation of the water quality, the HAS changed the name of the Institute in 1982 to the Balaton Limnological Research Institute, and its main task became to carry out the research of Lake Balaton."

"The several-story-high main building houses the laboratories, the library, the main offices, the aquarium room and workshops. The building is joined by two arcades, one leading to the guest house and the other to researchers' apartments. Changes to the Institute that have taken place in the past decades are the addition of a story in the guest house, that also now contains 15 guest rooms, 2 apartments, a conference hall that seats 100 people, a restaurant and the office of administration and finances offices, and the researchers' apartments have been modified into a building purely for research. The 2 hectares of lakeside parkland surrounding the institute provides a unique beauty. Over the years, six new researchers' homes have been built in the area leading from the roadway to the hillside". For more information see <http://www.blki.hu/BLRI.htm> under the title: History of the Institute.

The water temperature of Lake Balaton can be more than 20 °C at the end of May, so please, bring swimsuit!

### **Registration**

Upon arrival, please register in the hall of the Guesthouse, collect your delegate pack and your name badge which you are requested to wear at all times. The registration desk will be open on Sunday 20 May, 14:00- 19:00 and from 8:00 -10:00 Monday 21 May. The members of the Organizing Committee will be available during the Colloquium.

### **Get-together party**

On 20 May 19:00 in the restaurant of the Guesthouse (a glass of wine and some cakes)

### **Welcome Reception**

On 21 May 19:00 in the restaurant of the Guesthouse.

### **Scientific sessions**

The Scientific sessions and poster presentations will take place in the Lecture Hall of the Guesthouse.

### **Oral presentations**

Oral presentations are limited to 30 minutes including 25 minutes of presentation and 5 minutes for discussion. Chairs of sessions will be asked to strictly adhere to the published schedule, so please keep your talk to 25 minutes. Facilities will be available for slides, overheads, and Powerpoint presentations (PC with CD-ROM drive and USB-port, but with no zip drive or unzipping software). Speakers should deliver their media files/presentations to the technician as soon as possible.

### **Poster presentations**

Posters should be prepared as follows: width: 80 cm, height: 110 cm.

Poster boards will be labelled with number of your poster (to be found in Posters listed, see pages 12-13. Fixing material will be provided in the lecture room.

Posters should be mounted by 14:00 Monday 21 May, they will be presented until the end of the Colloquium, and they should be removed thereafter.

Authors are encouraged to present the content of the poster (maximum 3 minutes, plus 2 minutes discussion) during the Poster Session.

We recommend bringing a sufficient number of A4 handouts of your poster, to be displayed together with the poster itself. This will enable participants to create their own collections of poster copies.

### **Practical information**

#### **Meals**

Meals (lunch and dinner) for the participants who have requested them on the Registration Form for Payment will be served in the restaurant in the Guesthouse. Meals can also be purchased in the vicinity of the Colloquium venue, or in the settlement which is 10-20 minutes walking distance, in the settlement. Coffee and tea (with some cakes) will be served during the scheduled breaks, at the entrance of the lecture room.

#### **Notice board**

There will be a notice board in front of the Reception Desk for conference announcements and for delegates to place messages to each other.

#### **Internet**

Limited free internet access will be available to delegates during the sessions.

#### **Banks**

There are two Cashline machines (Bankomat) in the settlement (at the Mayor office and at the Ferry). There are also several banks in Balatonfüred (8 km from Tihany, there is frequent bus connection between Tihany and Balatonfüred).

#### **Excursion**

Wednesday is the day of the mid-symposium excursion. The fee is included in the registration fee. The bus will depart from our Institute at 7:00 am and go to Balaton Highlands National Park until Kékkút, where the local architecture will be shown. We will then continue to

Keszthely and visit Festetich Castle and have lunch. After lunch we will visit the Kis-Balaton Water Protection System (a bird paradise). After it we will visit the Wine-growing Research Institute in Badacsony, and enjoy a glass of wine. We will arrive back to the Institute at 19:00.

### **Congress Dinner**

Thursday (24 May) departing the Institute at 17:00, we will visit the 950 year old Benedictine Abbey. An English-speaking guide will give us a tour of the Abbey and thereafter will be a short organ concert. The Congress Dinner (at 19:00) will be in the restaurant “Kolostor” (=Cloister), near the Abbey, and we will experience fine traditional Hungarian cuisine, along with folk music and dancing.

### **Acknowledgement**

A generous donation from the Amphipod Newsletter (editor: Wim Vader) made it possible for some participants to attend the Colloquium. We are very grateful for the donation.

## Programme

### Sunday 20 May 2007.

14:00 Registration, mounting posters

19:00 Get-together party (in the Restaurant of the Institute)

### Monday 21 May 2007.

**8:00** Registration, mounting posters, loading of files for morning session

**10:00** Welcome (Lecture Hall)

**10:00** Welcome address and announcements

**10:15** Welcome address by Prof. Dr. Bíró Péter Director of the BLRI HAS,

**10:30 -11:00 Coffee/Tea**

#### Session 1: Amphipod databases

**Chairperson: Ilona B. Muskó**

**11:00 Coleman** Charles Oliver

The amphipod server – a solution for literature exchange

**11:30 Platvoet** Dirk , **Li** Shukiang, **Hou** Zhong-e and **van der Velde** Gerard

The Amphipod Pilot Species Project (AMPIS) after its first year.

**12:00 – 14:00 Lunch**

#### Session 2: Invasive Amphipoda

**Chairperson: Krzysztof Jazdzewski**

**14:00 Bącela** Karolina

Are invasive gammarids effective predators? – The case study of *Pontogammarus robustoides* (G. O. Sars, 1894) and *Dikerogammarus haemobaphes* (Eichwald, 1841) (Amphipoda).

**14:30 Konopacka** Alicja, **Grabowski** Michal and **Jazdzewski** Krzysztof

Facing mass invasion of aliens in Polish rivers – small affluents as refuges for native Amphipods

**15:00 Pöckl** Manfred

Success of the invasive Ponto-Caspian amphipod *Dikerogammarus villosus* by life history traits and reproductive capacity.

**15:30 – 16:00 Coffee/Tea**

**16:00 Velde** Gerard van der, **Platvoet** Dirk, **Leuven** R. S. E. W., **Riel** M. C. van and **Vaate** A. bij de

When invasive gammarids become predatory?

- 16:30 Wattier Remi, Grabowski Michal, Haine H., Bacela Karolina, Bollache Loic, Muskó Ilona B. and Rigaud Thierry**  
Population genetics and microsporidian parasites of *Dikerogammarus villosus*, an invasive gammarid species in Europe
- 17:00 Workshop: Plaiti, Wanda:** World status of the genus *Guernea* with possibility of new species from Mediterranean Sea

**19:00 Welcome Reception in the restaurant of the Guesthouse**

**Tuesday 22 May.**

**Session 3: Biodiversity/Biogeography**

**Chairperson: Adam Baldinger**

- 9:00 Arbačiauskas Kestutis**  
Amphipoda of Lithuanian inland waters: the clash between natives and aliens
- 9:30 Grabowski Michal**  
Amphi-Balkan expeditions – initiative, overview, perspectives
- 10:00 -10:30 Coffee/Tea**
- 10:30 Jazdzewska Anna and Jazdzewski Kzysztof**  
New data on the diversity and bathymetric distribution of Amphipoda of Admiralty Bay, King George Island, South Shetland Islands (Antarctic)
- 11:00 Karaman Gordan. S.**  
Diversity and origin of Amphipoda fauna (Crustacea) of Crna Gora (Montenegro)
- 11:30 Sezgin Murat, Katağan T. and Kocataş A.**  
A new record of *Amphilochoides boeckii* Sars, 1892 (Amphipoda) from the Eastern Mediterranean

**12:00 – 14:00 Lunch**

**14:00- 16:30 Poster Session (see Page 11)**

**Chairpersons: Claude De Broyer and Ed Hendrycks**

**16:30-17:00 Coffee/Tea**

**17:00-18:30 Workshop: De Broyer, Claude:** Biodiversity of the Southern Ocean Amphipoda

**19:00 Dinner**

**Wednesday 23 May**

**7:00-19:00 Conference Excursion**

**19:00 Dinner**

## Thursday 24 May

### Session 4: Life history, production and feeding

**Chairperson: Oliver Coleman**

**9:00 Berezina** Nadezhda A.

Glacial relict amphipod *Gammaracanthus loricatus* from Northern Russia: life cycle, feeding and metabolism

**9:30 Mirzajani** Ali Reza and **Daghteh** Ali Asghar.

Production of *Pontogammarus maeoticus* in vitro

**10:00-10:30 Coffee/Tea**

**10:30 Demchenko** Natalia L.

The dynamics of quantitative characteristics of three dominant benthic amphipod species in the Piltun region (north-eastern part of Sakhalin Island, the Sea of Okhotsk)

**11:00 Mirzajani** Ali Reza, **Nahavandi** Nahid and **Kiabi** Bahram H.

Biosystematics and Biology of *Gammarus komareki* in the Hyrcanian region of Iran

**11:30 Tandberg** Anne Helene S., **Vader** Wim and **Berge** Jørgen

Extended parental care in *Metopa glacialis* associated with *Musculus discors*?

**12:00-13:00 Lunch**

### Session 5: Talitridae

**Chairperson: Wim Vader**

**13:00 Fadhel Bouslama** Mohamed, **Gtari** Maher and **Charfi-Cheikhrouha** Faouzia

Genetic diversity of *Talitrus saltator* (Crustacea, Amphipoda, Talitridae) in Tunisia

**13:30 Nasri Ammar** Karima and **Morgan** Elfed

Endogenous activity rhythm of two sympatric amphipod species, *Talitrus saltator* and *Talorchestia brito* from a sandy beach in North Eastern Tunisia

**14:00 Richardson** Alastair M. M.

Coastally-restricted terrestrial amphipods (Talitridae): Limiting factors and implications

**14:30-15:00 Coffee/Tea**

**15:00 Rossano** Claudia, **Scapini** Felicita and **Morgan** Elfed

Locomotor activity rhythms in different species of semi-terrestrial talitrid Amphipods along a water-land gradient.

**15:30 Scapini** Felicita

Behavioural adaptations of talitrid amphipods to changing environments: Evolutionary and management perspectives

**17:30-18:30 Guided tour and a short organ concert in the Benedictian Abbey (Tihany)**

**19:00 Congress Dinner (in Tihany)**

## Friday 25 May

### Session 5: Systematics and others

**Chairperson: Traudl Krapp-Schickel**

**9:00 Krapp-Schickel Traudl**

What happened with the members of “good old *Maera*” (Melitidae) during the last decade?

**9:30 Kumari Margit, Kangur Külli and Haldna M.**

Spatial and temporal variation of invasive species *Gmelinoides fasciatus* and its impact to the macrozoobenthos communities in Lake Peipsi (Estonia)

**10:00-10:30 Coffee/Tea**

**10:30 Sari Alireza and Alizadeh H.**

SEM study of cuticle and setae of *Gammarus komareki* (Amphipoda: Gammaridae) from Iran

**11:00 Vazquez-Luis Maite, Sanchez-Jerez P. and Bayle-Sempere J.**

Increase of *Corophium acutum* abundance in rocky shallow bottoms due to the expansion of *Caulerpa racemosa* var. *cylindracea* in Western Mediterranean Sea

**11:30 Zakhama Sraieb Rym, Sghaier Y-R. and Charfi Cheikhrouha Faouzia**

Population structure and distribution of amphipod fauna associated with seagrass

**12:00 Zamanpoore Mehrdad and Poeckl Manfred**

Changes in existence and distribution of gammaridean amphipods along a gradient of physical factors in south-east boundaries of Zagros Mountain-Chain, South Iran

**12:30-13:00 Closing of the Colloquium**

**13:00 Lunch**

## Poster Session (Lecture Hall, Tuesday 14:00-16:30)

Chairpersons: Claude De Broyer and Ed Hendrycks

1. **Ayari Amel and Nasri-Ammar Karima**  
Locomotor activity rhythm in *Talitrus saltator* from Bizerte beach (North of Tunisie)
2. **Balogh Csilla and Muskó Ilona B.**  
The effect of water level changes on the quantitative trend and distribution of the amphipod *Chelicorophium curvispinum* and the zebra mussel.
3. **Bohli Dhouha, Morgan Elfed and Nasri-Ammar Karima**  
Effect of two aperiodic regimens on the locomotor activity rhythm of *Talitrus saltator* (Amphipoda, Crustacea)
4. **Davolos D., Pietrangeli B., Pavesi L. and De Matthaeis E.**  
Bacteria isolated from the digestive tract of talitrid amphipods (Crustacea): Preliminary evolutionary and ecological inference based on gene sequence analysis.
5. **Grabowski Michal**  
Is *Gammarus kesslerianus* Martynov, 1931 a valid species?
6. **Grabowski Michal and Pesic V.**  
Life Cycle of *Laurogammarus scutarensis* (Schäferna, 1922) endemic to the Skadar Lake basin
7. **Guerra-García José Manuel, Díaz-Pavón J. J., García-Ordóñez Azahara L., González-Paredes D. and García-Gómez J. C.**  
Seasonal fluctuations of the intertidal Caprellidae from Tarifa Island, Southern Spain.
8. **Gumuliauskaitė Simona and Arbačiauskas Kestutis**  
Life cycles of invasive *Pontogammarus robustoides* and native *Gammarus lacustris* in Lithuanian lakes.
9. **Havermans C., Zintzen V., De Broyer C. and Mallefet J.**  
The life history and dispersal methods of the amphipod *Jassa herdmani*
10. **Hendrycks Ed A.**  
Preliminary notes on novel abyssal amphipods collected during the DIVA-2 Expedition.
11. **Iannilli Valentina, De Matthaeis Elvira and Setini Andrea**  
DNA strand breakage in *Gammarus elvirae* after exposure to genotoxicants
12. **Kovács Kata and Selmezcy G.**  
Morphological variations of *Gammarus roeseli* in Hungarian streams
13. **Kozlov Oleg V. and Kolobova E. Yu.**  
Ferments systems reactions of *Gammarus lacustris* G. O. Sars on change of heavy metals concentrations
14. **Kozlov Oleg V. and Kozlova Svetlana V.**  
Gammarids importance for nutriment of fishes in Ishim Plain lakes
15. **Krapp-Schickel Traudl and Thomas, J. D.**  
New species of leucothoid amphipods from the Pacific Ocean and Caribbean Sea
16. **Krisp Holger, Schank Yasmin, Mayer Gerd, Walöbek Dieter and Maier Gerhard**  
Substrate preference and activity of some invasive and native gammarids
17. **Mayer Gerd, Maas A. and Waloszek Dieter**  
Comparison between the mouthparts of *Gammarus roeseli* and *Dikerogammarus villosus* – An attempt to understand the success of an invader to Lake Constance
18. **Muskó Ilona B., Wattier Remi, Rigaud Thierry, Balogh Csilla and Tóth Ádám Péter**  
Spatial distribution, morphometric and genetic analysis of the invasive *Dikerogammarus* (Crustacea: Amphipoda) species of Lake Balaton

- 19. Ovcharenko M., Codreanu-Balcescu D., Wita I., Grabowski Michal and Konopacka Alicja**  
Preliminary data on microparasites of alien and native gammarids (Amphipoda) occurring in Poland
- 20. Pavesi Laura and De Mattheis E.**  
Reproductive aspects of three talitrid species from Italy
- 21. Ruiz-Tabares A., Guerra-García J. M. and García-Gómez J. C.**  
Spatial distribution and habitat selection of the intertidal Caprellidae: A stress bioindicator in Ceuta, North Africa
- 22. Simčič Tatjana and Brancelj Anton**  
Metabolic activity of amphipod populations from different habitats
- 23. Vader Wim**  
Towards a new gammaridean checklist for the NE-Atlantic
- 24. Vader Wim, Tandberg Anne Helene S. and Berge Jørgen**  
A survey of associations between amphipods and molluscs
- 25. Väinölä R., Witt J. D. S., Grabowski Michal, Bradbury J. H., Jazdzewski K. and Sket B.**  
World diversity of freshwater amphipods – Update for 2005
- 26. Yossofvand F, Sari A. R, Mirzajani A. R and Kiabi B.**  
Amphipoda fauna of mountainous area of Lorestan Province, Iran: A morphological study
- 27. Zakhama Sraieb Rym, Sghaier Y. R. and Charfi Cheikhrouha Faouzia**  
Biogeography of amphipods in Tunisian coast

## **Abstracts**

in alphabetical order of the Authors

O= oral presentation, P= poster presentation

The contents of the Abstracts have not been revised, only minor corrections have been made.

## **AMPHIPODA OF LITHUANIAN INLAND WATERS: THE CLASH BETWEEN NATIVES AND ALIENS (O)**

**Arbačiauskas** Kestutis

Institute of Ecology, Vilnius University, Akademijos St. 2, LT-08412 Vilnius-21, Lithuania, [arbas@ekoi.lt](mailto:arbas@ekoi.lt)

During the recent survey of amphipods including glacial relict species, the pattern of their distribution across the inland waters of Lithuania was determined, and a few new native species were discovered. In the previous century, a number of alien species, primarily of Ponto-Caspian origin, have invaded Lithuanian waters through deliberate or unintentional introductions, and natural dispersal. In the habitats favouring non-native amphipods, the natives were severely impacted (frequently exterminated) by the newcomers. However, it appeared that environmental factors exist that limit the establishment and population density of alien amphipods and may restrict their dispersal.

## **LOCOMOTOR ACTIVITY RHYTHM IN *TALITRUS SALTATOR* FROM BIZERTE BEACH (NORTH OF TUNISIA) (P)**

**Ayari** Amel and **Nasri-Ammar** Karima

Unité de recherche «Biologie Animale et Systématique Evolutive», Faculté des Sciences de Tunis, Campus Universitaire de Tunis El Manar I 2092, Tunis, Tunisia. [ayari\\_amel13@yahoo.fr](mailto:ayari_amel13@yahoo.fr)

The talitrid amphipod *Talitrus saltator* is a supralittoral burrowing species. The population from Bizerte beach (North of Tunisia) was studied in order to characterise the endogenous locomotor rhythm. The activity of adults was investigated under two simultaneous experimental regimens: During the first one, the animals were kept in light-dark cycle (nLD) in phase with the natural diel cycle; for the second regimen, animals were maintained in constant darkness (DD). Recording equipment is composed by a controlled environment cabinet, a data logger, 16 annular recording chambers equipped with an infrared recording system and a computer. The temperature was held constant at  $18 \pm 0.5$  °C. Under LD and DD, the activity rhythm of *Talitrus saltator* is expressed as a circadian activity period ( $\tau = 24\text{h } 47' \pm 1\text{h } 23'$ ) with no evidence of a circatidal component; the activity is concentrated during the subjective night. The natural light-dark cycle is an important experimental synchroniser of the rhythm activity. Finally, our results suggest the existence of a circasemilunar rhythm in the locomotor activity of *Talitrus saltator* with a period equal to 14 days.

**ARE INVASIVE GAMMARIDS EFFECTIVE PREDATORS? – THE CASE STUDY OF PONTOGAMMARUS ROBUSTOIDES (G.O. SARS, 1894) AND DIKEROGAMMARUS HAEMOBAPHES (EICHWALD, 1841) (AMPHIPODA) (O)**

**Bączela** Karolina

Department of Invertebrate Zoology and Hydrobiology, University of Lodz, Poland

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According to some published works, many invasive species have very wide spectrum of diet and some of them are known as effective predators. This can promote their biological success in new habitats. During the last decade two aliens, *Dikerogammarus haemobaphes* and *Pontogammarus robustoides*, appeared to be the most common Ponto-Caspian gammarid species occurring in the Vistula River in Poland. The aim of the study was to estimate food preferences of the above aliens by field and laboratory experiments versus native *Gammarus fossarum* Koch, 1835. Nonindigenous species used in my investigations were sampled from the lower Vistula River where they co-occur, the native one from the small stream near the city of Lodz. Analyses of digestive track contents and results from two sets of laboratory experiments showed that the feeding strategy of above mentioned invasive species is more oriented to predatory behaviour, than that of the native gammarid.

**THE EFFECT OF WATER LEVEL CHANGES ON THE QUANTITATIVE TREND AND DISTRIBUTION OF THE AMPHIPOD CHELICOROPHIUM CURVISPINUM AND THE ZEBRA MUSSEL (P)**

**Balogh** Csilla and **Muskó** Ilona B.

Balaton Limnological Research Institute of the Hungarian Academy of Sciences, H-8237

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During the most arid period in Lake Balaton history between 2000 and 2003, the water level of the lake decreased by 82 cm and 80 % of the stony littoral, an important habitat for the dominant exotic invasive amphipod *Chelicorophium curvispinum* and the zebra mussel (*Dreissena polymorpha*) became dry. A recovery period started in 2004 due to intense precipitation which increased water level in the lake. Seasonal and spatial variations of the relative abundance, population density of the *C. curvispinum* and the zebra mussel were monitored in the period of 2003 – 2005 at four different shoreline sections and in two different portions of the rip-rap of Lake Balaton. After the dry period in early 2004, the bottom community was overdominated by the *C. curvispinum* and the relative abundance of the mussel on the bottom stones was smaller than in 2003. By the end of 2004 and during 2005, the water level returned to normal and the stones near the surface might provide a rather new surface for the recruitment of the invertebrates. Zebra mussels started successful and rapid colonization, so they proved better competitors for new space than *C. curvispinum*. Moreover, in 2005 only a minor change of water level fluctuation occurred from previous years. The effect of the above changes resulted in the reduction of *C. curvispinum* and the significant spread of the zebra mussel by 2005. BALOKO 3B022\_04 and OTKA (T042622, T034813) supported the study.

## GLACIAL RELICT AMPHIPOD *GAMMARACANTHUS LORICATUS* FROM NORTHERN RUSSIA: LIFE CYCLE, FEEDING AND METABOLISM (O)

**Berezina** Nadezhda A.

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*Gammaracanthus loricatus* (Sabine, 1821 et 1824) is a widespread amphipod in brackish water lagoons and estuaries in the Arctic seas, where it takes the *aestuariorum* form. Some occurrences of this form are known from the profundal zone of freshwater deep lakes of glacial origin. In these lakes *G. l. aestuariorum* inhabits deep cool waters like a typical boreal relict *G. lacustris* Sars, 1863. Being important food item in diet of commercial fish, *Gammaracanthus* species are an important link in aquatic ecosystem, however little is known about their ecology. The present study focuses on life cycle traits, feeding habits and metabolic rates of the amphipod *G. loricatus* from deep Lake Krivoie (White Sea basin) investigated during 2002-2005. Density of its population in profundal zone of the lake (28-32 m) was evaluated by marking method in 2003 and varied in the range of 400-600 ind.m<sup>-2</sup>. Studies of population dynamics of *G. loricatus* confirmed its 2-year life cycle but significant differences in number of reproducing females between years were recorded. Individual fecundity varied from 108 to 206 eggs per female in the body length range of 28 - 39 mm. Microscopic analysis of amphipod gut contents showed ontogenetic differences in diet and proportion of consumed food categories. Experimental data indicated high variability of consumption rates in *G. loricatus* related to type, availability and amount of food, and temperature of water. Significant increase in specific metabolic rate proportionally increasing temperature from 5 to 18 °C and further decrease at 20 °C were revealed. Also, increase in the metabolic rate was found during locomotory activity and feeding.

## EFFECT OF TWO APERIODIC REGIMENS ON THE LOCOMOTOR ACTIVITY RHYTHM OF *TALITRUS SALTATOR* (AMPHIPODA, CRUSTACEA) (P)

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*Talitrus saltator* is a supralittoral amphipod distributed along Mediterranean and European Atlantic sandy shores. This animal exhibits a nocturnal circadian locomotor rhythm entrained by the natural photoperiod. Experiments were conducted, in spring, on population of *Talitrus saltator* collected from Barkoukech site (Tabarka, Tunisia). Adults, freshly collected by hand, were kept in a controlled environment cabinet, regulated at 18 ± 0,5°C, during 10 days. Locomotor activity of 16 individuals, for each experiment, was monitored under 2 free running conditions: constant light (LL) and constant darkness (DD). Results have been investigated using double plotted actograms and periodogram analysis. Under constant darkness, actogram and wave form analysis have shown three activity patterns (uni, bi and pluri-modal) and 56% of animals were significantly periodic. Under constant light, the percentage of significant periodic individuals was 92% and all specimens exhibit a uni-modal profile. Periodograms resulting from these experiments have shown an evidence of a circadian rhythm [ $\tau_{LL}$ =25h12' ± 42' (constant light) and  $\tau_{DD}$  = 24h49' ± 57' (continuous dark)] with a circatidal component. On the other hand, the statistic analysis, using the

Wilcoxon and the  $\chi^2$  tests, confirm some differences between the two regimens. Under constant darkness, the activity time was the longer and the circadian period was the shorter. Under constant light, animals were more rhythmic and the inter-individual variability was less expressed.

## **THE AMPHIPOD SERVER – A SOLUTION FOR LITERATURE EXCHANGE (O)**

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Due to budget cuts many libraries have increasing difficulties supplying scientists with literature. Thus reprint exchanges between scientists becomes especially important. The Acrobat reader format (pdf) allows the sending of digital reprints to colleagues by email and storage of these files on computer hard-disks. The amphipod server is a form of library comprising pdf-files of crustacean literature. It is possible to upload new reprints and download them from the library. There are even classical works on amphipod systematics (Sars, Stebbing etc.) available. On the server an EndNote database file is available which lists all the files stored there. You can download this EndNote database onto your computer. For each reference in the EndNote file there is a link allowing a direct download from the server onto your local computer. The use of this server is restricted by a password which can be sent on demand. Check <http://amphipod.dnsalias.net> for details.

## **BACTERIA ISOLATED FROM THE DIGESTIVE TRACT OF TALITRID AMPHIPODS (CRUSTACEA): PRELIMINARY EVOLUTIONARY AND ECOLOGICAL INFERENCE BASED ON GENE SEQUENCE ANALYSIS (P)**

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Supralittoral talitrid amphipods (Crustacea) use as food the seaweed litter and marine plant detritus, however there are still open questions on the ecology of the bacteria present in their digestive tract and on the contribution of microbial enzymes to hydrolyse carbohydrate including complex polysaccharides. Our ongoing project is aimed to test comparatively assessing by 16S rRNA gene sequence analysis if the bacteria from the digestive tract of talitrid amphipods are peculiar to the food channel or members of the microbial population present in the rotting vegetation. In the present study we show results of a morphological investigation by phase-contrast microscopy and of a phylogenetic analysis (conducted by different approaches) on the 16S rRNA gene sequences of three Gram negative bacteria isolated from the digestive tract of *Talitrus saltator* (Amphipoda, Talitridae) collected from an Italian sand beach (Tyrrhenian sea). A strain showing a rod-shaped morphology was phylogenetically closely related (99% 16S rRNA gene sequence identity) to a *Burkholderia* sp. ( $\beta$ -Proteobacteria; Burkholderiaceae). Another isolate, with a rod-shaped morphology, shared 99% 16S rRNA gene sequence similarity with characterized taxa of the genus *Pseudoalteromonas* ( $\gamma$ -Proteobacteria; Pseudoalteromonadaceae). A third isolate revealed short rod-shaped cells and was phylogenetically related (97% 16S rRNA gene sequence identity) of an uncultured taxon of the *Cytophaga-Flavobacterium-Bacteroides* group (now

called *Bacteroidetes*) of the eubacterial branch. It is our intention to perform more molecular analysis (e.g. on the genes for the carbohydrate metabolism) to infer ecological traits of these bacterial taxa considering the herbivorous feeding roles of the talitrid amphipods and we welcome collaborative interaction on the project.

### **THE DYNAMICS OF QUANTITATIVE CHARACTERISTICS OF THREE DOMINANT BENTHIC AMPHIPOD SPECIES IN THE PILTUN REGION (NORTH-EASTERN PART OF SAKHALIN ISLAND, THE SEA OF OKHOTSK) (O)**

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The changes of quantitative characteristics (abundance and biomass) of three dominant amphipod species *Monoporeia affinis* (Lindstrom, 1855), *Eohaustorius eous eous* Gurjanova, 1962 and *Eogammarus schmidti* (Derzhavin, 1929) during summer-autumn period were studied at present work. The macrobenthic samples were taken by collaborators of the Institute of Marine Biology for three years (2003-2005) in the period from the beginning of July to the end of September during the expeditions to the Piltun region. The 11 stationary sites are located on the fine sand sediments at the range of depths 10-23 m. The salinity on the sites varied from 28 to 32, 3 ‰. The two peaks of the total amphipod abundance were revealed during all observed period in the exploring region. The total abundance of amphipods had the highest values at the middle of July (2500 ind./m<sup>2</sup>) and at the end of same month (5400 ind./m<sup>2</sup>). The increase of abundance in this period is explained by appearance of young hatches of species *M. affinis*. The share of species *M. affinis* can reach up to 80% of total amphipod abundance in the Piltun region. In the period from the beginning of August to the end of September the total abundance decreased from 2250 ind./m<sup>2</sup> to 490 ind./m<sup>2</sup>, but values of biomass were the greatest at that time (119,54 g/ m<sup>2</sup>; 103,11 g/ m<sup>2</sup>). The share of species *M. affinis* of total biomass decreased a little, because adult females died after one reproduction and young specimens became adult. The increase of total biomass in autumn depended on contribution of species *E. schmidti* to the total amphipod biomass (70%), because this species have the largest sizes by that time (24-27 mm). In general, the contribution of dominant species to the total amphipod abundance and biomass was various at different periods. The species *M.affinis* was dominant in abundance and biomass during all observed period. The species *E. schmidti* was dominant in biomass and role of this species increased by the autumn, when role of *M.affinis* decreased a little. The species *E. eous eous* was dominant only in abundance during all the time, but the peak of abundance for this species was registered at the end of September.

### **GENETIC DIVERSITY OF *TALITRUS SALTATOR* (CRUSTACEA, AMPHIPODA, TALITRIDAE) IN TUNISIA (O)**

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Direct sequence analysis of amplified DNA provides a powerful tool for genetic comparison of populations. In this study, we used direct sequence analysis of a PCR amplified region of the mitochondrial gene encoding for subunit I of cytochrome oxydase (COI). The aim is to examine the genetic relationship among a supralittoral sandhopper *Talitrus saltator*,

used as a bioindicator for beach monitoring. For this purpose, eight Tunisian populations were collected from north western to south eastern Tunisia coasts. Low genetic variation was recorded within populations. The interpopulation diversity is unlikely related to geographical distances between populations. This diversity will be discussed in regards to local environmental conditions and beaches stability.

## **AMPHI-BALKAN EXPEDITIONS – INITIATIVE, OVERVIEW, PERSPECTIVES (O)**

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Balkan Peninsula is an important European glacial refugium and evolutionary hot-spot area, well known for its enormous species richness and high level of endemism. Concerning freshwater Amphipoda, taking into account past efforts of several prominent specialists (eg. S. Carausu, S. Karaman, G. Karaman, V. Kuneva-Abadjeva, I. Petrescu, B. Sket), the distribution and taxonomy of this group in the area is still poorly known. There are many untouched regions with absolute lack of data. There are even no checklists of freshwater amphipod species for many Balkan countries. On the other hand, growing anthropogenic pressure in the area claims for a survey estimating amphipod diversity and distribution as a starting point for further scientific research. In 2004 I have started an initiative to perform wide scale amphipod surveys in the area. The main goal has been to gather a comparative collection of amphipods, preserved in a way enabling further taxonomic, phylogenetic and phylogeographic studies (morphological and molecular). Until now, two expeditions took place: in Romania (along the Carpathian Arch, in the Danube Delta as well as in the Dobrogea Plateau), in Montenegro and in Albania. Several hundreds localities were sampled, with ca. 30,000 individuals collected. The material is under study, with special focus on phylogeography of *Gammarus roeselii*, phylogeography and taxonomy of *G. balcanicus* group, *G. komareki* and *G. arduus*. Further expeditions are planned in following years. In parallel a network of collectors has been established in order to gather collections from other Balkan regions. A natural consequence of this initiative would be developing a reference centre for Balkan amphipod diversity, and involving in this activity colleagues from other European countries.

## **IS GAMMARUS KESSLERIANUS MARTYNOV, 1931 A VALID SPECIES? (P)**

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Martynov described *G. kesslerianus* based on very small collection from streams in surroundings of Sympheropol and Sevastopol on the Crimean Peninsula, Ukraine. He gave features telling it apart from *G. pulex* (Linnaeus, 1758). Also he mentioned that although *G. kesslerianus* is similar to *G. komareki* Schäferna, 1922 in setation of 2<sup>nd</sup> antennae, these two species are divergent. However, he did not point out any differences. In the same paper he described also a “smaller” form, *G. kesslerianus salgyrus*, from Sympheropol, yet indicated that dissimilarities between “basic” form and *G.k. salgyrus* may be partially related to different habitats and age of specimens. In 1969, analyzing descriptions and drawings, G. Karaman suggested that both forms of *G. kesslerianus* may in fact belong to *G. komareki*.

However he could not make final decision due to incomplete information from Martynov's paper and lack of material to study. In fact it appears that the original collection has been probably lost or destroyed. Recently, from Museum für Naturkunde, Berlin, I obtained a material collected in 1942 from Sympheropol – *terra typica* for *G. kesslerianus*. After studying this collection and comparing it to original descriptions of *G. komareki* and *G. kesslerianus* I conclude that both forms described by Martynov group conspecific individuals of various age and in reality belong to *G. komareki*. Thus I would propose to put *G. kesslerianus* and *G. k. salgyrus* on the list of junior synonyms of *G. komareki*.

#### **LIFE CYCLE OF *LAUROGAMMARUS SCUTARENSIS* (SCHÄFERNA, 1922) ENDEMIC TO THE SKADAR LAKE BASIN (P)**

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*Laurogammarus scutarensis* is endemic to the Skadar Lake drainage system on Balkan Peninsula. Its life cycle was studied in the Mareza spring, located in the vicinity of Podgorica, in Montenegro. The spring is of limnocrene character and has a year-round stable temperature ( $10^{\circ}\text{C}\pm 0.5$ ). Samples were taken in monthly (winter and fall) and two week (spring and summer) intervals from January to December 2005. In the studied spring, *L. scutarensis* has an iteroparous, multivoltine life cycle, most probably with two generations per year. The species breeds continuously throughout the whole year with oscillations in the intensity of reproduction. This (measured as a proportion of breeding to non-breeding females) seems to be positively correlated with photoperiod. The reproductive peak is observed from March to June, and the highest numbers of juveniles were found in May and in August-September. The mean sex ratio (females:males) fluctuated from 3.6:1 (spring/summer) to 0.76:1 (winter). Mean body size of mature individuals was 8.5mm (5-14mm), with males significantly larger (9.3mm) than females (7.8mm). Females start breeding at body length of 6mm, whereas the biggest observed females measured 14mm. Maximum partial fecundity seems to be correlated with a female size with highest value for individuals of medium body length. Compared to other gammarids, such life history pattern is rather typical for species inhabiting stable aquatic environments, such as springs or subterranean waters.

## SEASONAL FLUCTUATIONS OF THE INTERTIDAL CAPRELLIDAE FROM TARIFA ISLAND, SOUTHERN SPAIN (P)

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Tarifa Island is located in the Strait of Gibraltar, between the Mediterranean and Atlantic. The unique biogeographical position, together with the substrate heterogeneity and the protection degree as Marine Reserve, has contributed to maintain the richest and most beautiful rocky shores intertidal ecosystems of Spain. Under absence of anthropogenic influence, we have studied the fluctuations of algae and associated caprellids during a year cycle. Samples were taken every two months from the different intertidal levels. *Caprella penantis* and *C. liparotensis* were exclusively distributed in the low intertidal levels dominated by *Gelidium sesquipedale* and *Pterocladia capillacea*; *Caprella acanthifera*, *C. grandimana* and *C. takeuchii* were found in the intermediate levels of *Corallina elongata*, *Jania rubens* and *Gelidium* spp. and the caprellids were absent in the upper intertidal levels dominated by green algae (*Enteromorpha* and *Chaetomorpha*) and *Fucus spiralis*. All the caprellid species and the main algae were present all year. The peaks of algae biomass were measured in May and July, and were coincident with the peaks in caprellid abundances. The highest caprellid fluctuations were registered in the low levels: although *G. sesquipedale* maintained high biomass during the whole year, the associated *C. penantis* had very low densities in winter and high densities close to 1000 individuals per 100 g of algae in early summer. On the other hand, the population of *Caprella acanthifera*, *C. grandimana* and *C. takeuchii*, associated to intermediate levels, showed similar densities all year. These patterns could be related to winter storms, which mainly affect to the low intertidal levels.

## LIFE CYCLES OF INVASIVE *PONTOGAMMARUS ROBUSTOIDES* AND NATIVE *GAMMARUS LACUSTRIS* IN LITHUANIAN LAKES (P)

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Ponto-Caspian *Pontogammarus robustoides* is the most successful alien amphipod in the inland waters of Lithuania. The extinctions of native *Gammarus lacustris* were recorded in the lakes wherein the invader have established abundant populations. Superiority of *P. robustoides* may be associated with its life history, thus, the comparative study of life cycles of these two amphipod species was performed. The life cycle of invasive and native amphipods was studied in two lakes. In comparison to native amphipod, *P. robustoides* has a much longer breeding period. Its females carrying clutches were observed continuously during April – September, while gravid females of *G. lacustris* were recorded from April until June. Because of extended breeding period the invader produces in Lithuanian waters a few generations annually whereas the native species produces just one generation per year. Juveniles of *P. robustoides* occurred from April until November while those of native amphipod were observed just between June and July. Individual body sizes and clutch sizes

in *G. lacustris* were significantly larger in comparison to those for the invasive species. The body length of gravid females of *P. robustoides* varied between 8.5 and 16.4 mm, while that for *G. lacustris* was between 13.6 and 17.4 mm.

## **THE LIFE HISTORY AND DISPERSAL METHODS OF THE AMPHIPOD JASSA HERDMANI**

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*Jassa herdmani* (Walker, 1893), a tube-building amphipod, is found in large densities on several shipwrecks on the Belgian Continental Shelf, living in association with the hydrozoan *Tubularia indivisa*. The life history of this amphipod was investigated for the first time with samples from March to October, originating from two sampled years (2004-2005). Reproduction peaks, brood size, sex ratio and seasonal shifts in the occurrence of different male morphs were determined.

The largest part of the Belgian Continental Shelf is covered by soft sediments, which are an unsuitable habitat for *J. herdmani*. Amphipods lack a larval stage, which potentially limits their dispersal and therefore, possible dispersal mechanisms from one shipwreck to another are considered in this study. Rafting on substrates and drifting with water currents are identified as highly efficient dispersal methods.

We tested the dispersal method of drifting with currents, by investigating the reaction of the amphipods to a unidirectional flow. For this aim, different substrate types were used. We also investigated the existence of a possible mechanism for the detection of its hydrozoan host.

## **PRELIMINARY NOTES ON NOVEL ABYSSAL AMPHIPODS COLLECTED DURING THE DIVA-2 EXPEDITION (P)**

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The *R/V Meteor* Cruise 63/2 Expedition (DIVA-2, Latitudinal Gradients of Deep-Sea BioDIVERSITY in the Atlantic) was undertaken from Feb 23-April 1, 2005, departing from Cape Town and finishing at Mindelo (Cape Verde Is). This field subproject, a component within CeDAMar (Census of the Diversity of Abyssal Marine Life), is one of the many projects of the Census of Marine Life (a 10 year study to document known marine species and identify new species started in 2000). CeDAMar aims to document species diversity of oceanic abyssal plains as a basis for global change research and for a better understanding of historical causes and actual ecological factors regulating biodiversity. One major goal of DIVA is to complete a latitudinal transect from pole to pole in cooperation with other CeDAMar projects, e.g., ANDEEP (ANTarctic benthic DEEP-sea biodiversity Southern Ocean). During the DIVA-2 expedition, various gears were deployed from the German ship *R/V Meteor* to sample the benthos at depths > 5000m in three abyssal basins. Targeted basins were the Cape Basin, northern Angola Basin and the Guinea Basin in the south-east Atlantic off the west coast of Africa. Benthic samples were collected using four gears, namely box corer, MUC (multicorer), epibenthic sledge and 3.5 m modified Agassiz trawl. Approximately

430 amphipod specimens were obtained, but at this preliminary stage the number of new species is unknown. However, some new and unusual amphipods are reported on here. Families include expected and dominant deep-sea groups such as Pardaliscidae, Eusiridae, various families within Lysianassoidea, Phoxocephalidae and Oedicerotidae, while in some cases family placement is unknown.

## **DNA STRAND BREAKAGE IN *GAMMARUS ELVIRAE* AFTER EXPOSURE TO GENOTOXICANTS (P)**

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The chemical and physical agents are considered genotoxic when they damage DNA function and structure. A simple and low-expensive method to detect the effects due to genotoxic exposition is the "DNA strand breakage". In this work, this approach is tested in a freshwater gammarid species, proposed for toxicity testing due to availability, ecological relevance, sensitivity to toxicants and amenability for culturing and testing. The analysis has been performed by exposing *Gammarus elvirae* to CdCl<sub>2</sub>, ZnCl<sub>2</sub>, CuSO<sub>4</sub> for 24 and 72 hours. After the exposition, the genomic DNA was extracted and agarose gel electrophoresis was applied in either denaturant condition, to estimate single strand (SS) breaks, or in native condition for double strand (DS) breaks evaluation. By analysing the densitometric profile of the electrophoretic gel pattern, we can reveal the size of the DNA fragments. The peak relative distance from the sample loading start is proportional to the number of DNA strand breaks. Our results demonstrate that SS damage is independent of the metal concentration and exposure time, while DS damage correlates to the exposition and metal. Moreover, only exposition to Cd and Zn for 72 hours produces a visible effect. It is worth highlighting the fact that Cd concentration is 4-8 times the legal value for freshwaters in Italy. Besides, DNA damage-inducing Zn content is very similar to the legal concentration in water. This work demonstrates that DNA strand breakage can be used for monitoring some metal exposure.

## **NEW DATA ON THE DIVERSITY AND BATHYMETRIC DISTRIBUTION OF AMPHIPODA OF ADMIRALTY BAY, KING GEORGE ISLAND, SOUTH SHETLAND ISLANDS (ANTARCTIC) (O)**

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Due to the scientific activity of specialists from many countries, linked with Polish *Arctowski* and Brazilian *Commandante Ferraz* stations situated at Admiralty Bay, this Antarctic fjord has been designated by SCAR in 1996 as an Antarctic Specially Managed Area (ASMA). The benthic fauna of Admiralty Bay is very diverse. The highest species diversity and abundance is observed among polychaetes, molluscs and amphipods. Till now there are about 120 species of Amphipoda recorded from this Bay. The most common amphipods are representatives of the families: Pontogeneiidae and Lysianassidae. The present study combines older results with new data coming from quantitative sampling from the depths 20 – 500m. Sampling was done in 1985, using Van Veen grab in the central basin as well as in the shallower part of Admiralty Bay – Ezcurra Inlet. In this material several species

of Amphipoda new for this basin have been found (e.g. *Byblis securiger*, *Melphidippa antarctica*). In this study the bathymetric distribution of particular species is presented. Amphipod abundance generally diminishes from about 7000 ind/m<sup>2</sup> at the depth of 50 m to 100 ind/m<sup>2</sup> in the deepest part of the bay (>400m). The family composition also changes with depth. Shallower parts of the Bay are occupied mostly by Pontogeneidae, Calliopiidae and Lysianassidae and the deeper part is dominated by Phoxocephalidae. According to diversity at the family level, the richest region was the central basin at the depths 100 – 150m.

## **DIVERSITY AND ORIGIN OF AMPHIPODA FAUNA (CRUSTACEA) OF CRNA GORA (MONTENEGRO) (O)**

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Montenegro (Crna Gora) is one of the smallest countries in Europe, with surface of nearly 14.000 m<sup>2</sup>, with very heterogeneous relief, mostly karstic origin (from sharp relief of numerous mountains till flat valleys), climate (Mediterranean till continental), rich continental waters (numerous lakes, rivers, sources, subterranean waters, caves) and Adriatic Sea coast, including high annual precipitations (till over 4500 l/m<sup>2</sup>). The complicated geological events of this region in the past and the present richness of the waters and existence of refugia during the glacial periods made it possible to preserve numerous old tertiary epigeal and subterranean elements within the Amphipoda (*Typhlogammarus mrazeki*, *Niphargus vjeternicensis kusceri*, *Laurogammarus scutarensis*, *Metohia carinata*, etc), periglacial species (*Gammarus lacustris*, etc.) as well as postglacial immigrants (*Gammarus roeselii*, etc.), surficial brackish waters (*Echinogammarus veneris*), semi subterranean (*Melita bulla*) and subterranean species (*Psammogammarus caecus*; *Pseudoniphargus adriaticus*), as well as marine elements (*Orchestia cavimana*, etc.). The present very rich and highly endemic Amphipoda fauna of freshwaters (5 families, 10 genera and over 30 taxa) and that of brackish waters (with over 15 species) must be preserved and protected.

## **FACING MASS INVASION OF ALIENS IN POLISH RIVERS – SMALL AFFLUENTS AS REFUGES FOR NATIVE AMPHIPODS (O)**

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During last decades invasive amphipods of various origins have colonised middle and lower courses of large rivers in Poland. These colonisations have been mostly associated with decline of native amphipod species. Our goal was to reveal whether the decline of native species is a widespread phenomenon. Also we tested what may be the main physico-chemical factor ruling the distribution of native vs. alien amphipods. In years 2003-2006 our group performed extensive fieldwork to reveal the occurrence of gammarids in six large Polish rivers (Vistula, Oder, Bug, Narew, Notec, Warta) and 80 of their affluents. The total number of sampling stations was 130. Altogether we found 12 species of amphipods (7 aliens: *Chelicorophium curvispinum*, *Gammarus tigrinus*, *G. roeselii*, *Pontogammarus robustoides*, *Obesogammarus crassus*, *Dikerogammarus villosus*, *D. heamobaphes* and 5 natives: *G. pulex*, *G. fossarum*, *G. lacustris*, *G. varsoviensis*, *Synurella ambulans*). Generally, alien species

occurred only in large rivers, where natives were almost completely absent. In contrary, native amphipods thrived in affluents, where aliens did not enter. The main factor associated with that pattern was water conductivity (ranging in large rivers from 420uS to 1824uS, and in affluents from 365uS to 754uS). Distribution of aliens was positively correlated with growing values, while in native species the trend was reversed. High conductivity is a result of industrial pollution and may be the main reason for decline of sensitive native fauna and success of more euryoecious invaders. Aliens, preferring higher ionic content, do not spread in small rivers, which, if undisturbed, may remain safe refuges for native amphipods

## **MORPHOLOGICAL VARIATIONS OF *GAMMARUS ROESELII* IN HUNGARIAN STREAMS (P)**

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Amphipods are widespread in aquatic ecosystems. They have a central position in the food web, and their role as bioindicators is significant. In this work, I analyzed 141 samples collected during the Hungarian ECOSURV programme in which the species *Gammarus roeselii* occurred. According to the data of Karaman (1959), variations in the formation of dorsal indent of the thorax and abdomen segments, in the spination of urosome segments and in the quantity of bristles on the epidermis and the telson occur at those living on the Balkan in larger quantities, than e.g. in Central Europe, where the four-spined morphotype is commonly more widespread than the three-spined. Within *G. roeselii* the shape variations ‘*triacanthus*’ and ‘*roeselii*’ and the intermediates between these types were examined. They were measured based on spine and bump formation on the 7-10th segments. Specimens that have spine on their 7-10th segments were classified into group ‘A’. This is the primary ‘*roeselii*’ form. Specimens of group ‘B’ have no spine on their 7th segment, but they have spine on their 8-10th segments. This is the form ‘*triacanthus*’, which was earlier assumed to be separate species. Specimens of group ‘C’ have only spine on their 8-9th segments, but the spine of the 10th segment is rather a bump-like formation. Specimens in group ‘D’ have spine on their 9-10th segments, and bump on their 8th segment. The current knowledge considers *triacanthus* as a variant of *Gammarus roeselii* (Ponyi and Bankós 1978). My purpose was to determine the prevalence of variants in relation to each other; the variants may show some kind of pattern in their dominance in the country as a whole, or a correlation with the completed river typology will be revealed.

## **FERMENTS SYSTEMS REACTIONS OF *GAMMARUS LACUSTRIS* G. O. SARS ON CHANGE OF HEAVY METALS CONCENTRATIONS (P)**

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Works on studying influence of environment components and on hydrobionts research have huge importance for realization of substantive provisions of the Sustainable Development Concept in Kurgan region (forest-steppe zone of West-Siberian plain). *Gammarus lacustris* is the organism-indicator showing an impurity degree of lakes. In experiment we have studied proteolytic enzyme activity change and complex alkaline phosphatases under influence of some heavy metals ions *in vitro* and *in vivo*. Equal

concentration of  $\text{Cu}^{2+}$ ,  $\text{Zn}^{2+}$  and  $\text{Pb}^{2+}$  ions *in vitro* render inhibitor effect on a complex proteolytic enzymes activity, active at pH=6,6. Influence of  $\text{Pb}^{2+}$  ions is less expressed, and is the most contrast - influence of  $\text{Zn}^{2+}$  ions.  $\text{Pb}^{2+}$  and  $\text{Zn}^{2+}$  ions similarly influence on alkaline phosphatases. At low concentration there is an activation of a fermental complex, at increase of these metals ions concentrations in test - its appreciable inhibition. Influence of ions  $\text{Cu}^{2+}$  has unequivocal activating character, and with increase of metal concentration was increased fermental activity. Influence of  $\text{Cu}^{2+}$  ions on activity of the fermental systems *in vivo* differs essentially from those *in vitro*.  $\text{Cu}^{2+}$  ions concentration increase in a inhabitancy induces significant inhibition of the proteolytic complex ( $\text{pH}_{\text{opt}}=6,6$ ) during 24 hours and depends on influence time a little. The weak activating effect about  $\text{Cu}^{2+}$  ions maximum concentration limit and smooth inhibition higher concentration were characteristic for the complex alkaline phosphatases of *G. lacustris*. Investigated the *G. lacustris* proteolytic complex possesses greater sensitivity to  $\text{Cu}^{2+}$ , than alkaline phosphatases.

### **GAMMARIDS IMPORTANCE FOR NUTRIMENT OF FISHES IN ISHIM PLAIN LAKES (P)**

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*Gammarus lacustris* G. O. Sars (average proteins maintenance - 45%, carbohydrates - 4%, fats - 3%) is valuable food organism for such fishes as *Coregonus peled* and *Carassius carpio* in Ishim plain lakes. The plant of lakes it is better to carry out by undersized fry of these species. Gammarids pass to an active predatory lifestyle at high population densitites, influencing on juvenile fishes of *C. peled* and *C. carpio*. Survived individuals *C. carpio* pass to active feed by gammarids earlier (July), than *C. peled* juvenile fishes (August), than considerably reduce *G. lacustris* populations density. In lakes, where the leading role in ichthyocenosis is played by a perch and a ruff (predators-zoofags), gammarids (populations specific biomass 0,4-6,5 g/m<sup>2</sup>) are not dominants in zooplankton.

### **WHAT HAPPENED WITH THE MEMBERS OF "GOOD OLD MAERA" (MELITIDAE) DURING THE LAST DECADE? (O)**

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Amphipod taxa showing either very special characters (such as the gnathopods of *Leucothoe*, the body dentation of *Caprella*, or the odd body shape of *Pereionotus*), or taxa without any obvious or striking features at all, have always tempted workers to quick decisions: 'This one is obvious, it is of course species XY!' Careful revisions during the last decades have often revealed that these identifications were too superficial, and small but constant differences have led to the splitting of many so-called 'widely spread' or even 'cosmopolitan' species into a series of biogeographically well defined less variable ones. The Melitid genus *Maera* Leach for nearly 200 years was used to gather all the non-*Elasmopus* members (with "normal" mandible palp), such with not-unequal rami on uropod 3 (plesiomorphic shape and thus not *Melita* - like) or with not-serrated dorsal body (like *Cedarocus*) etc. During the last years, using cladistic analysis, step by step some groups of species could be found, keeping together as a clade sharing one or even more apomorphies,

and were given in newly coined genera. As these papers came out in different journals and by different authors, it became confusing: who has already treated this group of species,- and did they notice what I have seen now...? It seems helpful to present an overview starting from the situation in Barnard & Barnard, 1983, where 59 species are cited, and showing which species have changed to where, which have been added in the meantime, how many new genera exist at the moment for this defined group of critters, and last but not least, which characters separate these genera.

## **NEW SPECIES OF LEUCOTHOID AMPHIPODS FROM THE PACIFIC OCEAN AND CARIBBEAN SEA (P)**

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Our studies detail five species of the *Anamixis* group of the amphipod family Leucothoidae from Malaysia and Bora Bora in the Pacific Ocean, and Martinique in the Caribbean Sea. We present illustrations and diagnoses including a possible new species of *Nepanamixis*. Leucothoid amphipods are among the first amphipods ever described and are typically found as endocommensal associates of sessile invertebrates including sponges, ascidians, and bivalve Mollusks. Members of the *Leucothoe* group exhibit minimal sexual dimorphism while species in the *Anamixis* group exhibit such extreme sexual dimorphism that males and females were once placed in separate families. It is now known that developing leucomorph males transform into anamorph hyper-adult males in a single radical transformational molt assigned to three genera *Anamixis*, *Nepanamixis*, and *Paranamixis*. While detailed ecological studies have connected eight leucomorph stages with their anamorph counterparts, many unassigned taxa remain to be connected with their developmental counterparts and field collections continue to reveal a wealth of new species. These results are typical and underscore the level of undiscovered leucothoid diversity. Despite these limitations, the Leucothoidae remain objects of intense interest due to their intriguing ecology of endocommensal lifestyle.

## **SUBSTRATE PREFERENCE AND ACTIVITY OF SOME INVASIVE AND NATIVE GAMMARIDS (P)**

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We studied in laboratory experiments substrate preference and activity of the invasive gammarids *Dikerogammarus villosus*, *Echinogammarus ischnus* and the natives *Gammarus roeseli* and *G. pulex* under flow and still water conditions. Under flow conditions *Dikerogammarus villosus* and *G. pulex* showed a preference for hard substrates (large stones, diameter 10-15 cm and gravel, grain size 2-3 cm) while *E. ischnus* and *G. roeseli* were more frequently found in plants (*Fontinalis antipyretica*). Fine substrate (sand) was avoided by all gammarids tested. When *G. pulex* - who showed the greatest overlap in substrate preference

with *D. villosus* - was combined with *D. villosus* its preference shifted from hard substrate to plants. Native gammarids were much more active than invasives on all substrates. Under still water conditions where we tested *D. villosus* vs. *G. roeseli* and where we used the same hard substrates but *Elodea canadensis* as plant substrate, *D. villosus* showed no preference for any substrate while *G. roeseli* clearly preferred plants. We conclude that differences in substrate preference between *D. villosus* and *E. ischnus* / *G. roeseli* could permit their coexistence in nature when substrate is diverse. The overlap in substrate preference between *D. villosus* and *G. pulex* could lead to interactions between the two and could have supported the replacement of *G. pulex* by *D. villosus* in some rivers of South Germany. That both native gammarids were much more active than invasives suggests a higher risk to fish predation of natives.

### **SPATIAL AND TEMPORAL VARIATION OF INVASIVE SPECIES *GMELINOIDES FASCIATUS* AND ITS IMPACT TO THE MACROZOOBENTHOS COMMUNITIES IN LAKE PEIPSI (ESTONIA) (O)**

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This research investigates spatial and temporal variations in abundance, and impact of invasive Ponto-Caspian amphipod *Gmelinoides fasciatus* (Stebbing) on littoral macrozoobenthos communities of shallow eutrophic Lake Peipsi (3 555 km<sup>2</sup>). With intention to improve the feeding base of fish, *G. fasciatus* was introduced in the 1970s into L. Peipsi from Lake Baikal region, and has increased drastically in lake during the last 30 years. The quantitative samples of macrozoobenthos for this study were collected in the littoral zone of L. Peipsi in July – August from 2002 to 2006. For comparison data on zoobenthos in the near shore area of Lakes Peipsi from the years 1970, 1980, 1990 and 2000 were used. The aims of this study were to give an account of recent distribution and abundance of this amphipod as well as its share in the littoral macrozoobenthos communities, to find out its impact on natural communities. The results of this study were demonstrated that invasive species *G. fasciatus* is the most abundant in shallow water (<1m depth) and prefers hard substrate. The highest abundance was in gravel bottom. Introduction of *G. fasciatus* has irreversibly altered benthic communities of littoral zone in L. Peipsi. *G. fasciatus* is a dominant species in the littoral zone in L. Peipsi, while the native gammarids, *Gammarus lacustris* and *Pallasea quadrispinosa*, have been virtually superseded by this invader during recent decades. While L. Peipsi and L. Võrtsjärv are connected with River Emajõgi, this invasive species is not yet found in L. Võrtsjärv (Kangur et al., 2004).

### **COMPARISON BETWEEN THE MOUTHPARTS OF *GAMMARUS ROESELII* AND *DIKEROGAMMARUS VILLOSUS* – AN ATTEMPT TO UNDERSTAND THE SUCCESS OF AN INVADER TO LAKE CONSTANCE (P)**

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The Ponto-Caspian amphipod *Dikerogammarus villosus* Sowinsky, 1894 is a very successful invader in aquatic ecosystems all over Europe. Since 2002 the species is also found in Lake Constance, southern Germany. Field surveys and laboratory experiments, also in the frame of

a joint project on invader species in Lake Constance, funded by the European Union, indicate that the ecological impact of *D. villosus* is severe. This invasive species spreads fast, occurs at high population densities, and led to great reduction, and even elimination of other, established gammarid species, such as *Gammarus roeseli* Gervais, 1835 and *G. lacustris* G. O. Sars, 1863. In order to understand more of the differences between the invader and the native species, we compared the mouthparts of *D. villosus* with those of *G. roeseli* expecting that particularly differences in feeding attitudes should be expressed in morphological differences of the feeding appendages. First results and interpretations are presented here. It seems, that *D. villosus* unlike previous suggestions, is omnivorous, having less specialized feeding structures. The native species *G. roeseli* is herbivorous, which is indicated by specialized spines on the maxillula and the mandibular molar surfaces showing specializations for feeding on plant material. This study is part of the EU-funded project “*Aquatiscche Neozoen im Bodensee und seinen Zuflüssen*“ within the scope of the Interreg III A-programme “*Alpenrhein-Bodensee-Hochrhein*“.

## **BIOSYSTEMATICS AND BIOLOGY OF *GAMMARUS KOMAREKI* IN THE HYRCANIAN REGION OF IRAN**

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A study was conducted on biosystematics and biology of *Gammarus komareki* in 4 springs stations in Alborz Mountains from the Caspian Sea basin of Iran with about 100-150 km distances.

44 characters (40 morphometric and 4 meristic) were measured for specimens of each population. ANOVA showed a significant difference at the most of characters (more than 87% in two sex) among populations. The results of PCA on all specimens of each population showed that these populations were not completely separated, however, a few male specimens in Kojor station were far from others.

The results showed that reproduction of *Gammarus komareki* lasted through the year, the clutch size was low with mean about 7.6 eggs/ind. however the Navrud station with mean of  $11.6 \pm 5.8$  (egg/ind.) had a significant difference with other sites. Intestine content did not show a correlation between abundance and diversity of plankton with habitats. Habitat changes for environmental factors (physical and chemical variation) were limited in the springs and *Gammarus komareki* was very sensitive, it was not able to acclimate itself to laboratory condition although it survived and had a little active life.

## **PRODUCTION OF *PONTOGAMMARUS MAEOTICUS* IN VITRO (O)**

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*Pontogammarus maeoticus* is the most abundant Crustacean species in the sublittoral zone in the southwest of the Caspian Sea. The polyculture of *P. maeoticus* along with fish has significantly raised the fertilization and productivity in the fish ponds in Northern Caspian Sea.

In this study the animals were collected from Caspian Sea shore and placed in 4 aquarium 40 l. in laboratory situation where it had been modified with soft-sandy substrate. The animals were fed with vegetable wastage and detritus for 120-150 days. The finding showed that the abundance was multiplied from 3.2 to 7.8 in different aquariums. The mean egg numbers of specimens varied from 6 to 9 in different replicates that is comparable with nature. In other section of experiments four tanks 4 m<sup>3</sup> were used in open space with a similar substrate and feeding. The biomass of amphipoda became 2 to 2.4 times greater than initial amount after 45 days. This study showed the suitability of species to use in fish culture ponds.

### **SPATIAL DISTRIBUTION, MORPHOMETRIC AND GENETIC ANALYSIS OF THE INVASIVE *DIKEROGAMMARUS* (CRUSTACEA: AMPHIPODA) SPECIES OF LAKE BALATON (P)**

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Lake Balaton is a shallow lake (mean depth: 3.25 m) with a large surface area (length: 78 km, average width: 7.6 km, surface area: 596 km<sup>2</sup>), the largest one in Central Europe. It is connected with River Danube via Sió Channel, through which Ponto-Caspian invasive invertebrates could reach the lake. The *Dikerogammarus* species were accidentally introduced into Lake Balaton together with the mysid *Limnomysis benedeni* in 1950. They displaced the native *Gammarus roeseli* within a year. Our present morphometric and genetic analyses of 167 animals have proved the presence of *D. villosus*, *D. haemobaphes* and *D. bispinosus* in Lake Balaton, with the dominance of *D. villosus* showing large variability. *D. villosus* dominated on the stones near the water surface, and occurred together with *D. haemobaphes* on the bottom. *D. bispinosus* occurred very rarely. *Dikerogammarus* spp. were much more important at low water level (2003) than at higher one (2004 and 2005). *Chelicorophium curvispinum* and *Dreissena polymorpha* were also abundant on the stones. Hungarian National Fund (OTKA No T 0321165, T 034813, T042622), the Balaton Project of Hung. Acad. Sci., Hungarian French Support (F-31/2003) and the BALÖKO Project supported the studies.

### **ENDOGENOUS ACTIVITY RHYTHM OF TWO SYMPATRIC AMPHIPOD SPECIES, *TALITRUS SALTATOR* AND *TALORCHESTIA BRITO* FROM A SANDY BEACH IN NORTH EASTERN TUNISIA (O)**

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The sandhoppers *Talitrus saltator* and *Talorchestia brito* exhibit a nocturnal endogenous locomotor activity. Animals, freshly collected in spring from Barcoukech (Tabarka, Tunisia), were transferred to a controlled environment cabinet in the laboratory and their locomotor activity monitored individually in annular chambers equipped with an infrared activity recording system. Sixteen animals of each species were kept under constant darkness at a

constant temperature of 18°C, i.e. approximately the mean monthly air temperature at the site collection, for a period of 10 days. Parameters of the locomotor rhythm of the two species were described. The recordings were analysed for specific parameters, notably free-running period, stability, % rhythmic, wave-form, activity and rest times, to permit a comparison of the rhythms characteristics of the two species. The preliminary analysis indicates both species free-run with a period of longer than 24 h, i.e.  $25h\pm 34$  and  $25h20\pm 1h11$  in the case of *T. saltator* and *T. brito* respectively. However, considerable intraspecific variation was evident between individuals. The activity patterns ranged from irregular activity pattern in which some animals were inactive for at least one day in the middle of the experiments to apparently clear activity rhythm. Activity was mostly confined to the hours of subjective night. The rhythm as evaluated by the SNR is significantly less precise in *T. brito*. Moreover, it appeared that locomotion pattern in this species is characterised by a greater variability among individuals and reduced activity. The characteristics and biological significance of the rhythm of these species are discussed.

### **PRELIMINARY DATA ON MICROPARASITES OF ALIEN AND NATIVE GAMMARIDS (AMPHIPODA) OCCURRING IN POLAND (P)**

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The goal of our research was to identify microparasites (gregarines, microsporidia) of alien gammarids colonizing Polish waters, versus those infecting native species in the same areas. Material was collected in October 2005. Altogether, over 4000 individuals of 12 gammarid species (4 aliens and 7 natives) were collected from the deltaic system of the Vistula River, littoral of the Baltic Sea, and from small rivers draining directly to the sea. All gammarids were identified and sectioned to collect tissue samples. Microparasites were identified with use of light- and electron microscopy. Gregarines were recorded in digestive tracks of invasive *Pontogammarus robustoides* (*Uradiophora ramosa* & *Cephaloidophora mucronata*), and of native *Gammarus pulex* (*Cephaloidophora gammari*). Also Microsporidia were found only in these two gammarid species: *Pleistophora muelleri* in *G. pulex*, and *Nosema pontogammari* in *P. robustoides*. All the above microparasites are new to Poland. Only *Pleistophora muelleri* is a species widespread in Europe. The other microparasites were found before only in Ponto-Caspian region and evidently were transported to Central Europe with the invasive Ponto-Caspian gammarids. No microparasites were found in an invasive North-American *G.tigrinus*, and in Ponto-Caspian *Obesogammarus crassus*. Also no transfer of microparasites between natives and aliens was observed. The study was supported financially by the grant from Polish Ministry of Education & Science, no 2P04F 030 28.

### **REPRODUCTIVE ASPECTS OF THREE TALITRID SPECIES FROM ITALY (P)**

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This study was conducted on three talitrid species: *Talitrus saltator* (Montagu, 1808), *Orchestia gammarella* (Pallas, 1766) and *Macarorchestia remyi* (Schellenberg, 1950). All of

them live on the beach: *T. saltator* is a sandhopper –a burrowing species; *O. gammarella* and *M. remyi* are beachfleas –they take refuge under decaying debris. We aimed to analyse some aspects linked to their reproductive biology. Samples were taken from several stations along the Italian peninsula; *T. saltator* was sampled on both Adriatic and Tyrrhenian sea, *O. gammarella* and *M. remyi* on the Tyrrhenian one. Sites differ in anthropogenic pressure. Samples were taken every two months for *T. saltator* and *O. gammarella* and every month for *M. remyi*. Animals were sexed and females separated. Sex ratio and the proportion of females bearing eggs were assessed for each species. Total body length was measured and number of eggs was counted. The maximum length of females with eggs was 12.5 mm (Adriatic coast) and 15 mm (Tyrrhenian coast) for *T. saltator*; the number of eggs varied from 2 to 34 (Adriatic coast) and from 2 to 32 (Tyrrhenian coast). The maximum length for *O. gammarella* was 14 mm with eggs varying from 3 to 20. *M. remyi* had maximum body length of 11 mm and eggs from 1 to 13. Positive relationships between the two parameters were assessed in the three species. Where anthropogenic impact is low, females are generally bigger and produce a higher number of eggs. Results are analysed and compared in relation to the exploitation degree of the different areas.

## **THE AMPHIPOD PILOT SPECIES PROJECT (AMPIS) AFTER ITS FIRST YEAR (O)**

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In 2005 a project was started aimed at the production of a high-resolution database of external morphological characters of amphipods, a co-production of the University of Amsterdam (Netherlands), the Institute of Zoology of the Chinese Academy of Sciences and the Radboud University of Nijmegen (Neth.). The Ponto-Caspian amphipod *Dikerogammarus villosus* was chosen as the first species described in the project and with several techniques (classical line drawings, photographs and SEM) a systematic inventory of the body surface has started. The morphology of this species appears to be extremely complex in many aspects. Although thousands of pictures have been produced only the first 5 body segments have been scanned thus far. The results are very promising: 1) a lock-and-key system for pre-copulations was found and described; 2) the location of what are presumably statocysts was discovered; 3) a highly complex flow guidance system is now investigated; 4) the side-line organ is slowly revealing its secrets. The results of the first year will be presented.

## **SUCCESS OF THE INVASIVE PONTO-CASPIAN AMPHIPOD DIKEROGAMMARUS VILLOSUS BY LIFE HISTORY TRAITS AND REPRODUCTIVE CAPACITY (O)**

**Pöckl Manfred**

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*D. villosus* was not found in the Austrian stretch of the River Danube until 1989, and not before 1992 in the Bavarian Danube. This relatively large species was introduced into the Rhine catchments via the Main-Danube Canal. It quickly spread to adjacent areas in the Netherlands and France, and hence also used the southern corridor to spread into Western Continental Europe. It has successfully invaded the Rhône system and large rivers of northern Germany, as well as the Moselle and other French streams, rivers and canals. The species also occurs in several lakes, e.g. Traunsee, Lake Constance, Lake Garda. A potentially high reproductive capacity expressed in the number of eggs and brood volume, comparatively small eggs, optimal timing to release the maximum number of neonates per female in April/May (maximising rapid growth at high summer temperatures and plentiful food), a long reproductive cycle, a privilege of mating only for larger individuals in winter and spring, a female-biased sex ratio, together with a rapid development of eggs, rapid growth to sexual maturation, short life span, tolerance to a wide range of environmental conditions, and exceptional predatory capabilities, all give the invasive Ponto-Caspian gammarid an opportunity to develop large populations in fresh and brackish waters of the temperate biome all over the world. In all life-history variables, *D. villosus* is competitively superior to many of the indigenous species in north-western Europe and elsewhere.

#### **COASTALLY-RESTRICTED TERRESTRIAL AMPHIPODS (TALITRIDAE): LIMITING FACTORS AND IMPLICATIONS (O)**

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The Tasmanian talitrid fauna includes several terrestrial species that are restricted to the immediate coastal zone (within 200m of the high tide mark). While there are only a few records of similarly restricted talitrids elsewhere, the same distribution pattern is quite widely known in terrestrial oniscideans isopods and some other invertebrate groups. The distributional patterns of some of the Tasmanian species will be described, and the results of a field experiment will be presented, which suggest that the availability of salts may be the limiting factor. The implications of these distributions for the evolution of terrestrial talitrids will be discussed.

#### **LOCOMOTOR ACTIVITY RHYTHMS IN DIFFERENT SPECIES OF SEMI- TERRESTRIAL TALITRID AMPHIPODS ALONG A WATER-LAND GRADIENT (O)**

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Biological oscillators are the means by which organisms match the temporal structure of the surrounding environment. Previous research had shown that the whole of the characteristics of the locomotor activity rhythm in animals was a typical feature of each species, as a fingerprint that can be recognized, and a variation was observed among species depending on the environment. However, a high variability was recently observed within species and in populations belonging to the same species. With the aim of highlighting such variability and further inspect the influence of environment on rhythmic behaviour, locomotor activity

rhythms and the characteristics of the rhythms were analysed in different populations of talitrids belonging to three species (*Talitrus saltator*, *Orchestia montagui* and *O. gammarella*) and colonizing different habitats from the shoreline to the inland, from a sandy beach to a river bank. The recording sessions were carried out in the laboratory for 21 days in constant darkness and constant temperature. The survival, the percentage of active and periodic animals, the mean of the circadian period and its definition were calculated and compared between populations. The results showed a wide range of variability where rhythmic behaviours can be associated with the environmental features of the habitat where the animals had been collected. Not only the rhythmic behaviour itself but also the plasticity of the expression of locomotor activity rhythms appeared adaptive. A higher variability was observed in variable environments where natural cycles were hardly evident, whereas a higher precision in the rhythmic features was recorded where the natural cycles acted as limiting factors.

### **SPATIAL DISTRIBUTION AND HABITAT SELECTION OF THE INTERTIDAL CAPRELLIDAE: A STRESS BIOINDICATOR IN CEUTA, NORTH AFRICA (P)**

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The caprellid community associated with the intertidal algae was studied on a spatial scale along the coast of Ceuta, North Africa, using uni- and multivariate analyses. Sixteen stations were sampled to encompass the broadest range of environmental conditions. Three replicates (using quadrates of 25x25 cm<sup>2</sup>) were taken from the intertidal area (from zero level up to 25 cm) and the caprellids and algae were identified to species level. The caprellids were counted and the biomass and volume of each algal species were measured. Hydrodynamics, silting, suspended organic matter, organic matter in silt and suspended solids were also estimated for each station. The spatial distribution of the intertidal caprellid community reflected the physico-chemical conditions of the coasts; *Caprella penantis* and *C. danilevskii*, mainly associated to *Cystoseira tamariscifolia* and *Asparagopsis armata*, were dominant in the most exposed areas with higher hydrodynamics and low values of silting. *Caprella acanthifera*, *C. hirsuta* and *C. grandimana* were dominant in the anthropogenic areas and/or calm waters, clinging preferently on turfs of *Corallina elongata*, *Gelidium pusillum* and *Caulacanthus ustulatus*, or patches of *Halopteris scoparia* with high content of detritus. Data of correlations between algae (biomass and volumen) and each caprellid species are provided. The multivariate approach showed that environmental parameters (mainly hydrodynamics) together with the presence/absence of particular species of algae, are the main factors controlling the intertidal caprellid community.

### **SEM STUDY OF CUTICLE AND SETAE OF *GAMMARUS KOMAREKI* (AMPHIPODA: GAMMARIDAE) FROM IRAN (O)**

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In the present study, the cuticle of dominant species of Azarbayjan province of Iran, *Gammarus komareki* was studied ultrastructurally. The pore canals and their variations on head and different parts of body in four age groups in two seasons were compared. In

addition, various kinds of external sense organs were studied using SEM at higher magnification. The dissected parts of male and female specimens belonging to four age groups were prepared for ultrastructural study. Comparison of head cuticle pore canals revealed the sieve like distribution pattern in head polygons. The observed patterns are "linear rows of pores" towards the posterior body segments. The "Side line organs" were found in single and pair groups on most body segments in juveniles. While in adults and older specimens, these are limited to posterior segments of body in groups consist of three to five receptors. Various kinds of excretory pores (pits) and receptors were found on body surface. These are: sensory spines, cuticular projections, and also plumose, hairlike and bifurcate setae. Setae locations on different segments of body are mapped and their function is discussed.

## **BEHAVIOURAL ADAPTATIONS OF TALITRID AMPHIPODS TO CHANGING ENVIRONMENTS: EVOLUTIONARY AND MANAGEMENT PERSPECTIVES (O)**

**Scapini Felicità**

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Since the 1950th talitrid amphipods have been subject of behavioural research that made them models in developing ethology. Surprisingly to the generally accepted evolutionary paradigm, *Talitrus saltator* showed a genetically determined orientation adapted to the shoreline direction at the collecting site, which required fast evolutionary changes for the well documented changeability of sandy beaches. *T. saltator* also had visual capacities similar to those of insects and used a sun compass during daytime, despite its mainly nocturnal activity. Geographically extended studies (conducted in the framework of international projects funded by the British Council/Italian Ministry of Research and University; Swedish and Italian Ministries of Research and University; Chilean Ministry of High Education; European INCO-MED Projects in the 4th, 5th and 6th FP) have compared behavioural adaptations of sandhopper and beachhopper species to coastal environment with different ecology and geomorphological dynamics. Relationship was shown between shoreline stability and behavioural adaptations. Population genetics analyses highlighted genetic polymorphisms in natural populations and linked the genetic background of the population to behavioural adaptations. On the other hand, the importance of behavioural flexibility was stressed that allowed rapid adaptation to changing shorelines. These baseline studies, relating behavioural adaptations, population genetics and beach geomorphology, make talitrids suitable as bioindicators of environmental changes caused by man induced impacts in the short, medium and long term.

## **A NEW RECORD OF *AMPHILOCHOIDES BOECKII* SARS, 1892 (AMPHIPODA) FROM THE EASTERN MEDITERRANEAN (O)**

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Two specimens of the *Amphilochoides boeckii* Sars, 1892 were collected, respectively, sampled from a depth of 109 m off Gökova (one specimen) and 120 m depth off Marmaris (one) along the Aegean Sea coast of Turkey. The specimens examined are in accordance with

the original description of *Amphilochooides boeckii* (Krapp-Schickel, 1982: 71-73) and, consequently, no further description is required. A photo and drawings of one of the specimens are presented in figs. 1 and 2. A distribution map of *A. boeckii* in the Mediterranean Sea is also given.

## **METABOLIC ACTIVITY OF AMPHIPOD POPULATIONS FROM DIFFERENT HABITATS (P)**

**Simčič Tatjana and Brancelj Anton**

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Respiratory electron transport system (ETS) activity and respiration rate (R) have been measured in populations of amphipod genera *Gammarus* and *Niphargus* obtained from the habitats that differ in ecological factors, such as food supply and oxygen concentration. *Gammarus fossarum* were collected from the river and from the spring, *Niphargus hadzii* from the spring and *Niphargus stygius* from the cave. Both ETS activity and respiration rate, calculated per mg of metabolically active tissue, differed significantly between investigated populations. Population of *G. fossarum* from the river had the highest ETS activity, while the lowest values were determined in *N. hadzii*. The highest respiration rate of *G. fossarum* from the river indicated on high energy demands for standard metabolism. Low respiration rates that were measured in *N. stygius* are characteristic of cave animals which are adapted to unfavourable environmental conditions in subterranean habitats. The exploitation of metabolic potential for respiration was the highest in *G. fossarum* from the river, followed by *G. fossarum* and *N. hadzii* from the spring. The highest ETS/R ratio was obtained for *N. stygius*. Therefore, the differences in metabolism of amphipod species are probably one of the reasons that enable them to exploit successfully different habitats.

## **EXTENDED PARENTAL CARE IN *METOPA GLACIALIS* ASSOCIATED WITH *MUSCULUS DISCORS*? (O)**

**Tandberg Anne Helene S.<sup>1,2,\*</sup>, Vader Wim<sup>1</sup> and Berge Jørgen<sup>2</sup>**

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*Metopa glacialis* has previously been recorded as an associate of at least three different *Musculus* species, all of which have been recorded in either north Atlantic or Arctic waters. This study intends to investigate more closely the relationship between the amphipod *M. glacialis* and the bivalve mollusk *M. discors* sampled in August 2006 in the Heleysundet area at the east coast of Spitsbergen. In total, more than 300 specimens of *M. discors* were examined, and all associated amphipods were counted. The prevalence of *M. glacialis* was approx. 75%, whereas another amphipod, *Anonyx sp.*, had a prevalence of approx. 15%. The average number of *M. glacialis* in the examined hosts was 3.7, with a maximum of 41 in one shell. The length and sex of all *M. glacialis* were analysed in the 30 most infected shells. The number of *M. glacialis* in the analysed shells ranged between 12 and 41. The counts of *M. glacialis* indicate the presence of family structures with one or a pair (with exceptionally an extra female) adult specimens and multiple breeds of juveniles.

## **TOWARDS A NEW GAMMARIDEAN CHECKLIST FOR THE NE ATLANTIC (P)**

**Vader Wim**

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In 1991, Palerud & Vader published a checklist of the gammaridean amphipods of the NE Atlantic and Norwegian Arctic, covering the area from the tip of Bretagne northwards to Novaya Zemlya. Since then, amphipod taxonomy has undergone a period of large changes and a number of new species have been described from the area or found there for the first time. The present preliminary checklist can be considered as a 'prototype' for a new revised published checklist, which once again also will contain the most important synonyms and an indication of where to find the best descriptions of the species. It is presented here in the hope of constructive feedback from colleagues.

Palerud, R & W. Vader 1991. Marine Amphipoda Gammaridea in North-East Atlantic and Norwegian Arctic. - *Tromura, Naturvitenskap* 68, 1-97.

## **A SURVEY OF ASSOCIATIONS BETWEEN AMPHIPODS AND MOLLUSKS (P)**

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Associations between amphipods and mollusks are of two main types, which probably have evolved independently. In one type the amphipods live below the foot of intertidal or very shallow water gastropods or amphineurans; the amphipod partners mainly belong to the families Calliopiidae, Eusiridae and Hyalidae. In the other type the amphipods live inside the mantle cavity of subtidal bivalves and usually spend their entire lives there; these amphipods belong to widely different families (Behningiellidae, Leucothoidae, Lysianassidae, Stenothoidae, and Uristidae) and many of the associations seem to be obligate. The biology of these associations, especially of the second type, is very insufficiently studied. This poster gives a survey of all published records of such associations. In addition, amphipods living inside dead mollusc shells and species apparently mimicking mollusks are mentioned, but records of amphipods living among the epifauna of large molluscs or on or in gastropod houses tenanted by hermit crabs are excluded from this survey.

## WORLD DIVERSITY OF FRESHWATER AMPHIPODS – UPDATE FOR 2005 (P)

Väinölä R.<sup>1</sup>, Witt J. D. S.<sup>2</sup>, Grabowski Michal<sup>3</sup>, Bradbury J. H.<sup>4</sup>, Jazdzewski K.<sup>3</sup> and Sket B.<sup>5</sup>

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As a contribution to a global inventory of known animal species diversity in continental waters, initiated by the Belgian Biodiversity Platform, we compiled information of the non-marine amphipod taxa in the major biogeographical regions of the world. By the end of 2005, there were altogether ca. 1866 amphipod species and subspecies listed from fresh or inland waters worldwide. This represents about 70% increase to a previous count 25 years earlier (Barnard & Barnard 1983). The freshwater taxa account for 20 % of the total known amphipod diversity (Vader 2005). The actual diversity may still be threefold. Freshwater amphipods are most abundant in cool and temperate environments, and notably rare in the tropics. They are particularly diversified in subterranean habitats (45% of species are hypogean), in running waters, and in temperate ancient lakes. Some 70% of the diversity is Palearctic, 13% Nearctic, 7% Neotropical, 6% Australasian and 3% Afrotropical. Major hot-spots of endemic diversity are in Southern Europe, Lake Baikal, Ponto-Caspian basin, Southern Australia (including Tasmania) and SE USA. The summaries of species diversity in each of ca. 50 groups of freshwater animals will appear as a special issue of *Hydrobiologia*, and some checklists at an associated website.

## INCREASE OF *COROPHIUM ACUTUM* ABUNDANCE IN ROCKY SHALLOW BOTTOMS DUE TO THE EXPANSION OF *CAULERPA RACEMOSA* VAR. *CYLINDRACEA* IN WESTERN MEDITERRANEAN SEA (O)

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A study of the amphipods assemblages on rocky shallow bottoms (0.3 m depth) was carried out during summer 2004 and winter 2005. We studied two rocky habitats: native seaweeds and rocky bottoms colonized by *C. racemosa* var. *cylindracea* (Sonder) Verlaque, Huisman et Boudouresque (invasive species). The rocky platform is characterized by high hydrodynamics conditions and low values of deposit sediments. The results show that the presence of *C. racemosa* affects at detritus accumulation being this values the 50% of total biomass, the detritus values in summer were estimated as 472.5 g dw m<sup>-2</sup> in front of 5.9 g dw m<sup>-2</sup> estimated on native seaweeds; during the winter this pattern persist. This fact changes completely the habitat structure producing an amount of immobilised detritus during the year. Those conditions generate a habitat that benefits the colonisation by other species with different ecological requirements like *Corophium acutum*. *Corophium acutum* is tube-dweller typically of sandy, or muddy and calm bottoms and is very common in degraded areas like harbours. The abundances of *Corophium acutum* founded in presence of *Caulerpa racemosa*

reach values up to  $402.8 \pm 108.3$  ind/ m<sup>2</sup> in summer and  $172.2 \pm 108.5$  ind/ m<sup>2</sup> in winter, around 7 times bigger than abundances of this species on native seaweeds; and 4 times bigger than polluted habitats like harbours. Contrary, we have detected a displacement of species like *Amphithoe ramondi* and *Hyale schmidtii* because the development of *Caulerpa racemosa* bed.

## WHEN DO INVASIVE GAMMARIDS BECOME PREDATORY? (O)

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Gammaridean species replacements by invasive gammaridean species are recorded in several occasions all over the world. Intra Guild Predation is considered the factor determining such species replacement processes. However, it is known that gammaridean species are mostly omnivorous. However, some species seem to be more predatory than others. At invasions sometimes increased predation by gammaridean species is reported. It can be questioned which factors determine when gammarids become predatory. Several factors can play a role such as morphological change, genetic change, size, sex, temperature, the presence of abundant food etc. These factors will be discussed based on literature data, morphological and behavioral observations and experiments.

## POPULATION GENETICS AND MICROSPORIDIAN PARASITES OF DIKEROGAMMARUS VILLOSUS, AN INVASIVE GAMMARID SPECIES IN EUROPE (O)

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The Ponto-Caspian amphipod *Dikerogammarus villosus* is a successful invader in many parts of Europe. History of colonisation is well documented. A southern corridor of invasion allowed colonisation of Romania, Hungary, Austria, Southern Germany, Benelux and France. Currently, Danube, Rhine, Rhone, Seine and Loire river basins are impacted. Poland is currently facing colonisation from two fronts. Westward (Odra River), populations which

colonised Western Europe are colonizing through Northern Germany. Eastward (Bug River), populations from the Dnepr River are the source populations.

We report here an analysis of genetic diversity for 3 microsatellite loci and the presence of microsporidian parasite along the southern corridor of invasion, in Western Europe, as well as from both fronts in Poland. Results show neither loss of genetic diversity nor loss of parasites. The two Polish fronts are highly genetically differentiated. These results will be discussed in relation to the species ecology and invasion success.

## **AMPHIPODA FAUNA OF MOUNTAINOUS AREA OF LORESTAN PROVINCE, IRAN : A MORPHOLOGICAL STUDY (P)**

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Amphipoda constitute a major group which are mainly marine but have also freshwater representatives. Most species in Iranian inland waters belong to the *Gammarus pulex*-group. The specimens were collected from central Zagros region in north of Lorestan province (3000Km<sup>2</sup>) where 21 stations were sampled. All specimens were fixed by 70 % ethanol in field and were studied under light microscope to identification in laboratory. Most specimens were *Gammarus komareki* and *G. proietus* that had been known in Iran previously. These two species showed many morphological variation in mouthpart characters, telson and uropod III as well as head lobes shape in different stations. Beside there was probability of two new species, that one of them have some characteristics as like as of *G. crenulatus* and *G. paricrenatus* however it was separated with special characteristics of mandible palp, palm of gnathopod I, pleosomites 1-3, measurements in Uropod III. The other species had some characteristics of *G. parthicus* while it was different with dorsal contour of urosome 1-3, shape of head and up III. To clear identification and introduce of new species is needed more studies

## **BIOGEOGRAPHY OF AMPHIPODS IN TUNISIAN COAST (P)**

**Zakhama Sraieb Rym, Sghaier Y. R. and Charfi Cheikhrouha Faouzia**

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The amphipod fauna of Tunisian coast has still been relatively unexplored, except for scarce and very fragmented data. Following research on Tunisian amphipods conducted up to the beginning of the twentieth century by Chevreux, a long interval ensued until our recent work on northern and eastern Tunisian coast. This study attempted to a better knowledge of amphipod diversity of shallow water in Tunisian coast and their geographical distribution. Twenty localities along the Tunisian coast were selected and several marine habitats were examined such as Magnoliophytes (*Posidonia oceanica* and *Cymodocea nodosa*) and algae bottoms (*Ulva*, *Cystoseira*, *Padina*). Amphipods together with their substrata were collected by SCUBA diving or on apnoea at different depths; from 0 to -10 m. Amphipods were separated, sorted, preserved and then identified. A total of fifty species were identified, among them forty three species of Gammaridea and seven Caprellidea. A listing of marine

amphipods and their biogeographical distribution in Tunisia was given with a special attention for the new recorded species.

### **POPULATION STRUCTURE AND DISTRIBUTION OF AMPHIPOD FAUNA ASSOCIATED WITH SEAGRASS (O)**

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Crustacean amphipods are common and abundant in many littoral habitats of the marine environment particularly in seagrass. They are the most important group not only in terms of abundance and species richness, but also because of the functional role they play in this ecosystem. In order to detect the influence of the habitat on the distribution of amphipod fauna, two sea grasses were examined, *Posidonia oceanica* and *Cymodocea nodosa*. Sampling was carried out in July 2006 in three Tunisian localities, Raf-Raf in the North, Hergla in the centre and Zarzis in the South. At each locality, Amphipoda were collected with the substratum associated, three replicate samples were taken at each habitat. Amphipods were separated, preserved and identified to species level. The amphipod assemblage showed important differences among habitats in the three localities. Some species change significantly in abundance depending on the habitat considered. It was possible to conclude that there is an important influence of habitation on amphipod distribution and population structure.

### **CHANGES IN EXISTENCE AND DISTRIBUTION OF GAMMARIDEAN AMPHIPODS ALONG A GRADIENT OF PHYSICAL FACTORS IN SOUTH-EAST BOUNDARIES OF ZAGROS MOUNTAIN-CHAIN, SOUTH IRAN (O)**

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The distribution of fresh water amphipods is most importantly restricted by water temperature and altitude. They exist in most of aquatic habitats in North and north-west Iran, and expand their populations southward along the Zagros Mountains. The altitude gradient made by mountain's south-east boundary with their neighboring lowlands has produced an expected gradient in both air and water temperatures. Parallel to this gradient is another gradient in water salinity.

## Workshops

### BIODIVERSITY OF THE AMPHIPODA OF THE SOUTHERN OCEAN

#### De Broyer C. & the „Antarctic Amphipodologist Network”

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Amphipod crustaceans are the second most speciose animal group in the Antarctic and sub-Antarctic waters where they constitute a significant trophic resource for a number of Southern Ocean fishes, invertebrates, seabirds and mammals.

In the present context of growing impact of global environmental change in Polar regions, it is crucial to establish comprehensive baseline information on the Antarctic marine biodiversity as a sound benchmark against which future change can reliably be assessed.

An international network of specialists (the «Antarctic Amphipodologist Network (AAN)») was established to undertake the taxonomic revision of the Antarctic fauna of gammaridean and corophiidean amphipods (about 600 spp presently recognized), to synthesize their biogeographical and ecological traits and to elaborate the highly-needed identification guides and electronic identification keys. The “Synopsis of the Amphipoda of the Southern Ocean” authored by the AAN will cover all benthic amphipod taxa living in the Southern Ocean south to the Polar Front. The first volume includes a comprehensive catalogue of Antarctic and sub-Antarctic species of gammaridean and corophiidean amphipods with full synonymy, complete distribution records and bibliographical references. The catalogue covered 815 described species, 67 unidentified taxa, more than 7000 distribution records and 945 taxonomic and ecological references. The first volume also includes an interactive key to Southern Ocean families and subfamilies designed by J.K. Lowry. The second volume by C.O. Coleman monographs the Acanthonotozomellidae, Amathillopsidae, Dikwidae, Epimeriidae, Iphimediidae, Ochlesidae and Vicmusiidae.

All taxonomic and distribution data as well as bibliographical references of Antarctic and sub-Antarctic amphipods are accessible online through SCAR-MarBIN, the Antarctic Marine Biodiversity Information Network, which will be demonstrated.

### WORLD STATUS OF GENUS GUERNEA: POSSIBILITY OF NEW SPECIES FROM MEDITERRANEAN SEA (WORKSHOP)

#### Plaiti Wanda

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The genus *Guernea* (family Dexaminidae) includes 30 currently described species (sensu Barnard & Karaman 1991) which are assigned to two subgenera: *Guernea* and *Prinassus*. So far only one species (*Guernea coalita*) has been recorded from the Mediterranean. However, in recent studies of the Mediterranean benthos some amphipod specimens were found and provisionally assigned to the subgenus *Prinassus* (sensu Barnard & Karaman 1991). Some initial ideas on the systematic status and world distribution of subgenera of genus *Guernea* are put forward.

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