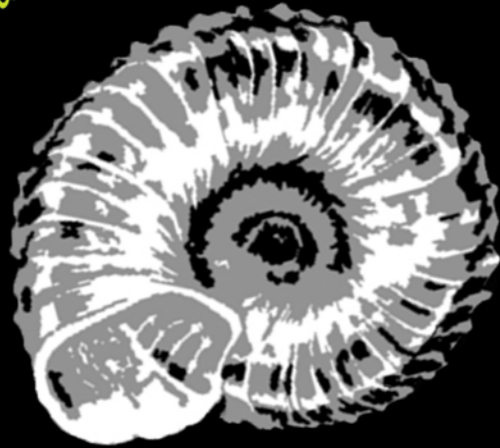


*EM* Malacologia 2011



6<sup>TH</sup> CONGRESS OF THE EUROPEAN  
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18-22 JULY 2011

VITORIA-GASTEIZ

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MALACOLOGICAL SOCIETIES**



## **ORGANIZING COMMITTEE**

### **Institutional Organizers**

Sociedad Española de Malacología

Grupo de investigación sobre Sistemática, Biogeografía y Dinámica de poblaciones de la Universidad del País Vasco (SBPd-UPV/EHU)

Museo Nacional de Ciencias Naturales - Consejo Superior de Investigaciones Científicas (MNCN-CSIC)

### **Local Organizers**

Systematics, Biogeography and Population dynamics working group (SBPd)

### **Chairperson**

Benjamín Gómez-Moliner (SEM, UPV/EHU, SBDp)

### **Deputy Chairperson**

José Templado (SEM, CSIC)

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### **Local Supporting Committee**

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Amaia Caro (UPV/EHU)

## **Scientific Committee**

David Aldridge (University of Cambridge)  
Ramón M. Álvarez-Halcón (Universidad Zaragoza)  
Rafa Araujo (Museo Nacional de Ciencias Naturales, CSIC)  
José R. Arrébola (Universidad de Sevilla)  
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Kurt Jordaens (University of Antwerp)  
Rafael La Perna (Università degli Studi di Bari, Italia)  
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Alberto Martínez-Ortí (Universidad Valencia)  
Benito Muñoz (Universidad Complutense, Madrid)  
Marco Oliverio (Università di Roma)  
Ana I. Puente (Universidad País Vasco)  
Joaquim Reis (Instituto Português de Malacologia)  
Carmen Salas (Universidad Málaga)  
Stefano Schiaparelli (Università di Genova)  
Mary Seddon (Chair, IUCN SSC Mollusc Specialist Group)  
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## **Supporting European Malacological Societies**

Sociedad Española de Malacología  
Société Française de Malacologie  
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## SPONSORS

We gratefully acknowledge the following sponsors.



Malacological Society of London



<b>Programme:</b>						
	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>	
<b>9,00</b>		Invited conference 2	Invited conference 4	Invited conference 5	Visit to Valle Salado, La Rioja & Congress closing luncheon	
<b>9,45</b>	Reception & Registration	Biogeography & Phylogeography	Endangered species and hot-spots of Biodiversity	Ecology		
<b>10,00</b>						
<b>10,45</b>		Coffee Break				
<b>11,15</b>		Systematics & Taxonomy	Endangered species and hot-spots of Biodiversity	Ecology		
						Biology, Reproduction & Mollusc culture
<b>13,00</b>		Lunch-time				
<b>15,00</b>			Poster session 1**	Biology, Reproduction & Mollusc culture		Ecology
<b>16,00</b>		Opening ceremony *	Systematics & Taxonomy			
<b>16,40</b>			Coffee Break	Coffee Break		
	Opening session. Invited conference 1 *	Coffee Break	Biology, Reproduction & Mollusc culture	Assembly of Malacological Societies		
<b>17,50</b>	Reception Icebreak *	Systematics & Taxonomy				
<b>18,10</b>						
<b>19,00</b>	Visit to the historic city center	Invited conference 3	Poster session 2**			
<b>20,00</b>						

\* The Congress will be held in the Faculty of Arts except those activities on Monday afternoon that will take place in the Palacio Villasuso.

\*\* The poster sessions will take place in the same building of the dining hall (Pabellón Universitario). The poster session room is located on the second floor.



<b>18<sup>th</sup> July, 2011 - Monday</b>	
<b>10,00 - 15,30</b>	<b>Reception &amp; Registration</b>
16,00 - 16,45	Opening ceremony *
<b>16,45 - 17,45</b>	<b>Invited conference: * Aldridge, David C.</b>
	The impacts and control of invasive alien bivalves
17,45 - 19,00	Icebreak *
<b>19,00 - 20,30</b>	<b>Visit to the historic city center</b>

\* The Congress will be held in the Faculty of Arts except those activities on Monday afternoon that will take place in the Palacio Villasuso.

\*\* The poster sessions will take place in the same building of the dining hall (Pabellón Universitario). The poster session room is located on the second floor.

<b>19<sup>th</sup> July, 2011 - Tuesday</b>	
<b>09,00 - 09,45</b>	<b>Invited conference: Pfenninger, Markus</b>
	More than meets the eye: a research program for the study of taxonomy, phylogeography and biogeography of Mediterranean land- and freshwater gastropods
09,45 - 10,05	<b>Stunžėnas, Virmantas</b> Haplotype phylogeographic diversity and digenean parasites of <i>Sphaerium corneum</i> (Bivalvia) in East, North and Central Europe
10,05 - 10,25	<b>Mylonas, Moissis</b> The genus <i>Turanena</i> (Gastropoda Enidae) in the Eastern Mediterranean islands
10,25 - 10,45	<b>Chueca, Luis Javier</b> Molecular systematics and phylogeography of <i>Sphincterochila</i> (Gastropoda, Helicoidea)
<b>10,45 - 11,15</b>	<b>Coffee break</b>
11,15 - 11,35	<b>Templado, José</b> Speciation process within <i>Dendropoma petraeum</i> species complex (Gastropoda: Vermetidae)
11,35 - 11,55	<b>Carmona, Leila</b> Preliminary molecular phylogeny of the Aeolidiidae (Aeolidina, Nudibranchia, Gastropoda)
11,55 - 12,15	<b>Elejalde, Miren Arantzazu</b> Phylogenetic relationships of banana slugs (Stylommatophora: Arionidae: <i>Ariolimax</i> ) using mtDNA
12,15 - 12,35	<b>Froufe, Elsa</b> <i>Anodonta cygnea</i> in Iberia: Autochthonous or introduced? First results on the genetic diversity based on mitochondrial and nuclear DNA sequences
12,35 - 12,55	<b>Martinez-Ortí, Alberto</b> An update of the systematic of Parmacellidae P. Fischer, 1856 (Gastropoda, Pulmonata)
<b>13,00 - 15,00</b>	<b>Lunch-time</b>
<b>15,00 - 16,00</b>	<b>Poster session</b>
16,00 - 16,20	<b>Kruckenhauser, Luise</b> What is a snail species? Mitochondrial lineages of snails with a <i>Trochulus hispidus</i> phenotype (Gastropoda: Pulmonata: Hygromiidae)
16,20 - 16,40	<b>Giribet, Gonzalo</b> Resolving molluscan relationships using Next Generation Sequencing and phylogenomic techniques
16,40 - 17,00	<b>Zardoya, Rafael</b> Gastropod mitogenomics
17,00 - 17,20	<b>Patel, Simit</b> The use of AFLP markers to examine Local Adaptation in the Land Snail, <i>Cepaea nemoralis</i>
<b>17,20 - 17,50</b>	<b>Coffee break</b>
17,50 - 18,10	<b>Petkevičiūtė, Romualda</b> Diversity and phylogenetic affinities of European species of the genus <i>Sphaerium</i> (Bivalvia, Sphaeriidae) based on karyotype composition and DNA sequences
18,10 - 18,30	<b>Reise, Heike</b> <i>Deroceras panormitanum</i> and congeners from Malta and Sicily, and the identity of the widespread pest slug
18,30 - 18,50	<b>Williams, Suzanne T.</b> Molecular systematics of the deep-water gastropod family Solariellidae (Trochoidea)
<b>19,00- 20,00</b>	<b>Invited conference: Agencia Vasca del Agua (URA)</b>
	Mussel zebra in the Basque Country

<b>20<sup>th</sup> July, 2011 - Wednesday</b>	
<b>09,00 - 09,45</b>	<b>Invited conference: Seddon, Mary</b>
	Using data from Mollusc Diversity studies and Regional Assessments to inform Conservation Needs
09,45 - 10,05	<b>Skujienė, Grita</b> Lithuanian molluscs listed in the Habitats Directive: analysis of populations' state
10,05 - 10,25	<b>Arrébola, José Ramón</b> Conservation and global management of the endangered species <i>Iberus gualtieranus gualtieranus</i> (Gastropoda: Helicidae) in Andalusia (Iberian Peninsula)
10,25 - 10,45	<b>Albuquerque, Mónica</b> Testing M@rBis (Marine Biodiversity Information System) as a useful tool for the creation of Marine Protected Areas. The case study of Selvagens Islands' Molluscs
<b>10,45 - 11,15</b>	<b>Coffee break</b>
11,15 - 11,35	<b>Douda, Karel</b> Threats to the endangered freshwater mussel <i>Unio crassus</i> caused by the impairment of its host fish resources in the Czech Republic
11,35 - 11,55	<b>Araujo, Rafael</b> Saving the naiads of the Banyoles Lake
11,55 - 12,15	<b>Teixeira, Amílcar</b> Are autochthonous mussel populations of Tâmega, Tua and Sabor rivers (Douro basin) threatened? Ecological status and future conservation measures
12,15 - 12,35	<b>Varandas, Simone</b> Rediscovery and possible conservation strategies for two freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) populations in the Tâmega River Basin (northern Portugal)
12,35 - 12,55	<b>Abiona, John A.</b> Comparative Evaluation of haemagglutination potential of haemolymph from two species of giant African land snail's ( <i>Archachatina marginata</i> and <i>Achatina achatina</i> )
<b>13,00 - 15,00</b>	<b>Lunch-time</b>
15,00 - 15,20	<b>Álvarez, Patricia</b> Protoconch whorls variation and delayed metamorphosis in <i>Epitonium celesti</i> (Aradas, 1854) (Mollusca, Gastropoda, Epitoniidae)
15,20 - 15,40	<b>Bidegain, Gorka</b> An alternative model for estimating the length-weight relationship of <i>Ruditapes decussatus</i> (native) and <i>Ruditapes phillippinarum</i> (introduced) bivalves on the northern coast of Spain (Cantabrian Sea)
15,40 - 16,00	<b>Boukhicha, Jihen</b> Reproduction of <i>Patella rustica</i> (Mollusca, Patellogastropoda) populations in exposed and sheltered sites
16,00 - 16,20	<b>Salas, Carmen</b> Formation of radial ribs in Bivalves: the role of the mantle folds
16,20 - 16,40	<b>Lopes-Lima, Manuel</b> Do freshwater mussels (Bivalvia, Unionoida) feed selectively according to seasonal dietary needs? A case study on <i>Anodonta cygnea</i>
<b>16,40 - 17,10</b>	<b>Coffee break</b>
17,10 - 17,30	<b>Hutchinson, John M.C.</b> Mating in <i>Ariunculus isselii</i> , an arionid slug without a spermatophore
17,30 - 17,50	<b>Sulikowska-Drozd, Anna</b> Reproductive strategy of clausiliid <i>Alinda biplicata</i> (Montagu, 1803) – variation across the geographical range of the species
<b>17,50 - 20,00</b>	<b>Poster session</b>

<b>21<sup>th</sup> July, 2011 - Thursday</b>	
<b>09,00 - 09,45</b>	<b>Invited conference: Oliverio, Marco</b>
	Larval ecology and evolution of prosobranchs: the state of the art in the age of DNA
09,45 - 10,05	<b>Aneiros, Fernando</b> Temporal variation of soft-bottom bivalve assemblages influenced by mussel culture in the Ria de Aldán (Galicia, NW Iberian Peninsula)
10,05 - 10,25	<b>Urta, Javier</b> A molluscan assemblage in a coralligenous bottom of the Alboran Sea: intra-annual changes and ecological considerations
10,25 - 10,45	<b>Gofas, Serge</b> Mollusca from a species-rich deep-water <i>Leptometra</i> community in the Alboran Sea
<b>10,45 - 11,15</b>	<b>Coffee break</b>
11,15 - 11,35	<b>Kappes, Heike</b> Suitability of floodplain forest mollusks for multi-species distribution modeling
11,35 - 11,55	<b>Paredes, Ricardo</b> Malacofauna assemblages in organic-rich sediments. Case study of the Upper Sinemurian (Lower Jurassic) from the Lusitanian Basin (Portugal)
11,55 - 12,15	<b>Moreira, Juan</b> Do mussel beds support the same mollusc diversity on artificial and natural intertidal habitats?
12,15 - 12,35	<b>Rueda, José Luis</b> Preliminary characterization of molluscan assemblages in Spanish mud volcanoes and adjacent bottoms (Gulf of Cadiz)
12,35 - 12,55	<b>Kuznecova, Viktorija</b> Land snail diversity in habitats of <i>Ena montana</i> (Draparnaud, 1801) in Biržai forest (Lithuania)
<b>13,00 - 15,00</b>	<b>Lunch-time</b>
15,00 - 15,20	<b>Rihova, Dagmar</b> Land snail shell degradation: its causes and manifestation
15,20 - 15,40	<b>Damerdji, Amina</b> Diversity and repartition of Gastropoda according to a transect North-South Ghazaouet-El-Aricha in the region's Tlemcen (Algeria)
15,40 - 16,00	<b>Sawangproh, Weerachon</b> Asian openbill stork ( <i>Anastomusoscitans</i> ), a competent predator of an invasive alien snail species in Thailand
16,00 - 16,20	<b>Škodová, Jana</b> Ecology and distribution of <i>Pupilla alpicola</i> (Charpentier, 1837) in the Western Carpathians
16,20 - 16,40	<b>Georgopoulou, Elisavet</b> Review of <i>Helicigona</i> and <i>Campylaea</i> (Gastropoda: Pulmonata) in Greece
<b>16,40 - 17,00</b>	<b>Coffee break</b>
<b>17.00</b>	<b>Assembly of Malacological Societies</b>

<b>22<sup>th</sup> July, 2011 - Friday</b>	
<b>9,00 - 10,00</b>	Trip to Salinas de Añana
10,00 – 12,00	Visit to the Salt Valley of Añana
<b>12,00 - 13,00</b>	Trip to La Rioja
13,00 - 14,00	Visit " <b>Marqués de Riscal</b> " winery
<b>14,00 - 16,30</b>	Congress closing luncheon
16,30 - 18,00	Trip to Laguardia
<b>18,00 - 19,00</b>	Back to Vitoria

## ORAL COMMUNICATIONS

### 18<sup>th</sup> July, Monday (16,45 - 17,45)

**Invited conference:** Aldridge, D.C. The impacts and control of invasive alien bivalves.

### 19<sup>th</sup> July, 2011, Tuesday

**Session A:** Biogeography & Phylogeography. (09,00 –10,45)

**Invited conference:** Pfenninger, M. More than meets the eye: a research program for the study of taxonomy, phylogeography and biogeography of Mediterranean land- and freshwater gastropods.

Stunžėnas, V., Petkevičiūtė, R. & Stanevičiūtė, G. Haplotype phylogeographic diversity and digenean parasites of *Sphaerium corneum* (Bivalvia) in East, North and Central Europe.

Mylonas, M., Vardinoyannis, K., Demetropoulos, S., Psonis, N. & Demetropoulos, A. The genus *Turanena* (Gastropoda Enidae) in the Eastern Mediterranean islands.

Chueca, L.J., Madeira, M.J., Martínez-Ortí, A. & Gómez-Moliner, B.J. Molecular systematics and phylogeography of *Sphincterochila* (Gastropoda, Helicoidea).

**Session B:** Systematics & Taxonomy. (09,00 –10,45)

Calvo, M., Alda, F., Templado, J. & Machordom, A. Speciation process within *Dendropoma petraeum* species complex (Gastropoda: Vermetidae).

Carmona, L., Gosliner, T.M., Pola, M. & Cervera, J.L. Preliminary molecular phylogeny of the Aeolidiidae (Aeolidina, Nudibranchia, Gastropoda).

Elejalde, M.A., Breugelmans, K., Vrijders, H., Leonard, J.L., Pearse, J.S., Jordaens, K. & Backeljau, T. Phylogenetic relationships of banana slugs (Stylommatophora: Arionidae: *Ariolimax*) using mtDNA.

Froufe, E., Lopes-Lima, M., Hinzmann, M. & Machado, J. *Anodonta cygnea* in Iberia: Autochthonous or introduced? First results on the genetic diversity based on mitochondrial and nuclear DNA sequences.

Martínez-Ortí, A. & Borredà, V. An update of the systematic of Parmacellidae P. Fischer, 1856 (Gastropoda, Pulmonata).

Kruckenhauser, L., Bartel, D., Haring, E., Sattmann, H., Harl, J. & Duda, M. What is a snail species? Mitochondrial lineages of snails with a *Trochulus hispidus* phenotype (Gastropoda: Pulmonata: Hygromiidae).

Giribet, G., Andrade, S. C. S., Dunn, C. W., Goetz, F., Rouse, G.W., Smith, S. & Wilson, N. G. Resolving molluscan relationships using Next Generation Sequencing and phylogenomic techniques.

Osca, D., Irisarri, I., Grande, C., Cunha, R.L., Templado, J. & Zardoya, R. Gastropod mitogenomics.

Patel, S. & Beaumont, M. The use of AFLP markers to examine Local Adaptation in the Land Snail, *Cepaea nemoralis*.

Petkevičiūtė, R., Stunžėnas, V., Stanevičiūtė, G. Diversity and phylogenetic affinities of European species of the genus *Sphaerium* (Bivalvia, Sphaeriidae) based on karyotype composition and DNA sequences.

Reise, H., Hutchinson, J.M.C., Schunack, S. & Schlitt, B. *Deroceras panormitanum* and congeners from Malta and Sicily, and the identity of the widespread pest slug.

Williams, S. T. Molecular systematics of the deep-water gastropod family Solariellidae (Trochoidea).

## 20<sup>th</sup> July, 2011 – Wednesday

**Session C:** Endangered species and hot-spots of Biodiversity. (09,00 – 12,15)

**Invited conference:** Seddon, M. Using data from Mollusc Diversity studies and Regional Assessments to inform Conservation Needs.

Skujienė, G. Lithuanian molluscs listed in the Habitats Directive: analysis of populations' state.

Arrébola, J.R., Cárcaba, A., Ruiz, A. Conservation and global management of the endangered species *Iberus gualtieranus gualtieranus* (Gastropoda: Helicidae) in Andalusia (Iberian Peninsula).

Dias, F C., Albuquerque, M., Souto, M., Berecibar, E., Tojeira, I. & Lourenço, N. Testing M@rBis (Marine Biodiversity Information System) as a useful tool for the creation of Marine Protected Areas. The case study of Selvagens Islands' Molluscs.

Douda, K., Horký, P. & Bílý, M. Threats to the endangered freshwater mussel *Unio crassus* caused by the impairment of its host fish resources in the Czech Republic.

Araujo, R., Campos, M., Feo, C. & Pou, Q. Saving the naiads of the Banyoles Lake.

Teixeira, A., Varandas, S., Sousa, R. & Lopes-Lima, M. Are autochthonous mussel populations of Tâmega, Tua and Sabor rivers (Douro basin) threatened? Ecological status and future conservation measures.

**Session D:** Biology, Reproduction & Mollusc culture. (12,15 - 13,00 & 15,00 – 17,50)

Varandas, S., Lopes-Lima, M., Teixeira, A., Sousa, R., Cortes, R. & Machado, J. Rediscovery and possible conservation strategies for two freshwater pearl mussel (*Margaritifera margaritifera*) populations in the Tâmega River Basin (northern Portugal).

Abiona, J.A., Akinduti, P.A., Oyekunle, M.A., Osinowo, O.A., Onagbesan, M.O. Comparative Evaluation of haemagglutination potential of haemolymph from two species of giant African land snail's (*Archachatina marginata* and *Achatina achatina*).

Álvarez, P. & Luque, A.A. Protoconch whorls variation and delayed metamorphosis in *Epitonium celesti* (Aradas, 1854) (Mollusca, Gastropoda, Epitoniidae).

Bidegain, G., Sestelo, M., Roca-Pardiñas, J. & Juanes, J.A. An alternative model for estimating the length-weight relationship of *Ruditapes decussatus* (native) and *Ruditapes philippinarum* (introduced) bivalves on the northern coast of Spain (Cantabrian Sea).

Boukhicha J., Tlig-Zouari S. & Ben Hassine O.K. Reproduction of *Patella rustica* (Mollusca, Patellogastropoda) populations in exposed and sheltered sites.

Salas C., Checa A., Harper E.M., Marina P. & Tirado C. Formation of radial ribs in Bivalves: the role of the mantle folds.

Lopes-Lima, M., Hinzmann, M., Lima, P., Teixeira, A., Varanda, S. & Machado, J. Do freshwater mussels (Bivalvia, Unionoida) feed selectively according to seasonal dietary needs? A case study on *Anodonta cygnea*.

Hutchinson, J.M.C. & Reise, H. Mating in *Ariunculus isselii*, an arionid slug without a spermatophore.

Sulikowska-Drozd A., Maltz T.K., Kappes H. & Páll-Gergely, B. Reproductive strategy of clausiliid *Alinda biplicata* (Montagu, 1803) – variation across the geographical range of the species.



## 21<sup>th</sup> July, 2011 – Thursday

**Session E:** Ecology. (09,00 – 13,00 & 15,00 – 16,40)

**Invited conference:** Oliverio, M. Larval ecology and evolution of prosobranchs: the state of the art in the age of DNA.

Aneiros, F., Moreira, J. & Troncoso, J.S. Temporal variation of soft-bottom bivalve assemblages influenced by mussel culture in the Ria de Aldán (Galicia, NW Iberian Peninsula).

Urra, J., Rueda, J.L., Gofas, S., Salas, C. & Marina, P. A molluscan assemblage in a coralligenous bottom of the Alboran Sea: intra-annual changes and ecological considerations.

Gofas, S., Salas, C., Rueda, J.L., Canoura, J., Farias, C. & Gil, J. Mollusca from a species-rich deep-water *Leptometra* community in the Alboran Sea.

Kappes, H., Kopeć, D. & Sulikowska-Drozd, A. Suitability of floodplain forest mollusks for multi-species distribution modeling.

Paredes, R. Comas-Rengifo, M.J. & Duarte, L.V. Malacofauna assemblages in organic-rich sediments. Case study of the Upper Sinemurian (Lower Jurassic) from the Lusitanian Basin (Portugal).

Moreira, J., Díaz-Agras, G., Candás, M., Cunha, X. & Urgorri, V. Do mussel beds support the same mollusc diversity on artificial and natural intertidal habitats?

Rueda, J.L., Fernández-Zambrano, A., Gofas, S., Salas, C., Urra, J., Farias, C., González-García, E., López-González, N., Fernández-Salas, L.M., Díaz del Río, V. & INDEMARES/CHICA 0211 TEAM. Preliminary characterization of molluscan assemblages in Spanish mud volcanoes and adjacent bottoms (Gulf of Cadiz).

Kuznecova, V., Skujienė, G. & Juzėnas, S. Land snail diversity in habitats of *Ena montana* (Draparnaud, 1801) in Biržai forest (Lithuania).

Rihova, D., Janovsky, Z. & Jurickova, L. Land snail shell degradation: its causes and manifestation.

Damerdjji, A. Diversity and repartition of Gastropoda according to a transect North-South Ghazaouet- El-Aricha in the region's Tlemcen (Algeria).

Sawangproh, W., Round, P.D. & Poonswad, P. Asian openbill stork (*Anastomusoscitans*), a competent predator of an invasive alien snail species in Thailand.

Škodová, J. & Horsák, M. Ecology and distribution of *Pupilla alpicola* (Charpentier, 1837) in the Western Carpathians.

Georgopoulou, E., Mylonas, M. & Vardinoyannis, K. Review of *Helicigona* and *Campylaea* (Gastropoda: Pulmonata) in Greece.

## POSTER COMMUNICATIONS

19<sup>th</sup> July, Tuesday (15,00 – 16,00) & 20<sup>th</sup> July, Wednesday (17,50 - 20,00)

Aldea, C., Rosenfeld, S., Ojeda, J., Mansilla, A. & Rozzi, R. New records of *Eatoniella* species (Gastropoda: Eatoniellidae) for Navarino Island, Beagle Channel. **P1**

Alfaya, J.E.F., Bigatti, G. & Machordom, A. Lack of genetic differentiation among populations of both the Patagonian *Malacobdella arrokeana* entocommensal nemertean and its host the geoduck, *Panopea abbreviate*. **P2**

Álvarez-Halcón, R.M. & Araujo, R. Non-indigenous molluscs in inland waters of Spain. **P3**

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## The impacts and control of invasive alien bivalves

**Aldridge, D.C.**

(1). Department of Zoology, University of Cambridge, Downing Street, Cambridge CB2 3EJ, UK; Email: [d.aldridge@zoo.cam.ac.uk](mailto:d.aldridge@zoo.cam.ac.uk)

Non-native bivalves represent some of the world's most harmful ecological and environmental pests. While the impacts of species such as zebra mussels (*Dreissena polymorpha*) on the power industry are very well known, costing billions of dollars each year, the direct and indirect effects of other invasive bivalves (e.g. *Mytilopsis trautwineana*) are not widely appreciated.

I will discuss the patterns and pathways of bivalve invasions, drawing examples from both freshwater and marine systems. After reviewing the industrial impacts and ecosystem-level changes driven by some invasive bivalves I will consider how we can use a sound understanding of the biology of bivalves to develop effective management and control strategies.

Particular attention will be given to understanding seasonal patterns in the vulnerability of bivalves to control agents, which is affected greatly by reproduction, body condition and metabolic processes. I will consider how an understanding of the physiological impacts of different control agents can help us to tailor agents to our target organisms, and can enable us to monopolise on synergistic effects of combination treatments.

The final part of my presentation will discuss emerging control strategies for invasive bivalves. A particular focus will be placed on the use of microencapsulated toxins (BioBullets) for the targeted delivery of control agents to bivalves. Most licensed agents, such as chlorine, are a poor choice because the mussels sense the toxin and close their valves, requiring the toxin to be dosed continuously for at least three weeks. Moreover, products such as chlorine are harmful to non-target organisms and their reaction with raw water to produce carcinogenic trihalomethanes precludes their use in most drinking water systems. BioBullets overcome the valve-closing response by delivering the control agent in a 'poison pill'. As a result, dramatically less product is required and products can be engineered to degrade within hours of entering the water, so that any uneaten material has no impact on the wider environment. BioBullets have been adopted by the UK water industry for controlling zebra mussel fouling, and field trials against other pests and within different industries are very promising.

**More than meets the eye: a research program for the study of taxonomy, phylogeography and biogeography of Mediterranean land- and freshwater gastropods**

**Pfenninger, M.**

Molecular Ecology Group, Biodiversity and Climate Research Centre, Biocampus Siesmayerstraße, Goethe University, 60323 Frankfurt am Main, Germany, eMail:

[Pfenninger@bio.uni-frankfurt.de](mailto:Pfenninger@bio.uni-frankfurt.de)

The specific taxonomy of gastropods is currently hampered by the unrecognized, yet widespread existence of cryptic species. Consequently, the geographic distribution of most taxa is only imperfectly known, with dramatic consequences for our knowledge of conservation status, biogeography and evolutionary history of snail and slug species in all realms. I suggest a research program to tackle these questions in a coherent manner, successively applying integrative taxonomy, biogeography and phylogeography in the study of the focal taxon. Worked examples from the genera *Ancylus*, *Candidula* and *Tudorella* which are distributed (also) in the Mediterranean illustrate the suggested proceeding.

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## **Using data from Mollusc Diversity studies and Regional Assessments to inform Conservation Needs**

**Seddon, M.**

IUCN SSC Mollusc Specialist Group and School of Biological Sciences, University of Reading, Reading, UK.

Address for Correspondance: Bracken Tor, Saxongate, Okehampton, Devon, UK

E-mail: [Mary@mollusca.org.uk](mailto:Mary@mollusca.org.uk), [Landsnails@gmail.com](mailto:Landsnails@gmail.com)

In the last 10 years, there has been considerable focus in improving the assessments of Molluscan Diversity, using quantitative measures of biodiversity, which provide information on the relative richness of sites. The development of techniques to look at Biodiversity Indices (Colwell & Coddington, 1994) have been used on molluscs various studies in Europe (e.g. Waldén, 1981, Cameron & Pokrysko, 2005), as well as Africa (Seddon et al, 2005) and Australia (Stanisic et al, 2007) show different techniques that can be used for these purposes, and these are far more informative than just using species lists for sites or habitats of conservation interest. However, not all taxa can be found using standardised quantitative sampling techniques, consequently these species can be under-recorded or even overlooked in standard surveys. Quantitative surveys need to target suitable sites for slugs, rock-dwelling and tree species, as litter sieving techniques will largely overlook these species. This type of data is essential in providing baseline information to estimate the levels of threats to species and to assist in conservation monitoring programmes. Legislation has required the development of monitoring programmes utilising some of the quantitative measures of diversity and the advantages and disadvantages of some of these protocols will be reviewed.

Conservation planning for tends to be targeted at habitats or better-known species such Birds, Mammals and Vascular Plants, as these have been well-studied over the last 30 years. Rodrigues *et al* (2004) showed that many threatened birds and mammals fell within protected areas. The focus of these conservation plans tends to be terrestrial, and the freshwater faunas tend to be overlooked in general, with poor protected area coverage for freshwater species (Darwall *et al*, 2009). Even less planning takes into account Mollusca, these species only get into in conservation actions plans if they are exploited, or if those species that have been listed in legislation. In the past the only data available to support threatened species listings was not comprehensive, as only species that were considered threatened were listed, and as none of the Least Concern species were evaluated, hence we could not provide any estimate of the proportion of species threatened at a Global or Regional level. National Red Lists were available, but these could only handle the endemic species, and not the widespread but declining taxa.

We will review the latest results from ongoing major projects: Pan-Africa Freshwater Project, Western Ghats Freshwater Project, East Himalayas Freshwater Project, Indoburma Project, European Project, SRLI Project indicating the types of data that can be extracted from these for conservation planning.

The Pan-African Freshwater Project reviewed all taxa from Fish, Molluscs, Crabs, Dragonflies and selected families of plants (Darwall et al, 2011) and the overview shows distinct differences in the threatening processes to the Asian projects. The overview of the protected areas against the high biodiversity areas and the areas with high % of threatened taxa shows that less than 33% of the threatened molluscs lie in Ramsar sites, compared to 60% of the Threatened birds and mammals (Darwall et al, in prep). In Asian more taxa are threatened by dams, whereas in Africa, although damming is a major threat, other threats such as habitat degradation through pollution and sedimentation are also significant threats. In Europe, threats lie in overexploitation of water resources and habitat degradation.

These regional overviews and the Sample Red List Project provide an indication of the likely threatening processes and % of threatened taxa on a Global basis. The number of extinct taxa are changing, with some taxa being rediscovered, whereas other taxa are added to the lists of potential extinctions provided by Regnier *et al* (2009). The first comprehensive regional overviews are showing that in general between 18% and 33% of all Molluscan species were considered threatened, which is more than mammals (25%) and in general a higher proportion are freshwater species than terrestrial species. However the proportion of Data Deficient is still very high in some parts of even well-known regions, as data deficient taxa fall into three categories: 1) taxonomic issues, 2) lack of recent records for distributions 3) uncertain taxa only known from lost type material or poorly described.

The overview that the comprehensive assessments provides ensures that some data exists on high biodiversity areas, regions with highly threatened taxa and areas of data deficiency, and this should allow for more targeted conservation actions. However, we are a long way from ensuring conservation actions, and we need to identify and catalyse actions on priority issues.

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## **Larval ecology and evolution of prosobranchs: the state of the art in the age of DNA**

**Oliverio, M.**

Dept. Biology and Biotechnologies "Charles Darwin"; Univ. "La Sapienza"; Viale dell'Università 32; I-00185 Roma, Italia. E-mail: marco.oliverio@uniroma1.it

The protoconch, retained in most adult gastropods, is often both a useful taxonomic tool and a morphological descriptor of larval ecology (planktotrophic vs. non-planktotrophic). Based on the recurrent phenomenon of pairs of sibling species with distinct larval development (P vs. NP), a speciation model involving loss of planktotrophy as the adaptive driving mechanism, has been proposed in the early '90s. However, many questions remained long unanswered at this regard, the most important probably being: how are differences in larval ecology reflected in the population biology (including genetics) of species? What are the genetic basis of planktotrophy (and of lecithotrophy), with special reference to the developmental mechanisms involved?

The recent possibility of gathering massive genetic data at relatively low cost, has not yet been exploited at best on these issues. Nevertheless, DNA sequences so far accumulated indicate that this kind of data is very useful to:

verify the specific distinction of putative pairs of species;

drawing general patterns on genetic variation, gene flow, population structuring, etc...;

test in a phylogenetic framework the actual status of siblings for species pairs, and date the speciation events by calibrated molecular clocks.

The burst of DNA data with the explosion of DNA-barcoding projects will very shortly make huge amounts of sequences available, allowing for robust testing of several hypotheses (species delimitation; sibling status of pairs of species; correlation of P>NP speciations with palaeoceanographical events; different population genetics driven by different larval development, etc...).

Unfortunately very little progress has been made on the definition of the genetic mechanisms underlying planktotrophy. We may expect that genome sequencing/annotation for closely related species with different larval development may offer chances to grasp on this issue. However, chances alone would yield little results, if specific developmental biology projects were not launched and adequately funded. Larval planktotrophy has been repeatedly adopted by metazoans, making this a crucial issue for EvoDevo. Molluscs, and gastropods in particular, should prove ideal model organisms, including groups without planktotrophy (archaogastropods), groups with poecilogonous species (opisthobranchs) and groups where poecilogony seems absent (caenogastropods).

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**Comparative Evaluation of haemagglutination potential of haemolymph from two species of giant African land snail's (*Archachatina marginata* and *Achatina achatina*)**

**Abiona, JA<sup>1</sup>, Akinduti, PA<sup>2</sup>, Oyekunle, MA<sup>2</sup>, Osinowo, OA<sup>1</sup>, Onagbesan, MO<sup>1</sup>**

(1) Department of Animal Physiology, University of Agriculture, Abeokuta, Nigeria.

Email: abionajohn@yahoo.ca

(2) Oyekunle, P. A. Department of Veterinary microbiology, University of Agriculture, Abeokuta, Nigeria.

A comparative study was conducted to evaluate haemagglutination potential in the haemolymph of two species of giant African land snails (*Archachatina marginata* and *Achatina achatina*). Three liveweight groups of snails (< 100 g, 101-150 g and >150 g) were used with 4 replicates per liveweight per species for haemagglutination assay (HA). Effect of aestivation was also evaluated vial withdrawal of feed and water for two weeks. Thereafter, the snails were aroused by epigram braking and fed together with water for another two weeks post aestivation before haemagglutination assay. Erythrocytes (2%) from cattle, sheep, goat and chicken were used for HA assay. Results showed that substances (agglutinins) that agglutinate erythrocytes of sheep, goat, cattle and chicken were present in the haemolymph of the two species of giant African land snails. Effect of species was found to be significant ( $P < 0.001$ ) on haemagglutination titre. Haemolymph of *Archachatina marginata* had higher haemagglutination titre than that of *Achatina achatina* across the three liveweight groups used in this study. Snail liveweight had no significant effect ( $P > 0.05$ ) on agglutinin content of the haemolymph in both species. Agglutination effect of haemolymph agglutinins depended on the source of erythrocyte used. Sheep erythrocyte recorded the highest haemagglutination titre, followed by goat, cattle, and chicken in that order.

**Key word:** Haemagglutinin, haemagglutination, haemolymph, titre, giant African land snails

**ORAL**

**Protoconch whorls variation and delayed metamorphosis in *Epitonium celesti* (Aradas, 1854) (Mollusca, Gastropoda, Epitoniidae)**

**Álvarez, P<sup>1</sup>, Luque, A.A<sup>1</sup>**

(1) Laboratorio de Biología Marina, Departamento de Biología, Universidad Autónoma, C/ Darwin, 2, 28049 Madrid, E-mails: patricia.alvarez@uam.es, angel.luque@uam.es

In many marine invertebrates larval metamorphosis is triggered by specific chemical and/or physical cues, mainly associated with the adult habitat. The duration of larval stage, the competence period and the developmental costs of delayed metamorphosis are important factors in understanding recruitment. Species with a long planktonic larval phase usually have great dispersal capability and are able to colonize or recolonize new areas and favour gene flow between widely separated populations.

All the species of Epitoniidae whose ecology is known live associated to anthozoans (anemones or corals). A few studies show that settlement of planktotrophic larvae is conditioned by the presence or absence of the prey.

*Epitonium celesti* is an amphiatlantic deep shelf and upper bathyal species, with a multispiral protoconch attaining the largest size and number of whorls described for any North Atlantic Epitoniidae and indicating a long planktotrophic development. The study of the protoconch of 28 specimens from CANCAP and SEAMOUNT expeditions has revealed an important variation in the number of whorls of the larval protoconch, that could indicate both the time at which larvae reach competence and the maximum period that larvae can grow and prolong its planktonic life delaying settlement.

**ORAL**

## Temporal variation of soft-bottom bivalve assemblages influenced by mussel culture in the Ria de Aldán (Galicia, NW Iberian Peninsula)

**Aneiros, F<sup>1</sup>, Moreira, J<sup>2</sup>, Troncoso, JS<sup>1</sup>**

(1). Dept. de Ecología y Biología Animal; Facultad de Ciencias del Mar; Univ. de Vigo. Campus Universitario Lagoas-Marcosende, 36310, Vigo, Spain. Email: faneiros@gmail.com

(2). Dept. de Biología (Zoología); Facultad de Biología; Univ. Autónoma de Madrid. C/ Darwin 2, 28049, Cantoblanco (Madrid), Spain. Email: juan.moreira@uam.es

Temporal dynamics of mollusc assemblages in soft bottoms is influenced by a number of environmental factors and is also sensitive to anthropogenic perturbations as well. In the southern Galician rias (NW Iberian Peninsula) there is an extensive mussel culture in rafts, which is impacting benthic ecosystems. For example, deposition of mussel pseudo-faeces on the soft bottoms below modifies granulometry and increases the organic matter content.

The Ria de Aldán is located at the SW of the Ria de Pontevedra and its western part is densely covered by mussel rafts. Bivalve assemblages in the vicinity of rafts were studied from May 1998 to May 1999 in a muddy bottom (17m depth). Five replicate samples were taken monthly by means of a Van-Veen grab thus covering a total area of 0.28m<sup>2</sup> per sampling. Samples were sieved through a 0.5mm mesh. An additional sample was taken to determine sediment characteristics (granulometry and carbonate and organic matter content). Physico-chemical characteristics of water column and sediment (temperature, pH, Eh and conductivity) were also measured. Bivalves present in the samples were sorted, identified and counted in the laboratory using a stereo microscope.

Forty different bivalve taxa were found, being the most abundant species *Kurtiella bidentata* and *Thyasira flexuosa*. Highest number of both individuals and species were found in November 1998, while Pielou's evenness and Shannon's diversity indexes were maximum in July 1998 and January 1999, respectively. Relationship between community structure and environmental parameters was determined using BIO-ENV analysis (PRIMER statistical package). The parameters which alone best fitted the temporal evolution of the bivalve assemblage were carbonate content and median grain size (Q<sub>50</sub>); the highest correlation was obtained for the combination of fine gravel content, Q<sub>50</sub> and organic matter content.

These results suggest that benthic bivalves in this area are highly influenced by sediment grain-size distribution and its content in organic matter and carbonates, which are, in turn, likely influenced by the presence of rafts in the nearby areas. Therefore, mussel raft culture not only affects benthic bivalve assemblages under the rafts but also those in the surrounding sedimentary bottoms.

**ORAL**

### **Saving the naiads of the Banyoles Lake**

**Araujo, R.<sup>1</sup>, Campos, M.<sup>1</sup>, Feo, C.<sup>2</sup> & Pou, Q.<sup>2</sup>**

(1). Departamento de Biodiversidad y Biología Evolutiva. Museo Nacional de Ciencias Naturales (CSIC). C./ José Gutiérrez Abascal 2. E-28006. Madrid (Spain),  
Email: rafael@mncn.csic.es,

(2) Consorci de l'Estany. Plaza dels Estudis 2. E-17820. Banyoles, Girona (Spain),  
Email: mcampos@consorcidelestany.org, cfeo@consorcidelestany.org.  
qpou@consorcidelestany.org

Since the Haas' (1916) paper on the freshwater bivalves of the Unionidae family (naiads) living in Banyoles Lake (Girona, Spain), very little information has been published about the molluscs living in this lake. Although several naiad species and subspecies have been cited, nowadays we know the presence of four different species: *Anodonta anatina*, *Potomida littoralis*, *Unio mancus* and *U. ravoisieri*. The first three are distributed throughout the Iberian Peninsula, but the last one is a rare species only present in the lake, the neighboring Fluviá Basin and in the rivers of Tunisia and Algeria.

The molluscs in the lake are highly threatened, being that their populations are very low. Worthy of comment is the critical situation of *P. littoralis*, whose population is practically extinct at the lake.

Thanks to the ambitious Project "PROYECTO ESTANY" of the LIFE + programme (European Union: LIFE08 NAT/E/000078) to regenerate the native fauna of Banyoles Lake, we are artificially rearing two of these molluscs: *U. ravoisieri* and *U. mancus*. Here we present the preliminary results obtained in 2010 and 2011. In the future we plan to work with *Potomida littoralis*.

We have designed a new laboratory with indoor tanks and aquariums and outdoor pools, both supplied with water from the lake. In these facilities, we will maintain live populations of the four native fish historically living in the lake (*Salaria fluviatilis*, *Barbus meridionalis*, *Squalius laietanus* and *Gasterosteus aculeatus*) and the parental naiad specimens. The main innovation of this facility is the natural nourishment for the newborn naiad juveniles, which come from the lake water and sediment. Several week-old-juveniles of *U. ravoisieri* and *U. mancus* born from the fish *S. fluviatilis*, *B. meridionalis* and *S. laietanus* are currently reared and fatten in the lab.

In the following years, fish artificially infected with glochidia will be the source of a new established naiad population in the lake, once the exotic fish are removed.

**ORAL**

**Conservation and global management of the endangered species *Iberus gualtieranus gualtieranus* (Gastropoda: Helicidae) in Andalusia (Iberian Peninsula)**

**Arrébola, J.R., Cárcaba, A., Ruiz, A.**

Dpto. Fisiología y Zoología. Fac. Biología. Univ. Sevilla. Avda. Reina Mercedes, 6.  
41012-Sevilla mastus@us.es

Recent genetic analyses have revealed *Iberus gualtieranus* as one of the 11 lineages considered to have a full species status in the *Iberus* genus complex. It is composed by three subspecies: *I. g. gualtieranus* (Linnaeus), *I. g. ornatissimus* (Cobos) and *I.g. mariae* (Cobos). Although the distribution range of *I.g. gualtieranus* is considered the more extended of the three subspecies, only one population that is restricted to the eastern third of Sierra de Gador (Almería, Southeastern Spain) is judged as the autochthonous one, while others originated by historical introductions. In the Sierra de Gador population, irrational and uncontrolled catches for gastronomic purposes are going on a long-standing and a traditional way. This threat and other pressures originated by human activities have provoked a significant reduction in the number of individuals in the environment, driven this species, known locally as “chapa”, near to its commercial extinction. Unfortunately, commercial captures continue in this region since the scarcity of the “chapa” has dramatically increased its prices. In this situation, the risk of extinction the species is extremely high.

One of the main goals of the Programme for Conservation and Sustainable Use of Land Snails of Andalusia (1998-2011), sponsored by the Ministry of Environment of the Junta de Andalucía, is the preservation of threatened species. We performed an intense sampling effort of *I.g. gualtieranus* in the Sierra de Gador, in order to characterize its present altitudinal and spatial distribution (especially the area of occupancy) and its habitat requirements. The conservation status of the snail was then defined in terms of its threats, the factors determining its space occupancy and density of the population in Sierra de Gador. Our results were not very optimistic. The habitat used by this species have been irreversibly fragmented and partially lost during the last decades. The genetic variability also went down in the population, and the density of individuals could be under the minimum threshold for population viability. Therefore, the density of adults could not be enough for the stability or recuperation of the population. At this point, breeding the snail in captivity (laboratory scale) was considered to future reinforcement of the population. During the last two years the species life cycle has been accomplished in the laboratory obtaining important and hopeful results. Finally, all data gathered for this species have been used to assess IUCN about the conservation status of the species.

**ORAL**

**An alternative model for estimating the length-weight relationship of *Ruditapes decussatus* (native) and *Ruditapes phillipinarum* (introduced) bivalves on the northern coast of Spain (Cantabrian Sea)**

**Bidegain, G<sup>1</sup>, Sestelo, M<sup>2</sup>, Roca-Pardiñas, J<sup>2</sup>, Juanes, J A<sup>1</sup>**

<sup>1</sup> Environmental Hydraulics Institute "IH Cantabria", Universidad de Cantabria, Avda. de los Castros s/n 39005, Santander, Spain, Email:bidegaing@unican.es

<sup>2</sup> Department of Statistics and Operations Research, University of Vigo, C/ Torrecedeira

86, E-36280 Vigo, Spain.

\* Corresponding author: bidegaing@unican.es

The aim of the present study was to estimate the length-weight relationship of *Ruditapes decussatus* and *Ruditapes phillipinarum*. For this purpose, this study was undertaken using data drawn from two estuaries along the coast of Cantabria (N Spain). The length-weight relationship of both species was estimated for both estuaries, using two models: a classic allometric model and a nonparametric model using local linear kernel smoothers. Additionally, derivatives were used for estimating a minimum size of capture for this species, corresponding to the size where the first derivative reaches the maximum. The confidence intervals, used to draw inferences from these derivatives curves, were constructed using bootstrap methods, and binning techniques were applied to speed up computation in the estimation and testing processes. Within this context, the models application and the individuals weight gain showed that (a) the nonparametric model resulted in a better fit of data for both species in all estuaries and (c) a different size of capture for each species. Based on these results some managing specific guidelines are presented.

This project was supported by the Department of Livestock, Agriculture and Fisheries from the Regional Government of Cantabria, through the Regional Fisheries and Food Administration.

**ORAL**

**Reproduction of *Patella rustica* (Mollusca, Patellogastropoda) populations in exposed and sheltered sites**

**Boukhicha, J\*1, Tlig-Zouari, S\*2 & Ben Hassine, OK\*3**

(1). Research Unit of Biology, Ecology and Parasitology of Aquatic Organisms, Faculty of Sciences of Tunis, Tunis El Manar University, 2092 Tunis, Tunisia, Email1: boukhicha.jihen73@gmail.com, Email2: s.tligzouari@gmail.com, Email3: kalthoum.benhassine@gmail.com

*Patella rustica* Linnaeus, 1758 is a limpet characterized by a broad geographical distribution ranging from the Mediterranean to the Atlantic rocky shores. It is an autumn breeder with gamete release taking place between September and December. In Tunisia, the biology of this species remains poorly known. The present study is aimed to compare the values the sex-ratio (*SR*) for each size class and gonadosomatic index (*GSI*) in two populations of *P. rustica* inhabiting two stations, located in Korbous (Tunis gulf), referred to as exposed (*St1*) and sheltered (*St2*). A total of 400 limpets were collected, in proportion of 200 individuals per station. The sex was assessed by color of the gonad which is greenish brown in the female and yellow orange in the male. The number of males, females and juveniles (sexually immature) was determined for each size class. The fresh tissue and gonad were weighed. The values of the sex-ratio for each size class and gonadosomatic index (*GSI*) were also calculated. The results revealed differences in proportions of sexes depending on size, at both stations. In addition, limpets from the exposed station (*St1*) have sexual maturity and sex reversal at an early age compared to those from the sheltered station (*St2*). *GSI* values obtained vary not only between males and females but also between the two stations. These observations were analyzed and possible factors responsible of these differences were suggested and discussed.

**ORAL**



**Speciation process within *Dendropoma petraeum* species complex  
(Gastropoda: Vermetidae)**

**Calvo, M<sup>1</sup>, Alda, F<sup>2</sup>, Templado, J<sup>1</sup>, Machordom, A<sup>1</sup>**

- (1) Museo Nacional de Ciencias Naturales (CSIC), José Gutiérrez Abascal 2,  
28006 Madrid, Spain. E-mails: mcalvo@mncn.csic.es,  
templado@mncn.csic.es, annie@mncn.csic.es
- (2) Instituto de Investigación en Recursos Cinegéticos (CSIC-UCLM-JCCLM),  
Ronda de Toledo s/n, 13005 Ciudad Real, Spain. E-mail:  
alda.fernando@gmail.com

The timing of divergence events is one of the central goals of contemporary evolutionary biology. The genus *Dendropoma* can be traced back to the Eocene and thus had an independent evolution from other Vermetidae for at least 50 myr, but only since the Miocene (15 myr) these gregarious gastropods were associated with coralline algae to form reefs. The major reef-building genus of vermetid gastropods in the Mediterranean was *Petalocochnus* until very recent times (Holocene), when it was almost completely replaced by the genus *Dendropoma*. Currently, the only recent reef-building Mediterranean gastropod is *Dendropoma petraeum*, which has recently been demonstrated that is actually composed by a complex of at least four cryptic species. Furthermore, the allopatric distribution of these cryptic species supports predominantly vicariant-based cladogenetic patterns. In this work we intend to elucidate the timing of the speciation process and associated demographic changes within this species-complex in the Mediterranean applying Bayesian coalescent-based methods.

Our results show that there were two major events in the diversification of this genus in the Mediterranean. The first, and oldest, an ancient radiation covering a period about 9-6 myr ago, in which major lineages of *Dendropoma* emerged. The second period, more recent, seems to have occurred between about 3.7 and 1.3 myr ago. This last period corresponds with the diversification within each of the lineages, giving rise to groups that do not always show a consistent geographical pattern. Therefore, if these data are correct, the divergence between the main species lineages of *Dendropoma* in the Mediterranean predated the "Messinian Salinity Crisis" (5.8-5 myr ago), and consequently survived to this dramatic period within this sea in some isolated refugia.

Once established the different species of this complex, they suffered new processes of diversification during the Plio-Pleistocene climatic cycles and eustatic sea-level fluctuations. Moreover, these processes could be related to the strikingly different patterns of change in effective population size observed between the western and eastern lineages since 2myr ago.

This study was possible thank to the financial support of the Fundación BBVA (Conservation Biology program), and the MICINN project CTM2008-00496.

**ORAL**

**Preliminary molecular phylogeny of the Aeolidiidae (Aeolidina, Nudibranchia, Gastropoda)**

**Carmona, L<sup>1</sup>, Gosliner, T.M<sup>2</sup>, Pola, M<sup>3</sup>, Cervera, J.L<sup>1</sup>**

(1)Departamento de Biología, Facultad de Ciencias del Mar y Ambientales, Universidad de Cádiz. Polígono Río San Pedro, s/n, Ap.40. 11510 Puerto Real (Cádiz), Spain, Email: leila.carmona@uca.es, lucas.cervera@uca.es

(2) Department of Invertebrate Zoology, California Academy of Sciences, 55 Music Concourse Drive, Golden Gate Park, San Francisco, CA 94118, USA, Email: TGosliner@calacademy.org

(3)Laboratorio de Biología Marina, Departamento de Biología, Edificio de Biología, C/ Darwin, 2, Universidad Autónoma de Madrid, 28049 Madrid, Spain, Email: marta.pola@uam.es

Aeolids are one of the groups of opisthobranchs with the largest number of known species. However, phylogenetic relationships within the clade have not been studied as comprehensively as in others. Phylogenetic analysis including Aeolidina are limited to portions of larger studies of the phylogenetic relationships within larger clades such as Nudibranchia, Cladobranchia, Heterobranchia or Euthyneura. Furthermore, phylogenetic studies at the family or generic level in Aeolidina, are limited to those of Gosliner *et al.* (2007), Gosliner and Kuzirian (1990) and Gosliner and Willan (1991) reviewing the systematics of Babakinidae and the genus *Flabellina*, respectively. Our study presents the first phylogenetic hypothesis of Aeolidiidae based on two mitochondrial (COI and 16S) genes and one nuclear (H3) gene for species of four aeolid families, with *Tritonia antartica* as outgroup. Although our results are not definitive, there are significant findings that may imply changes in the systematics of Aeolidiidae.

**ORAL**

## Molecular systematics and phylogeography of *Sphincterochila* (Gastropoda, Helicoidea)

**Chueca, LJ<sup>1</sup>, Madeira, MJ<sup>1</sup>, Martínez-Ortí, A<sup>2</sup> & Gómez-Moliner, BJ<sup>1</sup>**

(1). Dept. Zoología; Facultad de Farmacia; Univ. País Vasco; Paseo de la Universidad nº 7; 01006- Vitoria, Spain. Email: benjamín.gomez@ehu.es

(2). Museu Valencià d'Història Natural. Passeig de la Petxina, 15. E-46008 Valencia (Spain) and Departamento de Zoología. Facultad de Ciencias Biológicas. Universitat de València.

The genus *Sphincterochila* Ancey, 1887 is a terrestrial gastropod taxon which has a circum-Mediterranean distribution, from North-West Italy to the South-East of Spain, extending throughout North Africa, from Morocco to South Turkey. It is also present in some mediterranean islands. This genus is characterised by a thick calcareous, white shell, without any additional colour pattern. Shell is from globular to prominently keeled. The different species are well adapted to live in arid o semiarid environments. As many as six different subgenera have been decribed, *Sphincterochila s. str.*, *Cariosula* Pallary, 1910, *Zilchena* Forcart, 1972, *Albea* Pallary, 1910, *Rima* Pallary, 1910, and *Cerigottella* Gittenberger, 1993 (following the classification of Schileyko, 2005). However, the number of species, as well as the phylogenetic relationships of *Sphincterochila* taxa are still unclear. Thus, in this work, we present a molecular phylogeny for the genus *Sphincterochila* based on sequence data from two mitochondrial genes, COI and 16S rRNA.

In this work ten species have been analyzed by DNA sequenciation. Three of them: *Sphincterochila candidissima* (Draparnaud, 1801), *S. cariosula* (Michaud, 1833), and *S. baetica* (Rossmässler, 1854), included samples collected from their whole distribution range. Besides, we have studied samples of *S. maroccana* (Pallary, 1910), *S. saharica* (Debaux, 1887) from Algeria, *S. sardoa* (Kobelt, 1888) from Sardinia, *S. insularis* (O. Boettger, 1894) from Andikithira (Greece), *S. illicita* (Mousson, 1874) from Turkey, and *S. zonata* (Bourguignat, 1853) and *S. prophetarum* (Bourguignat, 1852) from Israel. More than 100 specimens have been included in this study with the aim of resolving the phylogeny and phylogeography of this interesting genus, as well as to identify snails passive transport phenomena through the Mediterranean region.

**ORAL**

**Diversity and repartition of Gastropoda according to a transect North-South Ghazaouet- El-Aricha in the region's Tlemcen (Algeria)**

**Damerdji, A**

Dept. Ecology- Environment; Facultad of SNV/STU; Univ.Tlemcen - BP : 119-13000-Tlemcen, Algeria, E-mail : damerdji\_halim@yahoo.fr

The region of Tlemcen was divided into four main areas: The coastline (Ghazaouet), the plain of Maghnia, that of Tlemcen with its mountains and its periphery, and ultimately that of the stepp. The composition on Gastropoda, was carried out on a north- south transect analysis showed 62 species malacological. Among Gasteropoda, Helicidae family is the most important in species richness and abundance. In this faunistical group, a decrease in species diversity and the equirepartition is observed in the area most northerly to the south. The study of the composition and structure of the stands malacological in the area further south indicates a disturbance due to local conditions that result in poor vegetation cover and abundance mesoclimatic arid. Species malacological widely spread are among sixteen. Two species (*Archelix bailloni* and *Helicella lemoinei*) are charactetistic only of the environment stepp and seven species are confined to the forest environment.

**ORAL**

**Testing M@rBis (Marine Biodiversity Information System) as a useful tool for the creation of Marine Protected Areas. The case study of Selvagens Islands' Molluscs**

**Dias, F C<sup>1</sup>; Albuquerque, M<sup>2</sup>; Souto, M<sup>3</sup>; Berecibar, E<sup>4</sup>; Tojeira, I<sup>5</sup>; Lourenço, N<sup>6</sup>**

<sup>1</sup> Task Group For Maritime Affairs; Rua Costa Pinto 165, 2770-047 Paço de Arcos, Portugal; Email: fdias@am-em.org

<sup>2</sup> Task Group For Maritime Affairs; Rua Costa Pinto 165, 2770-047 Paço de Arcos, Portugal; Email: malbuquerque@am-em.org

<sup>3</sup> Task Group For Maritime Affairs; Rua Costa Pinto 165, 2770-047 Paço de Arcos, Portugal; Email: msouto@am-em.org

<sup>4</sup> Task Group For Maritime Affairs; Rua Costa Pinto 165, 2770-047 Paço de Arcos, Portugal; Email: eberecibar@am-em.org

<sup>5</sup> Task Group For Maritime Affairs; Rua Costa Pinto 165, 2770-047 Paço de Arcos, Portugal; Email: itojeira@am-em.org

<sup>6</sup> Task Group For Maritime Affairs; Rua Costa Pinto 165, 2770-047 Paço de Arcos, Portugal; Email: nlourenco@am-em.org

M@rBis (Marine Biodiversity Information System), is a geo-referenced marine biodiversity information system. The main short-term objective of M@rBis is to provide the relevant information necessary to comply with the EU and international commitments regarding the extension of the Natura2000 Network to the marine environment in the waters under Portuguese jurisdiction. Furthermore, M@rBis will develop a comprehensive catalog of the Portuguese marine biodiversity and the corresponding data holders, providing a valuable reference and research tool for the scientific community, including malacologists.

In this talk we present the framework which lead to the creation of M@rBis, namely the design and implementation steps, a test case using mollusc species from the bibliography available about the Selvagens Islands (a marine and terrestrial Natural Reserve since 1971), analyse the bottlenecks and constraints found during the testing, and discuss the solutions developed to solve them. The effectiveness of M@rBis, as a decision support tool for the stakeholders (ICNB) to make the best choices regarding the creation of MPAs (Marine Protected Areas) will also be discussed.

Finally, we will focus on the species already described for Selvagens Inlands and their biogeographical relationships as compared to the surrounding areas.

**ORAL**

## **Threats to the endangered freshwater mussel *Unio crassus* caused by the impairment of its host fish resources in the Czech Republic**

**Douda, K, Horký, P, Bílý, M**

Dept. of Applied Ecology; Water Research Institute TGM; Podbabská 30, Prague, CZ 160 00, Czech Republic; Email: douda@vuv.cz

Parasitic stage is a crucial period in the life cycle of freshwater mussel of the superfamily Unionoidea, which influence both their reproduction success and dispersion. This study deals with possible threats to the thick shelled river mussel (*Unio crassus*, Philipsson, 1788) resulting from the impairment of its host fish resources in central Europe. We analysed the compatibility of parasitic larvae (glochidia) of *U. crassus* with its potential host fishes by the use of evaluation of transformation success and temporal progress of glochidia shedding. We recorded medium degree of host specificity of this species. Glochidia of *U. crassus* successfully developed on 14 from 27 evaluated potential hosts. Nevertheless, the transformation rate of glochidia on the suitable hosts was highly variable. Only three fish species (*Scardinius erythrophthalmus*, *Phoxinus phoxinus*, *Cottus gobio*) enabled successful transformation of the majority of attached glochidia. Coincidentally, these primary host species for *U. crassus* are also declining across Central Europe. To test the hypothesis of host limitation of *U. crassus*, we compare the availability of the primary host fishes and host community composition in sets of river reaches with i) living and ii) extirpated populations of *U. crassus* in the Czech Republic. We found that the rivers with occurrence of primary host fish species have higher probability of *U. crassus* population survival. Collectively, by incorporating host fish quality and availability data, we identified possible threats to *U. crassus* from host resource deficiency and demonstrated the role of parasite-host relationships in population dynamics of freshwater mussels.

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**ORAL**

**Phylogenetic relationships of banana slugs (Stylommatophora: Arionidae: *Ariolimax*) using mtDNA**

**Elejalde, MA<sup>1</sup>, Breugelmans, K<sup>1</sup>, Vrijders, H<sup>1</sup>, Leonard, JL<sup>2</sup>, Pearse, JS<sup>2</sup>, Jordaens, K<sup>3</sup> and Backeljau, T<sup>1</sup>**

- (1) Royal Belgian Institute of Natural Sciences, Vautierstraat 29, B-1000 Brussels, Belgium, Email: mirenarantzazu.elejalde@ehu.es, karin.breugelmans@naturalsciences.be, hilde.vrijders@naturalsciences.be, thierry.backeljau@naturalsciences.be
- (2) Joseph M. Long Marine Laboratory, 100 Shaffer Rd, University of California-Santa Cruz, Santa Cruz, CA 95060, USA, Email: jlleonar@ucsc.edu, pearse@biology.ucsc.edu
- (3) Joint Experimental Molecular Unit, Royal Museum for Central Africa, Leuvensesteenweg 13, B-3080 Tervuren, Belgium, Email: kurt.jordaens@africamuseum.be

Banana slugs, giant stylommatophoran slugs of the genus *Ariolimax* Mörch, 1860, are found throughout the Pacific Northwest of North America, from southeast Alaska to southern California. On the basis of genital morphology there are five taxa in the genus *Ariolimax*, comprising two subgenera, *Ariolimax*, *sensu stricto* and *Meadarion* Pilsbry (1948). *A. A. columbianus columbianus* (Gould, 1851) ranges from southeast Alaska to central California and *A. A. c. stramineus* Hemphill, 1891 is found on the coast of south-central California. In *A. Meadarion*, *A. M. dolichophallus* Mead, 1943, *A. M. californicus californicus* Cooper, 1872, and *A. M. c. brachyphallus* Mead, 1943 are known from different parts of the San Francisco Peninsula. Some authors suggested that the genital characters have evolved rapidly enough to distinguish species and the reproductive behavior has played an important role in the evolution of the group. In order to clarify the phylogeny of the genus, three mitochondrial genes were analyzed; COI, 16S rRNA and CytB.

A nucleotide sequence analysis of three concatenated mtDNA fragments revealed four well-supported clades in the subgenus *Ariolimax*, each of which is considered as a “good” species, viz. *A. columbianus sensu stricto*, *A. stramineus*, *A. buttoni* (which was formerly considered as synonym of *A. columbianus*), and an undescribed species from Mount Palomar.

The mtDNA data also resolved the subgenus *Meadarion* as a fifth clade, consisting of one undescribed species from Fremont Peak in San Benito County, and three poorly supported clades showing distinct genitalia and reproductive behavior, and which correspond to *A. californicus*, *A. dolichophallus* and *A. brachyphallus*.

Hence, currently a total of eight putative species are recognized in the genus *Ariolimax*, mostly with parapatric distributions and little or no geographic overlap.

M.A Elejalde was supported by a postdoctoral fellowship from the Gobierno Vasco.

**ORAL**

***Anodonta cygnea* in Iberia: Autochthonous or introduced?  
First results on the genetic diversity based on mitochondrial and nuclear DNA  
sequences**

**Froufe, E<sup>1</sup>, Lopes-Lima, M<sup>1,2</sup>, Hinzmann, M<sup>1,2</sup>, Machado, J<sup>1,2</sup>**

(1) CIIMAR (Centro Interdisciplinar de Investigação Marinha e Ambiental), Rua dos Bragas 289, 4050-123 Porto, Portugal.

E-mail: elsafroufe@gmail.com

(2) ICBAS – UP (Instituto de Ciências Biomédicas de Abel Salazar  
Largo Professor Abel Salazar, 2, 4099-003 Porto, Portugal

Email: lopeslima@aquicultura.com, mfhinzman@hotmail.com,

jmachado@icbas.up.pt

*Anodonta cygnea* L. (Bivalvia: Unionoida) is distributed from the British Islands in the West, to Siberia in the East, from Scandinavia in the North and South into northern Africa; is rarely found in fast moving rivers and streams preferring lowland rivers, canals, drainage dykes, as well as lakes and ponds. The only known populations in the Iberian Peninsula are in shallow lowland freshwater lakes in central western Portugal and this limited distribution is considered a result of introduction of glochidia infected fish from central Europe. Moreover, this species has been misidentified countless times with *A. anatina*, both being highly polymorphic and often difficult to distinguish.

With such a wide distribution range, and with the uncertainty about the origin of the Iberian populations, the objectives of this study are: 1) to determine genetic diversity of *A. cygnea* from Iberia, 2) to ascertain the origin and number of introduction events of these populations, and 3) proposing conservation measures for this species in the Iberian Peninsula, in accordance with the results obtained.

We have sequenced both nuclear (ITS) and mitochondrial genes (COI) for 20 individuals from three Iberian populations. New sequences were additionally compared with others from UK, and central Europe. The results obtained, together with historical evidences, indicate that a unique anthropogenic introduction event probably have occurred since all individuals from the three populations have the same haplotypes, both nuclear and mitochondrial, and at present no gene flow between populations seems possible. Nevertheless, a scenario of multiple colonizations from the same source population is also possible and further SNPs or microsatellites analyses would be needed to distinguish with certainty between the two scenarios. The most likely source of the introduction of this species in Iberia is discussed.

**ORAL**



### **Review of *Helicigona* and *Campylaea* (Gastropoda: Pulmonata) in Greece**

**Georgopoulou, E<sup>1,2</sup>, Mylonas, M<sup>1,2</sup>, Vardinoyannis, K<sup>2</sup>**

- (1). Dept. of Biology; Natural History Museum of Crete; Univ. of Crete; Knossos Av.;  
PoBox 2208, GR71409 Heraklion, Crete, Greece, Email:  
bio1355@edu.biology.uoc.gr
- (2). Natural History Museum of Crete; Univ. of Crete; Knossos Av.; PoBox 2208,  
GR71409 Heraklion, Crete, Greece, Email: mollusca@nhmc.uoc.gr

The family Helicidae (Rafinesque, 1815) is represented by various genera in Greece. Studies on the genera *Helicigona* (Férussac, 1821) and *Campylaea* (Beck, 1837) of Greece are scattered and usually most of them focus in a particular area, in the mainland or the islands. Here we examine all the species that are distributed in mainland and insular Greece. For each species quantitative and qualitative shell characters are presented, their genitalia as well as distribution maps. Our results show that 25 species are distributed in mainland and insular Greece. There are no species present on the eastern islands of the Aegean with the exception of Samos and Ikaria; also they are absent from Crete. All the species are rock-dwelling, found from the sea level – even in tiny islands – till the peak (2,917 m) of the highest mountains. Some have very strict distributions while others are widespread. Eight species belong to the genus *Campylaea*, and all of them are distributed only on the greek mainland; all the other species, belong to the genus *Helicigona* and they are distributed both in mainland and insular Greece. Finally we discuss their distribution, regarding sympatry, elevation and the geologic history of the area.

**ORAL**

## Resolving molluscan relationships using Next Generation Sequencing and phylogenomic techniques

**Giribet, G<sup>1</sup>, Andrade, S. C. S.<sup>1</sup>, Dunn, C. W.<sup>2</sup>, Goetz, F<sup>2</sup>, Rouse, G.W.<sup>3</sup>, Smith, S<sup>2</sup>, Wilson, N. G.<sup>4</sup>**

<sup>1</sup>Museum of Comparative Zoology, Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, Massachusetts 02138, USA.

<sup>2</sup>Department of Ecology and Evolutionary Biology, Brown University, Providence, Rhode Island 02912, USA.

<sup>3</sup>Scripps Institution of Oceanography, UCSD, La Jolla, California 92093, USA.

<sup>4</sup>The Australian Museum, Sydney, New South Wales 2010, Australia.

The relationships among the extant molluscan classes have been difficult to resolve with confidence, and as a consequence, numerous hypotheses, based on disparate sources of data, are currently used. While some have advocated for paraflyly of the aplacophoran classes, at the base of the tree, others recognize the clade Aculifera, including the two aplacophoran classes plus chitons. Likewise, monophyly of Conchifera has been disputed in recent molecular analyses that favored a relationship of Monoplacophora to Polyplacophora, constituting the clade Serialia. Even for those supporting monophyly of Conchifera, they generally see monoplacophorans as the most-basal clade, from which other forms have evolved, something difficult to represent in a cladistic manner. The addition of molecular markers to the problem of molluscan systematics during the past two decades has contributed little to the deep relationships among the classes, although has resolved many intra-class nodes. This is in part because earlier molecular studies relied on PCR-based amplification of a few target genes. However, the development of Next generation Sequencing with *454* and *Illumina* sequences promises resolving deep nodes in the mollusc tree of life, by virtue of using hundreds of genes obtained from multiple molluscan transcriptomes. Here we present novel transcriptome data for 15 molluscs representing all molluscan classes and discuss the implications of our results in understanding molluscan phylogenetics.

**ORAL**

## Mollusca from a species-rich deep-water *Leptometra* community in the Alboran Sea

**Gofas, S<sup>1</sup>, Salas, C<sup>1</sup>, Rueda, JL<sup>2</sup>, Canoura, J<sup>3</sup>, Farias, C<sup>3</sup>, Gil, J<sup>3</sup>**

- (1) Depto. Biología Animal, Facultad de Ciencias, Universidad de Málaga, E-29071 Málaga, Spain. Email: sgofas@uma.es
- (2) Centro Oceanográfico de Málaga, Instituto Español de Oceanografía, Puerto Pesquero s/n, E-29640 Fuengirola, Spain. Email: jose.rueda@ma.ieo.es
- (3) Centro Oceanográfico de Cádiz, Instituto Español de Oceanografía, Apdo. 2609, Puerto Pesquero, Muelle de Levante s/n, E-11006 Cádiz, Spain. Email: carlos.farias@cd.ieo.es

As part of the DEEPER project of Instituto Español de Oceanografía, the benthic fauna was sampled on the Djibouti banks in the Alboran Sea. An exceptional species richness was registered in one particular haul with the beam trawl in 349-365 m, on Avempace or Algarrobo bank, the most northwestern of the group. We found 156 species of molluscs, of which 82 were represented by at least one live specimen (total 1480 live specimens and 1666 shells) in the fraction sorted down to 0.5 mm.

The most abundant animal species is the crinoid *Leptometra phalangium*, represented in the sample by more than 800 individuals. Among molluscs, the dominant species in number of live specimens are *Limopsis aurita* (450), *Yoldiella philippiana* (267), *Kelliella miliaris* (146), *Bathyarca pectunculoides* (126), *Pagodula echinata* (70) making up altogether 67% of the live specimens. Gastropods slightly predominate in number of species (43 alive, 86 in total) over bivalves (34 alive, 66 in total) but most live-taken individuals (73%) are bivalves. On the other hand, there are 30 species represented by a single live specimen and 10 more represented by two. Some of the species found are considered rare or very rare, e.g. *Neomenia carinata*, *Adeuomphalus ammoniformis*, *Epitonium linctum*, *E. hispidulum*, *Eulima fuscozonata*, *Drilliola emendata*, *Spirolaxis clenchi*, *S. lamellifer*, *Tiberia minuscula*, *Philine monterosati*, *Crenella pellucida*, *Polycordia gemma*, and some of them are here documented for the first time as living in the Mediterranean. One third of the species are not reported from the nearby and well known platform of Alboran, indicating that there are significant sub-regional differences and that the total number of species would still increase with further sampling. A few species represented only by abundant shells e.g. *Puncturella noachina*, *Anatoma crispata*, *Iothia fulva*, *Limacina retroversa*, *Bathyarca frielei*, could represent a thanatocenosis from a locally extinct fauna of a cold period.

For its exceptional richness, both by numbers and by the quality of the species, this type of bathyal community with *Leptometra* and *Limopsis* should be considered a high priority for habitat conservation in the Mediterranean deep sea.

**ORAL**

**Mating in *Ariunculus isselii*, an arionid slug without a spermatophore**

**Hutchinson, JMC, Reise, H**

Senckenberg Museum of Natural History Görlitz; PF 300 154, 02806 Görlitz,  
Germany, E-mail: majmch@googlemail.com

*Ariunculus* is a genus of terrestrial slugs often treated as a subgenus of *Arion*. A survey of the literature reveals doubts about many of the described species: only *A. speziae* and *A. isselii* are now generally recognised as belonging to *Ariunculus*. *Ariunculus isselii* is widespread on Sardinia. We describe its external appearance, mating behaviour and genital anatomy, and interpret the functioning of the genitalia based on specimens killed during copulation or shortly afterwards. In contrast to *Arion*, the epiphallus is reduced to a small ampulla because sperm is pumped out piecemeal into the recipient's atrium rather than transferred in a spermatophore. This may explain why mating lasts 12 hours after the initial genital eversion, much longer than in any *Arion*. The absence of a spermatophore provides unequivocal grounds for keeping *Ariunculus* separate from *Arion*. More similarly to *Arion*, the papilla is inserted into the partner's partially everted bursa duct: we discuss four different hypotheses for the function of this. Also as in some *Arion*, the oviduct is everted during mating so as to apply a ligula. Additionally we provide information on egg laying in captivity, and report that the species can self-fertilise.

**ORAL**

## Suitability of floodplain forest mollusks for multi-species distribution modeling

**Kappes, H**<sup>1,2</sup>; **Kopeć, D**<sup>3</sup>; **Sulikowska-Drozd, A**<sup>4</sup>

(1). Dept. Limnology and Conservation, Senckenberg Research Institute,  
Clamecystraße 12, D-63571 Gelnhausen, Germany, Email:  
hekappes@senckenberg.de

(2). Biodiversity and Climate Research Centre (LOEWE BiK-F), Senckenberganlage  
25, D-60325 Frankfurt a.M., Germany

(3). Dept. of Nature Conservation, University of Łódź, 1/3 Banacha str., 90-237 Łódź,  
Poland, Email: domin@biol.uni.lodz.pl

(4). Dept. of Invertebrate Zoology and Hydrobiology, University of Łódź, Banacha  
12/16, 90-237 Łódź, Poland, Email: sulik@biol.uni.lodz.pl

Species distribution modeling is a common tool to assess the potential distribution range of species and, recently, communities (multi-species approach). We were interested in the basic assumption of these models, namely, that the association of a species with the environment, and between species within communities, is the same across large scales, that is, across different climatic conditions. As the focal species, we selected the clausiliid *Alinda biplicata* because field data suggests that the number of occupied grids increased in NW Germany and it thus is a candidate for modeling.

We studied mollusk species from floodplain forests that (1) are inhabited by *A. biplicata*, and that (2) are characterized by the trees *Alnus glutinosa*, *Acer pseudoplatanus*, *Carpinus betulus* and/or *Fraxinus excelsior*. We sampled eight floodplain sites each in NW-Germany, Central Germany and Central Poland. These sites span over most of the East-West range of the geographical distribution of *A. biplicata*. Within each site, we sampled eight random subplots from which we quantified gastropod densities and the number of neonates, juveniles and adults of the focal species.

Along with *A. biplicata*, we found 73 other species (total: 74). The sites in Poland had the highest alpha-diversity and densities, whereas the sites in NW-Germany harbored the lowest alpha-diversity and densities. However, the sites in NW-Germany had a high gamma-diversity, and the species-area curve was far from saturation. The assemblages differed between the regions and no site had the same species composition. The highest co-occurrence of *A. biplicata* was with *Cochlicopa lubrica*, *Punctum pygmaeum*, *Nesovitrea hammonis*, *Discus rotundatus* (all in  $\geq 20$  sites). We show differences and similarities in species-habitat relations across regions. Further, the age structure of the populations of *A. biplicata* differed between the regions. Differences are discussed in relation to the susceptibility of the life stages to habitat filtering by summer droughts. Our results indicate that the prediction accuracy of single-species models probably can be increased by additional habitat layers, but that the prediction accuracy of multi-species approaches will be hampered by regional species pools.

**ORAL**

**What is a snail species? Mitochondrial lineages of snails with a *Trochulus hispidus* phenotype (Gastropoda: Pulmonata: Hygromiidae)**

**Kruckenhauser, L<sup>1</sup>, Bartel, D<sup>2</sup>, Haring, E<sup>1</sup>, Sattmann, H<sup>1</sup>, Harl, J<sup>1,2</sup>, Duda, M<sup>1,2</sup>**

(1) Museum of Natural History Vienna, Burggring 7, A-1010 Vienna, Austria. E-mail: luise.kruckenhauser@nhm-wien.ac.at

(2) Department of Evolutionary Biology, University of Vienna, Althanstrasse 14, A-1090 Vienna, Austria

For studying evolution it is compulsory to recognize species. However, for some taxa, especially in land snails, this is not an easy task. Within the *T. hispidus* complex it has proved to be difficult to define species.

Hence we took a broad approach including individuals of *T. hispidus* from 129 locations covering a fairly broad geographic distribution with a focus on the Eastern Alps and surrounding areas. From each sampling site from about three individuals a fragment of the mitochondrial COI gene was analysed (total: 387). We also included related taxa in our study: *T. oreinos*, *T. sericeus*, *T. striolatus*, *T. coelomphala*, *T. clandestinus*, *T. biconicus*, *T. villosulus* and *T. villosus*. In addition, from selected individuals representing different COI lineages we analysed a fragment of the mitochondrial 12S and 16S genes (100 specimens). Furthermore, nuclear sequences (appr. 1400 bp including parts of the 5.8S, ITS2 and 28S) from 49 individuals were analysed.

The mitochondrial variation of specimens determined as *T. hispidus* (on the basis of morphological and anatomical examination) was exceptional high (max. p distance 18% in COI). The COI sequences of *T. hispidus* revealed nine distinct lineages, whose phylogenetic relationships could not be resolved due to saturation effects. Seven lineages can be assigned to restricted, partly overlapping geographic regions, while two lineages show a widespread distribution with no clear geographic patterns. In several cases quite divergent lineages occur even at the same sampling locality. No genetic differentiation was found between individuals resembling morphologically the *T. sericeus* or the *T. hispidus* phenotype.

The combined 16S-12S tree yielded a better resolution. In this tree some related taxa (*T. striolatus*, *T. villosulus*, *T. coelomphala*) are intermixed with *T. hispidus* lineages. Hence *T. hispidus* is paraphyletic. The nuclear sequences do not differentiate between any of the mitochondrial clades, except *T. oreinos*. Thus, the nuclear data provide no argument for species status of any of the *T. hispidus* lineages. For final conclusions on species delimitation it will be necessary to investigate possible gene flow between all syntopic lineages in detail.

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**ORAL**

**Land snail diversity in habitats of *Ena montana* (Draparnaud, 1801) in Biržai forest (Lithuania)**

**Kuznecova, V<sup>1</sup>, Skujienė, G<sup>1</sup>, Juzėnas, S<sup>2</sup>**

(1). Dept. of Zoology; Faculty of Natural Sciences; Vilnius University; M.K. Ciurlionio 21/27; LT-03101 Vilnius, Lithuania, Email: Viktorija.Kuznecova@gf.stud.vu.lt;

Grita.Skujiene@gf.vu.lt

(2). Dept. of Botany and Genetics; Faculty of Natural Sciences; Vilnius University; M.K. Ciurlionio 21/27; LT-03101 Vilnius, Lithuania, Email: Sigitas.Juzenas@gf.vu.lt

*Ena montana* (Draparnaud, 1801) – Middle Europe-Alpine-Carpathian mountain species known altogether in 26 European countries. In some northern countries it belongs to the Red List. In summer of 1958 the first finding of *E. montana* in Lithuania was made by P. Šivickis. It was found in an old mixed Biržai forest of the Northern Lithuanian Lowland. This is the only place in Lithuania where this species was found till now. In studies of 2010 in Biržai forest research of 28 sites were carried out. Overall 47 species of land snails were found and vegetation composition and the cover of each plant species was estimated using the Braun-Blanquet 9-grade scale. Additional for each vegetation plot, we calculated the average EllenbergIVs for light, temperature, continentality, moisture, soil reaction and nutrients using the JUICE program. The aim of this study was to define what ecological factors, determined from plant species, have significant impact on the abundance of *E. montana* in different sites of Biržai forest and what influence it has to other land snail species. It was found that independently on presence or absence of *E. montana*, vegetation composition in studied sites showed no significant differences. The position of *E. montana* optima along each environmental gradient were calculated. Of course, plant indicator values cannot replace physico-chemical field measurements in animal ecology. However, they can provide valuable information, which can be utilized in animal ecology field studies at both the species and the community levels.

**ORAL**

**Do freshwater mussels (*Bivalvia*, *Unionoida*) feed selectively according to seasonal dietary needs? A case study on *Anodonta cygnea***

**Lopes-Lima, M<sup>1,2</sup>, Hinzmann, M<sup>1,2</sup>, Lima, P<sup>1</sup>, Teixeira, A<sup>3</sup>, Varanda, S<sup>4</sup>, Machado, J<sup>1,2</sup>**

<sup>1</sup>CIIMAR-UP – Interdisciplinary Centre For Marine and Environmental Research, University of Porto, Rua dos Bragas 289, 4050-123 Porto, Portugal.  
lopeslima@aquicultura.com

<sup>2</sup>ICBAS – Abel Salazar Biomedical Sciences Institute, University of Porto, Largo Prof. Abel Salazar, 2, 4099-003 Porto, Portugal

<sup>3</sup>CIMO-ESA-IPB – Mountain Research Centre, School of Agriculture, Polytechnic Institute of Bragança, Campus de Santa Apolónia, Apartado 1172, 5301-854 Bragança, Portugal

<sup>4</sup>CITAB-UTAD - Centre for Research and Technology of Agro-Environment and Biological Sciences, University of Trás-os-Montes and Alto Douro, Forestry Department, Apartado 1013, 5001-811 Vila Real, Portugal.

Several species of animals are able, during their life cycles, to selectively choose specific food items that meet special needs and unique metabolic crucial stages, such as growth, reproduction or parental care. Is this capability also present in freshwater mussels (*Bivalvia*, *Unionoida*)? It is already established that microalgae usually are the main food source for standing water unionids and that these bivalves have the ability to select food based on certain cellular characteristics before uptake. Moreover, its metabolism displays a seasonal cycle, where the different stages of growth, sexual development and reproduction are well identified, mainly in temperate waters. Therefore, the objective of this study is to examine the seasonal composition of phytoplankton in the gut contents of freshwater mussels *Anodonta cygnea*, to determine whether they are able to select food items seasonally and which, if any, are their preferences. Samples of stomach contents and water samples were collected in the lagoon of Mira, in northwest Portugal, monthly for a one year period. The composition of microalgae found in water samples and gastrointestinal contents was diversified and was represented by seven main groups: Chlorophyta, Cryptophyta, Chrysophyta, Cyanobacteria, Euglenophyta, Bacillariophyta and Dinophyta. In both cases Chlorophyta showed a clear predominance, this group was followed by Bacillariophyta and Cryptophyta in water samples and Bacillariophyta and Cyanobacteria in gastrointestinal contents. Although the mussels eat algae in a very similar pattern to their abundance, some specific groups were preferred in certain periods, even while present in very low levels in the water. This indicates that these animals are capable of selecting food for their specific characteristics. This selection may be associated with specific physiological needs of the mussel in different life cycle stages and related nutritional requirements. Specifically, the peak of blue green algae in the gastrointestinal contents during the development of gametes covers two smaller maximums: one of diatoms during gametogenesis restart and another of Chlorophyta in the end. A significant peak of Cryptophyta also co-occurs with glochidia brooding.

**ORAL**



**An update of the systematic of Parmacellidae P. Fischer, 1856 (Gastropoda, Pulmonata)**

**Martínez-Ortí, A, Borredà, V**

Dept. Zoologia; Facultat de Ciències Biològiques; Univ. València; c/ Dr. Moliner, 50;  
46100-Burjassot, Valencia, Spain and Museu Valencià d'Història Natural, Email:  
amorti@uv.es

This paper compares two western Mediterranean species which had been included in the genus *Parmacella*, *P. deshayesii* from north Africa and *P. valenciennii* from the south of the Iberian peninsula, which show so many distinctive features that we believe are sufficient for them to be considered not as different species but of different subgenera, clarifying some doubts about their co-specificity and designating neotypes for both. An historical revision of the taxonomy of the family Parmacellidae is included. The taxonomical study of the species of *Parmacella* carried out allows us to realize an update of the systematic of the family. We propose its division into two genera: *Parmacella* and *Drusia*, the latter being an old genus-name from Gray (1855) available now, which in turn is divided by us into two subgenera: *Drusia* s. str. and *Drusia* (n. subg.), that are properly characterized morpho-anatomically. A distribution map of the taxons of the family Parmacellidae in the western Mediterranean and a taxonomic key of this family with the new systematic scenario proposed are shown.

**ORAL**

**Do mussel beds support the same mollusc diversity on artificial and natural intertidal habitats?****Moreira, J<sup>1,2</sup>, Díaz-Agras, G<sup>2</sup>, Candás, M<sup>2</sup>, Cunha, X<sup>2</sup>, Urgorri, V<sup>2</sup>**(1). Dept. de Biología; Facultad de Biología; Univ. Autónoma de Madrid; E-28049 Madrid, Spain. Email: [juan.moreira@uam.es](mailto:juan.moreira@uam.es)(2). Estación de Biología Mariña da Graña; Universidade de Santiago de Compostela; E-15590 Ferrol, Spain. Email: [guillermo.diaz@usc.es](mailto:guillermo.diaz@usc.es)

Intertidal ecosystem engineers such as coralline algae, ascidians, oysters and mussels increase heterogeneity and complexity of the substratum, thus creating habitat for many species, mostly small invertebrates. The role of those engineers in natural rocky shores has extensively been studied in the last years, and that of mussel beds in particular. For instance, aggregates of mussels provide other organisms with substratum for attachment, protection against predators and physical stress. Their role is, however, little known in artificial structures and there are few studies which have investigated whether mussel beds there support similar assemblages to natural habitats.

The Galician rias (NW Iberian Peninsula) are a special kind of estuarine system which supports an increasing concentration of human population in their coastline. This translates in a number of anthropogenic perturbations, including overexploitation of natural resources, urban sewage and proliferation of artificial structures, i.e. coastal defences, harbour facilities, marinas and seawalls. The Ría de Ferrol is among the most urbanised and seawalls there are usually found along most of the middle and inner areas, in many cases fragmenting or replacing natural intertidal habitats. Seawalls are, however, known to support a number of sessile organisms also found in natural habitats, such as foliose algae, barnacles and mussels.

In this communication, mussel beds were studied in three different habitats at the Ría de Ferrol: artificial vertical seawalls made of natural rock (granite), vertical and horizontal natural rocky shores. This was done to test hypotheses about diversity and composition of mollusc assemblages inhabiting mussel beds according to the inclination and nature of substratum. Spatial replication was done following an orthogonal design at two scales: 100s of meters (4 locations) and 10s of ms (2 sites per location). Replicate cores were collected at each site and mollusc assemblages were compared among the three habitats. Results found may serve to assess whether artificial seawalls constitute surrogate habitats of disappearing natural shores in highly urbanised areas, or rather to find how to improve their design to support a similar biodiversity as do natural intertidal habitats.

**ORAL**

**The genus *Turanena* (Gastropoda Enidae) in the Eastern Mediterranean islands**

**Mylonas, M<sup>1,2</sup>, Vardinoyannis, K<sup>2</sup>, Demetropoulos, S<sup>3</sup>, Psonis, N,<sup>1,2</sup>  
Demetropoulos, A<sup>3</sup>**

(1) Department of Biology, University of Crete, Vassilika Vouton, GR-71409, Irakleio, Crete, Greece, *E-MAIL*: mylonas@nhmc.uoc.gr

(2) Natural History Museum of Crete, University of Crete, Knossos Av., GR-71409, Irakleio, Crete, Greece

(3) Cyprus Wildlife Society, P.O.Box 24281, Lefkosia 1703, Cyprus

The southwestern distributional limits of the genus *Turanena* (Gastropoda, Enidae) are found in Turkey, Syria and Israel. In the Aegean islands three more species have been reported; *T. hemmeni* from Samos isl., *T. carpathia* from Rhodes and Karpathos, and *T. katerinae* from Crete.

Within this study we also found it in Symi isl., in Cyprus and in two more localities in Crete. The specimens from Crete and Cyprus have almost identical shells and genitalia, even though their habitats are completely different – limestone subalpine scrubland in Crete, volcanic rocks and forest in Cyprus.

The genetic distance among the populations of Cyprus and Crete is very small. We support the idea that both islands share the same species and that it has recently colonized the islands from the surrounding areas.

**ORAL**

### Gastropod mitogenomics

**Osca, D<sup>1</sup>, Irisarri, I<sup>1</sup>, Grande, C<sup>2</sup>, Cunha, RL<sup>3</sup>, Templado, J<sup>1</sup>, Zardoya, R<sup>1</sup>**

(1) Dept. de Biodiversidad y Biología Evolutiva, Museo Nacional de Ciencias Naturales- CSIC, José Gutierrez Abascal, 2, 28006, Madrid, Spain. Email: davidosca@mncn.csic.es

(2) Centro de Biología Molecular Severo Ochoa, Nicolás Cabrera, 1, 28049, Madrid, Spain. Email: cgrande@cbm.uam.es

(3) CCMAR, Campus de Gambelas - Universidade do Algarve, 8005-139 Faro, Portugal. Email: rcunha@ualg.pt

Complete mtDNA sequences provide strong phylogenetic signal for resolving deep relationships, and generate more robust phylogenies than those reconstructed based on individual genes. Determining complete mtDNA sequences has proceeded more slowly for molluscs than for other animal phyla, notably vertebrates and arthropods. Despite the limited sampling, the field of molluscan mitogenomics is particularly promising, and for instance, gastropod mt genome exhibit greater variety of gene orders compared to any other metazoan mt genome. Thanks to the recent effort of several research groups (including ours) the number of gastropod complete mt genomes is rapidly accumulating. At present (May 2011), fifty-one complete or almost complete mt genomes are available for gastropods (1 Patellogastropoda, 2 Vetigastropoda, 1 Neritopsina, 20 Caenogastropoda, 3 “lower Heterobranchia”, 16 Opisthobranchia, and 8 Pulmonata.). Our research group obtained twelve of these gastropod mt genomes, and at present is working on determining several new ones. Our first results supported four of the seven natural groups currently recognized within Gastropoda (Vetigastropoda, Caenogastropoda, Patellogastropoda, and Heterobranchia), and showed that the gene order of Vetigastropoda might represent the ancestral one for Gastropoda. We proposed that at least three major gene rearrangements took place in the ancestors of Caenogastropoda, Patellogastropoda, and Heterobranchia, respectively. Some of the most intriguing early results (such as the close relationship between the pulmonate *Siphonaria* and the sacoglossan opisthobranchs, or the inclusion of Pyramidelloidea within pulmonates) were confirmed by recent results of other research groups. Complete mt genomes are lacking for the other three natural groups of gastropods: Cocculiniformia, Neomphalina, and Neritopsina (an almost complete mtDNA is available for *Nerita melanotragus*). Although the number of complete mt genomes is increasing rapidly in the last years, still more data are needed to further understand gastropod systematics. The phylogenetic affinities of Cocculiniformia, Neomphalina, and Neritopsina with respect to other gastropods, the relative position of Patellogastropoda, and the delimitation of lower Heterobranchia groups and Euthyneura are still open questions that need to be tackled in the next future.

**ORAL**

**Malacofauna assemblages in organic-rich sediments. Case study of the Upper Sinemurian (Lower Jurassic) from the Lusitanian Basin (Portugal)**

**Paredes, R<sup>1</sup>, Comas-Rengifo, MJ<sup>2</sup>, Duarte, LV<sup>1</sup>**

- (1). Dept. de Ciências da Terra & IMAR-CMA; Faculdade de Ciências e Tecnologia; Univ. Coimbra; Portugal; Largo Marquês de Pombal, 3000-272 Coimbra, Portugal; Email: rparedes@dct.uc.pt; lduarte@dct.uc.pt
- (2). Dept. de Paleontología; Facultad de Ciencias Geológicas; Univ. Complutense; C/ José Antonio Novais 2, 28040 Madrid, Spain; Email: mjcomas@geo.ucm.es

Outcrops of S. Pedro de Moel (W-central Portugal) enable the study of some reference sections of the Upper Sinemurian (~193 Ma) of the Lusitanian Basin. A part of this succession, with more than 40m thick, is composed by marly limestone marine sediments showing frequent organic matter rich intervals. An abundant and unusual malacofauna occurs in these facies, consisting of benthonic groups such as infaunal and epifaunal bivalves and also a few gastropods. Nektonic groups of cephalopods such as ammonoids, belemnites and occasionally nautiloids are also frequent. The ammonitic record allows dating the studied succession from the Oxynotum-Raricostatum Zones interval.

We present in this work the main malacofauna assemblages and discuss their palaeocological implications based on a high-resolution study across the stratigraphic succession analyzed. This involves more than 1,200 mollusk specimens. The occurring genera of bivalves are Pholadomya, Pleuromya, Gryphaea, Liostrea, Pseudolimea, Mactromya, Plagiostoma, Oxytoma and Pseudomytiloides. Gastropods are scarce and are represented by Pseudokatosira, Eucycloscala and Ovactaeonina. The occurring genera clearly show two different domains: (1) Near-shore soft bottom biofacies with abundant infauna Pholadomya, scarce semi-infauna Pleuromya; Gryphaea associated with Liostrea are the dominant epifaunal bivalves; also all the gastropod specimens are confined to this domain; nektonic elements such as Echioceratids ammonites followed by the appearance of Oxynoticerias oxynotum fragmocones signed this domain to the Oxynotum Zone; (2) Hemipelagic assemblages, suggested by the occurrence of Pseudomytiloides and Oxytoma inequivalvis association. Fragmocones of Echioceras raricostatum assigns the second domain to the Raricostatum Zone (uppermost Sinemurian). Some examples of the last association form pavements which exhibit laminated sedimentation with bivalve fragments.

Ongoing studies focus on the questions underlying the endemism of some species and the sinecological significance of these benthic associations.

This work has been financially supported by project PTDC/CTE-GIX/098968/2008 (financed by FCT-Portugal and COMPETE-FEDER).

**ORAL**

**The use of AFLP markers to examine Local Adaptation in the Land Snail,  
*Cepaea nemoralis***

**Patel, S<sup>1</sup> and Beaumont, M<sup>2</sup>**

- (1) School of Biological Science, Philip Lyle Building, University of Reading, Whiteknights, PO Box 68, Reading, RG6 6BX, UK, Email: [simit.patel@hotmail.co.uk](mailto:simit.patel@hotmail.co.uk)
- (2) School of Biological Sciences, University of Bristol, Woodland Road, Bristol, BS8 1UG, UK, Email: [m.beaumont@bristol.ac.uk](mailto:m.beaumont@bristol.ac.uk)

The land snail *Cepaea nemoralis* is highly polymorphic for shell colour and banding pattern, the genetic basis of which is known through breeding experiments. They also demonstrate interesting patterns of local adaptation, where yellow shells are more prevalent in open habitats and pink/brown shells in woodland. This pattern is thought to arise due to visual selection by predators and/or physiological selection by differences in microclimatic between habitats. This pattern is geographically repeated in open and woodland sites separated by a few hundred metres in lowland regions of the UK, implying selection is operating on a very local scale. However, beyond morph frequency data, no molecular evidence exists to support this claim. *C. nemoralis* were sampled from two open-woodland population pairs and genotyped at 245 amplified fragment length polymorphism (AFLP) loci. AFLP loci with elevated levels of differentiation between habitats ('outlier loci') compared to a neutral model are likely to be linked to regions of the genome under selection. The results of two outlier detection methods (DFDIST & BayeScan) and further analysis on population structure will be presented.

**ORAL**

**Diversity and phylogenetic affinities of European species of the genus *Sphaerium* (Bivalvia, Sphaeriidae) based on karyotype composition and DNA sequences**

**Petkevičiūtė, R, Stunžėnas, V, Stanevičiūtė, G**

Institute of Ecology of Nature Research Centre, Akademijos str. 2, LT-08412 Vilnius, Lithuania, Email: romualda@ekoi.lt; stunzenas@ekoi.lt; grasta@ekoi.lt

Estimation of sphaeriid species diversity has been greatly hampered by the highly variable shell morphologies exhibited by many taxa. Therefore, the taxonomic status of species within the traditional genus *Sphaerium* Scopoli 1777, and intrageneric grouping has provided considerable discussion for over a century. Moreover, after decades of controversy, the taxonomic relationships among intraspecific groups of *S. corneum* s. lato have not yet been undoubtedly clarified. In cases where traditional taxonomy gives problematic results, species distinctness and phylogenetic relations of certain forms may be concluded from karyological and/or molecular data. These circumstances stimulate the study of *Sphaerium* spp. collected from different populations in Europe. The karyotypes were studied using conventional karyometric analysis, and then C-banding technique. Two regions of rDNA, nuclear ITS1 and mitochondrial 16S gene fragments, were sequenced and alignments used for comparative analysis to obtain species-specific markers and to evaluate intraspecific divergence. Our results confirm the extensive chromosomal variability already described in the species of *Sphaerium*. The following species were karyotyped for the first time and modal diploid numbers revealed:  $2n=30$  for *S. corneum* var. *mamillanum*,  $2n=28$  for *S. nucleus*,  $2n=36$  for *S. ovale* and  $2n=260$  for *S. rivicola*. Mitotically unstable B chromosomes were found in all studied European species of *Sphaerium* s. str. B's showed interspecific differences in size and shape; small or medium sized metacentric or submetacentric elements were detected. B chromosomes in all species studied were C-negative.

The results of DNA analyses uncovered distinct (while karyotypically indistinguishable) lineages within *S. nucleus*. Sequence divergence up to 2.8 % on the basis of 16S rDNA, and up to 0.67 % on the basis of ITS1 was revealed. No genetic differences between *S. corneum* var. *mamillanum* and typical *S. corneum* were found. In general, two groups within *Sphaerium* spp. are supported by molecular phylogenies as well as by karyological data: one constituted by polychromosomic species (subgenus *Amesoda*); the second group comprises the type species *S. corneum* and the other known diploid Palaearctic species ascribable to *Sphaerium* s. str.

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**ORAL**

***Deroceras panormitanum* and congeners from Malta and Sicily, and the identity of the widespread pest slug**

**Reise, H, Hutchinson, JMC, Schunack, S, Schlitt, B**

Senckenberg Museum of Natural History Görlitz; PF 300 154, 02806 Görlitz, Germany, E-mail: Heike.Reise@senckenberg.de

The name *Deroceras panormitanum* is generally applied to a terrestrial slug that has spread worldwide and can be a pest; earlier it had been called *Deroceras caruanae*. Neither name is appropriate. The taxonomic descriptions apply to a species known only from Sicily and Malta. This true *D. panormitanum* and the tramp species show clear differences in mating behaviour and morphology. For instance, the penial caecum of *D. panormitanum* is more pointed, everting faster at copulation. The size of the penial lobe varies considerably in preserved specimens but is always prominent at copulation. *Deroceras golcheri* from Malta is distinct from *D. panormitanum*, but a phylogeny based on COI mtDNA sequences implies that they are sister species more closely related than to the tramp species. When crossed with the other species, *D. panormitanum* can sometimes transfer sperm to the partner's sarcobelum but the partner either fails to evert its penis (*D. golcheri*) or at least fails to transfer sperm (the tramp species). It seems that names previously applied to the tramp species refer to *D. panormitanum* or are homonymous.

**ORAL**



## Land snail shell degradation: its causes and manifestation

**Rihova, D<sup>1</sup>; Janovsky, Z<sup>2</sup>; Jurickova, L<sup>1</sup>**

(1). Dept. of Zoology, Faculty of Science, Charles University Prague, Vinicna 7, 128 44, Prague 2, Czech Republic; Branta.bernicla@seznam.cz

(2). Dept. of Botany, Faculty of Science, Charles University Prague, Benatska 6, 128 44, Prague 2, Czech Republic; Zdenek.janovsky@seznam.cz

Despite their potential utilizability for ecological and population biology studies, the causes and nature of land snail shell degradation are almost unknown. We studied degradation of 13 common Central European land snails in field as well as in laboratory conditions in order to describe their degradation pattern and to elucidate the causes of observed shell alterations.

The causes of shell degradation can be divided into two basic groups. The influence of **abiotic factors** (leaf litter/soil pH, moisture and insolation) is strongly dependent on site where degradation takes place. The second group of shell alterations is caused by **biotic interactions**, such as shell breakage inflicted by animals, fungal infestation of the shell surface or plant root traces. Moreover, the progress and the rate of shell disappearance are influenced by **shell characters**, foremost by shell size.

Six general categories of shell alterations have been observed: colour changes, shell wall opacification, mycelial infestation, periostracum deterioration, dissolution of calcareous parts and mechanical breakage of the shell. We observed a significant difference in the shell degradation patterns between small and large snail species. Large species corroded mainly from the outside after periostracum disintegration, whereas small species corroded mainly from the inside with periostracum being mostly intact. Also the rates of shell disappearance differed among species.

We revealed taphonomic signatures (site-specific "mixtures" of shell alteration types) of six used common temperate forest types. The influence of particular forest type is so different among used sites that we aren't able to offer any general approach how to include empty shells into ecological and population analyses without bias. Thus we recommend to use living specimens only in quantitative studies; and to include empty shells exclusively to species' list.

**ORAL**

### Preliminary characterization of molluscan assemblages in Spanish mud volcanoes and adjacent bottoms (Gulf of Cadiz)

**Rueda, JL<sup>1</sup>, Fernández-Zambrano, A<sup>1</sup>, Gofas, S<sup>2</sup>, Salas, C<sup>2</sup>, Urra, J<sup>2</sup>, Farias, C<sup>3</sup>, González-García, E<sup>3</sup>, López-González, N<sup>1</sup>, Fernández-Salas, LM<sup>1</sup>, Díaz del Río, V<sup>1</sup>, INDEMARES/CHICA 0211 TEAM**

- (1). Centro Oceanográfico de Málaga; Instituto Español de Oceanografía; Puerto Pesquero s/n; 29640 Fuengirola, Málaga, Spain. Email: jose.rueda@ma.ieo.es
- (2). Dept. Biología Animal; Universidad de Málaga; Campus de Teatinos s/n; 29071 Málaga, Spain.
- (3). Centro Oceanográfico de Cádiz; Instituto Español de Oceanografía; Muelle de Levante s/n; P.O. Box 2609, 11006 Cádiz, Spain.

Habitats and benthic communities in mud volcanoes (MVs) within Spanish waters of the Gulf of Cadiz are under study within the interdisciplinary project INDEMARES/CHICA. More than 10 MVs occur at 300-1100m depth, displaying different seafloor characteristics (mud vs hard bottoms with hydrocarbon-derived authigenic carbonates), hydrodynamism, or seepage activity (active vs latent conditions). Molluscan assemblages in MVs and adjacent bottoms were studied with different sampling methods (otter trawl, beam trawl, rock dredge, box corer) in order to maximize the collection of different species. Muddy soft bottoms mainly occur in Anastasya, Pipoca and Tarsis MVs and the molluscan assemblage is dominated by *Abra longicallus*, *Kelliella abyssicola*, *Ennucula aegeensis*, *Yoldiella philippiana*, *Y. messanensis*, *Bittium watsoni*, *Ampulla priamus* and *Galeodea rugosa*. Pennatulaceans and bamboo corals also inhabit these bottoms, representing the substrate for ovulids (*Aperiovula* sp.), solenogastres and the pectinid *Delectopecten vitreus*. Bottoms with coarse sand and bioclasts were found in Gazul and Chica MVs and the assemblage was characterized by *Nassarius coralligenus*, *Bathyarca philippiana*, *Limopsis aurita*, *Notolimea crassa*, *Pseudamussium sulcatum*, *P. septemradiatum* and *Astarte sulcata*. Others were the solenogastre *Neomenia carinata* or the bivalve *Heteranomia squamula*. Hard bottomss (authigenic slabs, chimneys) are common in Gazul, Chica and Hesperides MVs. In these substrates *Asperarca nodulosa*, *Limopsis angusta*, *Spondylus gussonii* as well as *Propilidium exiguum*, *Danilia tinei* and *Mitrella pallaryi* are dominant. In these bottoms, species associated with porifera (*Emarginula* spp., *Hanleya hanleyi*), with gorgonians (*Anamenia gorgonophila*, *Simnia nicaeensis*) or with cold water corals (*Lima marioni*) also occur. Molluscan assemblages associated with gas emissions were restricted to the summits of Anastasya, Almazan and Aveiro MVs and dominated by *Acharax* sp., *Solemya* sp. and *Lucinoma* sp. This type of molluscan assemblage is recorded for the first time in Spanish waters. Molluscan biodiversity in this area seems lower to other areas of southern Spain (Alboran Sea seamounts) and related to seafloor characteristics, heavily swept by the Mediterranean Outflow Water current.

ORAL

### Formation of radial ribs in Bivalves: the role of the mantle folds

**Salas C<sup>1</sup>, Checa A<sup>2</sup>, Harper EM<sup>3</sup>, Marina P<sup>1</sup>, Tirado C<sup>1</sup>**

(1). Departamento de Biología Animal, Universidad de Málaga, Campus de Teatinos s/n, 29071 Málaga, Email: casanova@uma.es

(2)Departamento de Estratigrafía y Paleontología, Universidad de Granada, Avda Fuentenueva s/n, 18071 Granada, Email: acheca@ugr.es

(3)Department of Earth Sciences, Downing Street, Cambridge CB2 3EQ, UK, Email: emh21@hermes.cam.ac.uk

Bivalves display a variety of shell ornaments, of which the ribs are the most frequent sculptural element. Most of the ribbed ornaments can be classified into three categories: (a) *Radial*, helicospiral, with elements that radiate from the umbo. These result from the continuous secretion of groups of cells from definite portions along the growing shell margin. These structures have been named “corpora spinosa” by Stone (1998) (e.g. *Cardiidae*); (b) *Commarginal*, parallel to the margin. This sculpture is composed of a series of conformable curves on the shell margin. They are periodically secreted by mantle extension and shrinkage, and in some cases, mantle bulging or bending results in plicate shell folding (e.g. *Veneridae*); and (c) *Oblique*, with elements crossing both the commarginal and radial ribs (e.g. *Solecurtus*, *Digitaria*).

The formation of different shell sculpture, among them the radial ribs, has been analysed in successive studies from different perspectives. A variety of theoretical models have been proposed while theoretical morphologists have been concerned with the biological mechanism underlying such models, but few studies have been addressed to determine the function of the underlying mantle structures.

Histological and SEM observations on the mantle folds of several species with radial sculpture and belonging to different clades (*Arcidae*, *Glycymeridae*, *Cardiidae*, *Carditidae*, *Pectinidae*) have been carried out in order to determine the morphology and possible function of the mantle folds during the formation of the radial ribs. According to these observations, in all the species analyzed the outer mantle fold shows structures able to promote the process of calcification of the ribs. These structures are morphologically different between clades and their developments seem to be also related with the size of the radial ribs.

**ORAL**

**Asian openbill stork (*Anastomusoscitans*), a competent predator of an invasive alien snail species in Thailand**

**Sawangproh, W<sup>1,2</sup>, Round, PD<sup>2</sup>, Poonswad, P<sup>3</sup>**

- (1) Program in Conservation Biology, School of Multidisciplinary Studies, Mahidol University, Kanchanaburi Campus, 199 Moo 9 LumsumSubdistrict, Saiyok District, Kanchanaburi Province 71150 Thailand, Email: kawsw@mahidol.ac.th  
(2) Department of Biology, Faculty of Science, Mahidol University, Rama VI Road, Rachadhavi District, Bangkok 10400 Thailand, Email: frpdr@mahidol.ac.th  
(3) Department of Microbiology, Faculty of Science, Mahidol University, Rama VI Road, Rachadhavi District, Bangkok 10400 Thailand, Email: scpps@mahidol.ac.th

Freshwater golden apple snails (*Pomacea canaliculata*), native to South and Central America, and the West Indies, are the major agricultural pest in paddy fields in Thailand. Some evidences showed that they were consumed by Asian openbill storks (*Anastomusoscitans*). Yet, there is no report on their effectiveness of predation on the snails in Thailand. The snails were randomly collected by quadrat sampling in several paddy fields visited by storks, counted, and measured the empty shell and live snails in terms of the shell size to assess the effectiveness of stork predation on the snail population. The results showed that the high number of storks visited the fields significantly decreased snail population ( $r_s = 0.902$ ,  $p = 0.000$ ). Storks are tactile predators and obviously prefer to eat adult snails to juvenile ones. Overall, this study suggests that storks were the powerful predator to eradicate the snail population especially adult snails that had high reproductive potential in paddy fields.

We are very grateful to the UDC scholarship to support our expense till we finished field work. We would like to extend special thanks to the Department of Biology, Faculty of Science, Mahidol University for allowing us to use some facilities.

**ORAL**

## Ecology and distribution of *Pupilla alpicola* (Charpentier, 1837) in the Western Carpathians

**Škodová, J., Horsák M.**

Department of Botany and Zoology; Faculty of Science; Masaryk University;  
Kotlářská 2, CZ-61137 Brno, Czech Republic  
Email: javesko@centrum.cz; horsak@sci.muni.cz

*Pupilla alpicola* (Charpentier, 1837) is a rare and endangered terrestrial snail (Gastropoda: Stylommatophora: Pupilliidae). This glacial relic species is well known from European fossil records with recent distribution only in the Alps and Western Carpathians. Recent findings indicate a strict preference for treeless and extremely calcareous fens, however a detailed knowledge of the autecology of this snail is still missing. In this study we examined 162 isolated fen habitats in the Western Carpathian, of which 31 were inhabited by *P. alpicola*. We found that measured water conductivity and Ellenberg's indicator values for soil reaction, light and nutrients were best explanation variables for the occurrence of *P. alpicola*. We confirmed that *P. alpicola* prefers fens with a strong precipitation of calcium carbonate and found out that it favors nutrient-poor and sparse vegetation. The current distribution of this species in the Western Carpathians is also strongly associated with a time-space continuum of calcareous fens during the Holocene. Although there are more suitable sites, the current populations are situated not further than 40 kilometers from the known paleorefugia - fen sites where the occurrence of this species is documented based on fossil evidence continuously from the Pleistocene/Holocene boundary. Detailed understanding of ecological demands of this relic and endangered species can be useful not only for effective protection of this snail species, but also for conservation scenario of its unique and highly endangered habitats of treeless calcareous fens.

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**ORAL**

## Lithuanian molluscs listed in the Habitats Directive: analysis of populations' state

**Skujienė, G**

Dept. of Zoology; Faculty of Natural Sciences; Vilnius Univ.; Čiurlionio 21/27; LT-03101 Vilnius, Lithuania, Email: grita.skujiene@gf.vu.lt

Molluscs' species richness in Lithuania is currently estimated at 151 species. Of these, only 5 species are nationally protected. The Annexes of the Directive (92/43/EEC) on the Conservation of Natural Habitats and Wild Fauna and Flora (EUHSD) of the European Union include six molluscs' species occurring in Lithuania: *Anisus vorticulus*, *Unio crassus* (Annexes II and IV); *Vertigo angustior*, *V. geyeri*, *V. moulinsiana* (Annex II); *Helix pomatia* (Annex V). Nevertheless, two of it – *A. vorticulus* and *H. pomatia* for uncertainly reasons are not nationally protected.

The first monitoring of molluscs in 13 sites of the European ecological network Natura 2000 of Lithuania was made in 2008. The main results showed that protection is insufficient. Three studied (from seven) protective sites for *V. angustior* were wrongly distinguished, only 175,5 ha were suitable for this species, and the population density in this site was only 12 ind./m<sup>2</sup>. Situation outside Natura 2000 was worse – one population was extinct, other – was very small 8,4 ha and had small density - 9,6 ind./m<sup>2</sup>. *V. moulinsiana* has two Natura 2000 areas in Lithuania and one of it was studied: the population density in Meteliai Regional Park (19,5 ha) was 31 ind./m<sup>2</sup> but two habitats near Obelija lake were disturbed. Situation outside Natura 2000 (in other two studied places, Ruzas (250,3 ha) and Juodeliai (24 ha) swamps) was better - 147 ind./m<sup>2</sup>. Results showed that *V. geyeri* occurs in two little open calcareous swamps and the population density was different – in smaller swamp (4,1 ha) it reached 41 ind./m<sup>2</sup>, but in bigger (38,2 ha) it was only 5 ind./m<sup>2</sup>.

*U. crassus* was studied in 7 Natura 2000 sites. It was found that species protection has some problems: 1) not include the best places for protection – effluents and sources; 2) not eject beavers and as result the water mode is changing and became insufficient for species; 3) not coordinate protective measures for *U. crassus* and for fishes in the same places.

This work has been financed by the Environmental Protection Agency (Grant No. 4F08-82).

**ORAL**

## Haplotype phylogeographic diversity and digenean parasites of *Sphaerium corneum* (Bivalvia) in East, North and Central Europe.

**Stunžėnas, V., Petkevičiūtė, R., Stanevičiūtė, G**

Institute of Ecology of Nature Research Centre, Akademijos 2, LT-08412, Vilnius, Lithuania, Email: stunzenas@ekoi.lt; romualda@ekoi.lt, grasta@ekoi.lt

Large geographical ranges of *Sphaerium corneum* provide an excellent opportunity to examine the role of the last glacial period in shaping the geographical distribution of these clams. Freshwater habitats have relatively discrete boundaries and dispersal events are probably infrequent, consequently patterns of variance are likely to reflect accurately historical patterns of colonization, escaping the obscuring effects of continued gene flow. The historical phylogeography of *S. corneum* in East, North and Central Europe was investigated using partial 16S sequence from the mitochondrial genome. Nuclear sequence of internal transcribed spacer (ITS)-1 was also obtained, but they were identical and uninformative for the relationships among populations. Phylogenetic analyses based on 16S mtDNA revealed two well-differentiated clades: Western haplotype clade (Lithuania, Hungary and Czech Republic) and Eastern (East Latvia and Lithuania, Ukraine and Czech Republic, Finland and Norway). Both clades have own single mother haplotype. Eastern mother haplotype has formed group of haplotypes with very small polymorphism: differences in 1-2 bp among haplotypes. Western clade contains more different haplotypes with differences in 1-6 bp. More different haplotypes could reflect more ancient clade history. Contact zones of both clades exist in Czech Republic and Lithuania. On the other hand, great haplotype differences in Western clade provide support on an assumption that Western clade postglacial refugia was localized in East-Central Europe. Almost all studied populations, except Finland population, were infected by one species of digenean parasites - *Phyllodistomum folium*. All macrocercous-cystocercous cercariae of these parasites have identical ITS2 and 28S nuclear rDNA. Genetically identical parasite was detected in *Pisidium amnicum* and final fish host, *Gasterosteus aculeatus*. Only in Ukraine population one *S. corneum* was infected by *Crepidostomum* sp.

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**ORAL**

## Reproductive strategy of clausiliid *Alinda biplicata* (Montagu, 1803) – variation across the geographical range of the species

**Sulikowska-Drozd A.<sup>1</sup>, Maltz T.K.<sup>2</sup>, Kappes H.<sup>3,4</sup>, Páll-Gergely B<sup>5</sup>**

- (1) Department of Invertebrate Zoology and Hydrobiology, University of Łódź, Banacha Str. 12/16, 90237 Łódź, Poland; Email: sulik@biol.uni.lodz.pl  
 (2) Natural History Museum, University of Wrocław, Sienkiewicza Str. 21, 50-335 Wrocław, Poland; Email: tomaltz@biol.uni.wroc.pl  
 (3) Senckenberg Research Institute, Dept. Limnology and Conservation, Clamecystraße 12, D-63571 Gelnhausen, Germany, hekappes@senckenberg.de  
 (4) Biodiversity and Climate Research Centre (LOEWE BiK-F), Georg-Voigt-Straße 14-16, D-60325 Frankfurt a.M., Germany  
 (5) Department of Biology, Shinshu University, Matsumoto 390-8621, Japan; Email: pallgergely2@gmail.com

The distribution range of the clausiliid *Alinda biplicata* comprises Central Europe from N.E. France in the west, S. Sweden in the north, Central Poland in the East and Albania in the south. It thus occurs in a wide range of macroclimatic conditions, but it usually lives in woods and shaded herbage, sometimes in more open habitats among rocks. *A. biplicata* is ovoviviparous, but the data on its reproduction in the field are fragmentary. In the laboratory, offspring was produced during the whole year with two maxima in spring and autumn. Snails give birth to 1-8 neonates (most often 2-3) usually four times a year. The shells of new born snails have 2.5-3.0 whorls and are ca. 2 mm high.

We aimed to compare the dynamics of egg retention in natural populations of *A. biplicata* in different part of its geographical and altitudinal range. Every month we checked the presence of developing eggs in the uterus of 30 adult individuals from several sites in Europe. The number of embryos and their development stage was analyzed in relation to the climatic characteristic of the area and the size of parental shell. We recorded when the reproductive season started and ceased, when embryos were ready to be born and how many eggs developed simultaneously in the uterus.

Egg retention started in April in *A. biplicata* from Central Germany and Poland, while in the maritime climate of N.W. Germany it began in the second half of March. Gravid snails composed between 3 and 91 % of the sample (the highest frequency in May and June). Usually, 8-12 developing eggs were found in the uterus, but the number decreased during the growing season, which points to a gradual release of neonates. Our results suggest that the variation in the reproductive strategy among the studied populations (frequency of gravid snails, number of embryos in uterus and their development stage) is related to the climatic gradient.

**ORAL**



## Are autochthonous mussel populations of Tâmega, Tua and Sabor rivers (Douro basin) threatened? Ecological status and future conservation measures

**Teixeira, A<sup>1</sup>, Varandas, S<sup>2</sup>, Sousa, R<sup>3,4</sup>, Lopes-Lima, M<sup>3,5</sup>**

- (1) CIMO-ESA-IPB – Mountain Research Centre, School of Agriculture, Polytechnic Institute of Bragança, Campus de Santa Apolónia, Apartado 1172, 5301-854 Bragança, Portugal, Email: amilt@ipb.pt
- (2) CITAB-UTAD - Centre for Research and Technology of Agro-Environment and Biological Sciences, University of Trás-os-Montes and Alto Douro, Forestry Department, Apartado 1013, 5001-811 Vila Real, Portugal. Email: simonev@utad.pt
- (3) CIMAR-LA/CIIMAR – Centre of Marine and Environmental Research, Rua dos Bragas 289, 4050-123 Porto, Portugal, Email: ronaldo.sousa@ciimar.up.pt
- (4) CBMA – Molecular and Environmental Biology Centre, Department of Biology, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal
- (5) ICBAS – Abel Salazar Biomedical Sciences Institute, Universidade de Porto, Largo Prof. Abel Salazar, 2, 4099-003 Porto, Email: lopeslima@aquicultura.com

Autochthonous mussel populations are still present in high densities in three Portuguese northeastern water courses: Tâmega, Tua and Sabor Rivers (Douro basin). *Margaritifera margaritifera* (L.) is only present in headwater sections of Tua (e.g. Tuela and Rabaçal) and Tâmega (e.g. Beça and Terva) streams, while *Potomida littoralis* (Cuvier 1798) was detected in the lower Sabor and Tua. *Unio delphinus* (Spengler 1793) and *Anodonta anatina* (L.) are relatively common in these rivers. During spring and summer of 2009 and 2010, sediment and water quality of different sampling sites were measured and habitat and microhabitat used by mussel species determined. Ecological analyses, based on algae, macroinvertebrate and fish communities were made following the Water Framework Directive procedures. Polynomial regressions showed the preference of juvenile and adult *M. margaritifera* populations to colonize riffle zones, characterized by permanent current and highly shaded, buried in the fine sediments (gravel and sand) deposited in the interstices of coarse substrates (cobbles and boulders). Low salt (conductivity < 50 µS/cm), nutrient (N-Total <0.2 mg/L) and particulate material (POM <3 mg/L e PIM <0.01mg/L) contents and a good ecological integrity confirmed the low human influence. The other mussel populations are naturally distributed along the middle and lower sections, adapted to more eutrophic waters. They tended to occupy fine sediment zones, reaching high densities in lateral arms of the main river. Differences were more visible between *U. delphinus*, more concentrated in fine sediments of banks, while *P. littoralis* were typically found in pebble zones of middle channel arms, with higher water currents. Lower ecological integrity was found, taking into account several metrics determined (e.g. IPTIn). Most of these unique and viable populations are threatened by the drastic reduction in the available habitat (lentic habitat from reservoirs) and biotic shifts (autochthonous fish displaced by alien species) that can be expected from big dam constructions recently established by Portuguese governmental policies and developed for these three rivers. Furthermore several small hydropower plants will be constructed in the next years affecting many headwaters, disrupting river connectivity and leading to disappearance of autochthonous fish host species. Conservation measures must consider ecological monitoring, legislation and translocation programs for mussel populations and the global ecosystem protection, namely in high ecological integrity areas.

### **A molluscan assemblage in a coralligenous bottom of the Alboran Sea: intra-annual changes and ecological considerations**

**Urra, J<sup>1</sup>, Rueda, JL<sup>1,2</sup>, Gofas, S<sup>1</sup>, Salas, C<sup>1</sup>, Marina, P<sup>1,2</sup>**

(1). Departamento de Biología Animal, Universidad de Málaga, Campus de Teatinos s/n, 29071 Málaga, Email: biologiamarina@uma.es

(2). Centro Oceanográfico de Málaga, Instituto Español de Oceanografía, Puerto Pesquero s/n, 29640 Fuengirola (Málaga)

The composition and structure of a molluscan assemblage inhabiting an outcrop with a coralligenous community was studied from September 2004 to May 2005 in southern Spain. Nine replicates were taken with a small rock dredge (trawling area of ca. 130 m<sup>2</sup>). A total of 117 molluscan species were identified, with gastropods as the dominant group both qualitatively (71 spp.) and quantitatively (1105 individuals). The gastropod *Calyptraea chinensis* was the dominant species throughout the studied period, and the family Conidae presented the highest number of species. The Shannon-Wiener diversity index and the Evenness showed non-significant changes between cold (autumn-winter) and warm months (spring-summer), displaying high values (~4 bits and ~0.8 bits respectively) that seem common in this type of habitat.

Some of the dominant and/or frequent species are strictly associated with coralligenous-building organisms, such as *Jujubinus exasperatus*, *Gibbula fanulum* and *Tectura virginea* with calcareous algae, or *Neosimnia spelta* with gorgonians. Regarding trophic guilds, carnivores are the dominant group, including those that feed on sessile preys, and followed by filter feeders due to the high abundance of *C. chinensis*. Regarding biogeographic distributions, most of these species (<95%) are widely distributed in European waters, being very low the number of strictly Mediterranean species (*Mitromorpha mediterranea*, *Euspira macilenta* and *Pollia scabra*). The Alboran Sea represents the distributional limit towards the Mediterranean for some species found in this bottom, such as the Atlantic *Bela powisiana*.

Rocky-coralligenous bottoms are scarce in the western Alboran Sea but support a high species richness molluscan assemblage, displaying higher values than the surrounding soft bottoms due to an increase of micro-habitats (gorgonians, soft bottoms, hard bottoms with crevices). This high biodiversity is also partly explained by the coexistence of different taxa with contrasting biogeographic affinities (from northern Europe to tropical west Africa) promoted by the geographical location of the area. Due to this, conservation efforts should be required to protect this stretch of coastline where one of the most biodiverse invertebrate assemblages along the European coasts can be found.

**Rediscovery and possible conservation strategies for two freshwater pearl mussel (*Margaritifera margaritifera*) populations in the Tâmega River Basin (northern Portugal)**

**Varandas, S<sup>1</sup>, Lopes-Lima, M<sup>2,3</sup>, Teixeira, A<sup>4</sup>, Sousa, R<sup>2,5</sup>, Reis, J<sup>6</sup>, Cortes, R<sup>1</sup>, Machado, J<sup>2,3</sup>**

- (1). CITAB-UTAD – Centre for Research and Technology of Agro-Environment and Biological Sciences, University of Trás-os-Montes and Alto Douro, Forestry Department, Apartado 1013, 5001-811 Vila Real, Portugal, Email: simonev@utad.pt
- (2). CIMAR-LA/CIIMAR – Centre of Marine and Environmental Research, Laboratory of Ecotoxicology and Ecology, Rua dos Bragas 289, 4050-123 Porto, Portugal. Email: lopeslima@aquicultura.com, jmachado@icbas.up.pt, ronaldo.sousa@ciimar.up.pt
- (3). ICBAS – Instituto de Ciências Biomédicas de Abel Salazar, Universidade do Porto, Largo Prof. Abel Salazar, 2, 4099-003 Porto, Portugal. Email: lopeslima@aquicultura.com, jmachado@icbas.up.pt
- (4). CIMO-ESA-IPB – Mountain Research Centre, School of Agriculture, Polytechnic Institute of Bragança, Campus de Santa Apolónia, Apartado 1172, 5301-854 Bragança, Portugal. Email: amilt@ipb.pt
- (5). CBMA – Centre of Molecular and Environmental Biology, Department of Biology, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal. Email: ronaldo.sousa@ciimar.up.pt
- (6). IPM – Portuguese Malacology Institute, Zoomarine - E. N. 125 km 65 - Guia - 8201-864 Albufeira, Portugal. Email: joaqreis@gmail.com

*Margaritifera margaritifera* (L., 1758) was considered extinct in Portugal between 1986 and 2001. However, in 2001 six *M. margaritifera* populations were rediscovered. In this study we report the rediscovery of two new *M. margaritifera* populations in two tributaries of the river Tâmega, namely the rivers Beça and Terva. A survey carried out on visible mussels only, was conducted in 2009/2010; a population of 450 individuals was estimated for the river Beça but just 14 adults for river Terva. The population of the latter river is very small and aged, suggesting that it will soon disappear. The maximum inhabited length in rivers Beça and Terva was 10 km and 1 km respectively. Mean mussel density was low in both rivers but more abundant in the Beça (from 0 to 0.01 m<sup>-2</sup>) than in the river Terva (0 to 0.002 m<sup>-2</sup>). Shell length (Lmax) values were distinct between populations (ranging from 123 mm in Beça to 114 mm in Terva) and also among sampling sites (from 90 mm in Beça 3 to 123 mm in the river Beça 6). A relatively large number of juveniles (<65 mm) were only found in the river Beça in a particular river section (26% in site Beça 5) where abiotic (*i.e.* good water quality and habitat) and biotic (*i.e.* presence of trout populations, an essential fish host species) conditions allowed pearl mussel recruitment, possibly due to better ecological integrity. Only large specimens with very few juveniles were found in the remaining sampling sites along both rivers. The results indicate that both populations are a highly susceptible to extirpation, in particular the river Terva). Some of the main threats to these populations have already identified (e.g. habitat fragmentation and loss of due to the presence of weirs for irrigation and hydroelectric power, organic pollution, bank erosion as a result of wildfire events) and urgent conservation measures are needed.

**ORAL**

**Molecular systematics of the deep-water gastropod family Solariellidae  
(Trochoidea)**

**Williams, S. T.**

Natural History Museum, Cromwell Rd, London SW7 5BD, UK

Email: s.williams@nhm.ac.uk

The marine gastropod family Solariellidae are small marine snails that show a diverse range of morphologies. Predominantly occurring in deep-water, solariellids are found globally and are in desperate need of taxonomic revision. Solariellidae were previously thought to be a subfamily of Trochidae, but have recently given familial status. No subfamilial classification exists for the group and the assignment of species to genera is often uncertain.

I have been working in collaboration with an international team of experts to produce the first molecular phylogeny of the family Solariellidae. Molecular samples have been collected by the Muséum national d'Histoire Naturelle, Paris, and made available by Dr Philippe Bouchet. These samples are the result of six deep-sea cruises to the Philippines, New Caledonia, Norfolk archipelago, Solomon Islands and Madagascar and include many rare and unusual species, including species that are new to science.

Preliminary molecular trees have been produced using Bayesian inference based on four genes (28S, COI, 16S and 12S). We used sequences from these genes to establish relationships among trochoidean families. We have also identified several clades within the Solariellidae that correspond to new and existing genera.

**ORAL**



# POSTER COMMUNICATIONS



*6<sup>TH</sup> Congress of the European  
Malacological Societies*



**New records of *Eatoniella* species (Gastropoda: Eatoniellidae) for Navarino Island, Beagle Channel**

**Aldea, C<sup>1</sup>, Rosenfeld, S<sup>1,2</sup>, Ojeda, J<sup>3,4,5</sup>, Mansilla, A<sup>2,3,4</sup>, Rozzi, R<sup>3,4,6</sup>**

(1). Centro de Estudios del Cuaternario de Fuego-Patagonia y Antártica (Fundación CEQUA), Universidad de Magallanes, Avenida Bulnes 01890, Punta Arenas, CHILE.

E-mail: cristian.aldea@cequa.cl.

(2). Departamento de Ciencias y Recursos Naturales, Facultad de Ciencias, Universidad de Magallanes, Casilla 113-D, Punta Arenas, Chile.

(3). Instituto de Ecología y Biodiversidad (IEB), Santiago, Chile.

(4). Parque Etnobotánico Omora, Sede Puerto Williams, Universidad de Magallanes.

(5). Programa de Magíster Mención Manejo y Conservación en Recursos Naturales de Ambientes Subantárticos, Universidad de Magallanes, Casilla 113-D, Punta Arenas, Chile.

(6). University of North Texas, USA.

The genus *Eatoniella* Dall, 1876 correspond a group of tiny caenogastropods distributed along the Pacific and Atlantic coasts, Falkland/Malvinas Islands and Antarctic Peninsula. The information has been generated about this genus in the waters of southern South America is scarce and the literature is scatter. The aim of this revision is to report the extension of the range of *Eatoniella nigra* and *E. picea* in the southern Magellanic region, through the reporting of new geographic records, and a comparison of the external morphology of both species. On Navarino Island (55°04'47.75"S - 67°35'24.55"W) two intertidal surveys (2009-2010) were carried out. Living specimens were collected and examined in the laboratory. A total of 51 specimens of *E. picea* and 73 *E. nigra* were recorded. The average diameter/height ratio for *E. nigra* was  $0.61 \pm 0.04$  and *E. picea* was  $0.53 \pm 0.02$ . This work corresponds to the first record of *E. nigra* and *E. picea* on Navarino Island, Cape Horn Biosphere Reserve. These two species have similar morphology, but one of the features to differentiate them is that *E. picea* has more convex whorls, a higher spire and a conical shell thinner. The information generated for representative species of the genus is still very scarce and little is known about their habits in marine communities, therefore it would be important to consider them in future research.

**POSTER**



**Lack of genetic differentiation among populations of both the Patagonian *Malacobdella arrokeana* entocommensal nemertean and its host the geoduck, *Panopea abbreviata***

**Alfaya, JEF<sup>1</sup>, Bigatti, G<sup>1</sup>, Machordom, A<sup>2</sup>**

(1) LARBIM, Centro Nacional Patagónico (CENPAT-CONICET). Bvd. Brown 2915, U9120ACV Puerto Madryn, Chubut, Argentina. E-mails: joselias@cenpat.edu.ar and gbigatti@cenpat.edu.ar

(2) Museo Nacional de Ciencias Naturales (MNCN-CSIC). José Gutiérrez Abascal, 2. 28006 Madrid, Spain. E-mail: annie@mncn.csic.es

The nemertean *Malacobdella arrokeana* lives as entocommensal in the geoduck *Panopea abbreviata*, its exclusive host, and is the only representative of the genus in the southern hemisphere. This geoduck has been heavily fished in northern Patagonia since 1999, and different authors indicate that between 99,4 and 100% are parasited by *M. arrokeana*. It is interesting to note that when more than one specimen inhabits a bivalve, these nemerteans are immature. *Panopea abbreviata* is distributed in the north Patagonic gulfs, situated in the limit of Magallanic malacological and Argentinean provinces that comprise the San Matías, San José and Nuevo gulfs. Each of these provinces has different environmental characteristics respect to thermal gradients, thermohaline conditions, etc. Taking these particularities in mind, specimens from their main distribution area were sampled to assess their genetic structure, linking it to dispersion pattern or historical events suffered by these species. The three molecular markers showed almost no genetic variation for both species. The genetic parameters indicate population in expansion or submitted to selection. Different episodes of habitat modifications, and mainly the more recent, could explain the patterns and indices found. Such changes can provide the conditions for expansion, colonization or rapid recolonization, with the consequent loss of variation. Alternatively, a selective loss of rare nemertean genotypes by the geoduck would explain the low variability found in all their populations analysed and would indicate a strong association between the host and the entocommensal genetic structure.

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**POSTER**

## Non-indigenous molluscs in inland waters of Spain

Álvarez-Halcón, RM<sup>1</sup>, Araujo, R<sup>2</sup>

- (1) Depto. de Derecho Público; Facultad de Derecho; Universidad de Zaragoza; c/ Pedro Cerbuna, 12; 50009 Zaragoza; Email: 315025@celes.unizar.es  
 (2). Depto. de Biodiversidad y Biología Evolutiva; Museo Nacional de Ciencias Naturales (CSIC); c/ José Gutiérrez Abascal, 2; 28006 Madrid; Email: rafael@mncn.csic.es

The urgent study of exotic freshwater molluscs in Spain is required for proper management of biodiversity and their habitats as established in the European Strategy on Invasive Alien Species and the provisions of Spanish law. Our work reviews the main literature on the presence of exotic molluscs in all the Spanish drainage systems and provides new cites, gaining a better understanding of their distribution, routes of introduction and impact in Spain. They aid in the formulation of proposals for regulation and management.

According to bibliographic data managed and conducted surveys, a total of 14 freshwater exotic molluscs (9 gastropods and 5 bivalves) have been cited in Spain in the wild or in seminaturalism: *Pomacea insularum*, *Melanoides tuberculatus*, *Potamopyrgus antipodarum*, *Lithoglyphus naticoides*, *Pseudosuccinea columella*, *Planorbella duryi*, *Gyraulus (Gyraulus) chinensis*, *Ferrissia (Kincaidilla) fragilis*, *Physa acuta*, *Anodonta woodiana*, *Corbicula fluminea*, *Corbicula fluminalis*, *Dreissena polymorpha* and *Mytilopsis leucophaeata*.

There are doubts about the validity of the presence of 2 of these species: *Corbicula fluminalis* and *Lithoglyphus naticoides*. Of the remaining 12, the introduction of 5 species has occurred in the past 25 years: *Pomacea insularum*, *Anodonta woodiana*, *Corbicula fluminea*, *Mytilopsis leucophaeata* and *Dreissena polymorpha*, being the most damaging species to natural ecosystems, infrastructure and crops. The other 7 species apparently do not cause significant damage, but its long-term impact on native biodiversity is significant because they are very widespread and naturalized. For example in the cases of *Potamopyrgus antipodarum* and *Physa acuta*, or are locally invasive, such as *Melanoides tuberculatus* and *Planorbella duryi*. Trade, farming or cultivation of exotic species and the activities related to the aquarium, fishing and river or sea navigation, are the most common pathways in the wild, but then disperse in many ways.

We propose the inclusion of these 12 species in the Spanish Catalogue of Invasive Alien Species to enforce the general prohibition of possession, transportation, traffic and trade of live or dead specimens established by Law 42/2007 of 13 December Natural Heritage and Biodiversity. Indeed, we propose the inclusion in this Catalogue of at least 7 other potential freshwater invasive species (3 gastropods and 4 bivalves) in order to avoid their future introduction: *Pomacea canaliculata*, *Pomacea bridgesii*, *Bellamy chinensis*, *Limnoperna fortunei*, *Corbicula fluminalis*, *Dreissena rostriformis bugensis* and *Rangia cuneata*.

POSTER

**Ultrastructural study of the apyrene sperm of *Coralliophila meyendorffii*  
(Neogastropoda: Muricidae)**

**Amor, MJ<sup>1</sup>, Richter, A<sup>2</sup> and Durfort, M<sup>1</sup>**

- (1) Dept. Biología Celular, Facultat de Biologia, Universidad de Barcelona.  
Avda. Diagonal 647, 08028 Barcelona, Spain. Email: mamor@ub.edu;  
durfort@ub.edu.
- (2) Depto. Biología, Edificio de Biología, Facultad de Ciencias, Universidad  
Autónoma de Madrid, 28049 Madrid, Spain. Email: alexandra@acett.org

Males of the family Muricidae produce two kinds of sperm: fertile ones, called typical or eupyrene sperm, and sterile cells called atypical or apyrene sperm. In order to study the potential use of apyrene sperm characters in the phylogeny of Muricidae, in the present work we undertake an ultrastructural study of the atypical spermatogenesis of *Coralliophila meyendorffii*, a species pertaining to the subfamily Coralliophilinae. The latter is characterized among others by living symbiotically on anthozoa, incubating egg-capsules and having evolved protandry.

During early stages and before onset of nuclear breakdown, the spermatoblast of *C. meyendorffii* exhibits numerous well developed Golgi body represented by numerous dictyosomes and a highly developed endoplasmic reticulum (ER) with swollen cisterns surrounding granules of medium electron density. The spermatogenesis proceeds with a progressive nuclear vacuolization which culminates with the complete nuclear breakdown. As a result, mature atypical sperm become anucleated cells. The process of nuclear vacuolization is similar to that observed in other gastropods species with apyrene sperm and parallels the nuclear degeneration in an apoptotic process. Simultaneously to nuclear degeneration, the cytoplasm of apyrene sperm undergoes intense changes: centrioles replicate and give rise to numerous axonemes, mitochondria degenerate and become electron dense vesicles, and a high quantity of cytoplasmic vesicles is produced.

The mature apyrene sperm is lancet shaped, motile and present multiple axonemes arranged peripherally. It contains two different classes of cytoplasmic vesicles: one formed by large vesicles of heterogeneous filling and another one of smaller vesicles with a uniformly electron-dense content. The presence of two different types of cytoplasmic vesicles in *C. meyendorffii* is unusual within Muricidae. Non-coralliophilinae muricids studied up to now produce only one type of vesicles similar to the smaller vesicles of *C. meyendorffii*. Further studies on other coralliophilines will show whether this difference is of phylogenetic value or not.

**POSTER**

## Temporal variation of soft-bottom gastropod assemblages influenced by mussel culture in the Ria de Aldán (Galicia, NW Iberian Peninsula)

**Aneiros, F<sup>1</sup>, Moreira, J<sup>2</sup>, Troncoso, JS<sup>1</sup>**

(1). Dept. de Ecología y Biología Animal; Facultad de Ciencias del Mar; Univ. de Vigo. Campus Universitario Lagoas-Marcosende, 36310, Vigo, Spain. Email: faneiros@gmail.com

(2). Dept. de Biología (Zoología); Facultad de Biología; Univ. Autónoma de Madrid. C/ Darwin 2, 28049, Cantoblanco (Madrid), Spain. Email: juan.moreira@uam.es

Temporal dynamics of mollusc assemblages in soft bottoms is influenced by a number of environmental factors. Benthic molluscs are also sensitive to anthropogenic perturbations such as those derived from aquaculture activities. In the southern Galician rias (NW Iberian Peninsula) there is an extensive mussel culture in rafts, which is impacting benthic ecosystems. For example, deposition of mussel pseudo-faeces on the soft bottoms below modifies granulometry and increases the organic matter content; this results, in turn, in changes in benthic assemblages.

The Ria de Aldán is located at the SW of the Ria de Pontevedra and its western part is densely covered by mussel rafts. Gastropod assemblages in the vicinity of rafts were studied from May 1998 to May 1999 in a muddy bottom (17m depth). Five replicate samples were taken monthly by means of a Van-Veen grab thus covering a total area of 0.28m<sup>2</sup> per sampling. Samples were sieved through a 0.5mm mesh. An additional sample was taken to determine sediment characteristics (granulometry and carbonate and organic matter content). Physico-chemical characteristics of water column and sediment (temperature, pH, Eh and conductivity) were also measured. Gastropods present in the samples were sorted, identified and counted in the laboratory using a stereo microscope.

The studied site showed a high gastropod diversity (>40 taxa) when compared to other similar areas in the Galician rias. The most abundant species were *Calyptraea chinensis* and *Cylichna cylindracea*, which were present most of the year. Relationship between community structure and environmental parameters was determined using BIO-ENV analysis (PRIMER statistical package). Results showed that the parameters that best fitted the temporal evolution of the bivalve assemblage were the ones related with either sediment grain-size distribution or its composition, both alone and combined.

These results suggest that benthic gastropods in this area are highly influenced by sediment grain-size distribution and its composition, which are, in turn, likely influenced by the presence of rafts in the nearby areas. Therefore, mussel raft culture may be affecting benthic gastropod assemblages in the surrounding sedimentary bottoms and being responsible for the high diversity found.

**POSTER**

**The molluscan assemblage in photophilous algae from the Bay of Tunis:  
Intra-annual changes and ecological considerations**

**Antit, M<sup>1</sup>, Gofas, S<sup>2</sup>, Daoulatli, A<sup>1</sup>, Rueda JL<sup>3</sup>, Salas, C<sup>2</sup>**

- (1). Département de Biologie, Faculté des Sciences, Université de Tunis El Manar, 2092 Tunis, Tunisia, Email: antit\_mouna@yahoo.fr
- (2). Departamento de Biología Animal, Universidad de Málaga, Campus de Teatinos s/n, 29071 Málaga, Email: sgofas@uma.es; casanova@uma.es
- (3). Centro Oceanográfico de Málaga, Instituto Español de Oceanografía, Puerto Pesquero s/n, 29640 Fuengirola (Málaga), Email: jose.rueda@ma.ieo.es

The composition and structure of a molluscan assemblage inhabiting the photophilous algae from surrounding of La Goulette harbour (Bay of Tunis) was studied from February 2009 to February 2010. Five replicates per month with a quadrat of 50 × 50 cm were taken, the molluscs were collected and the algae biomass were dried in a stove at 100°C and weighted. A total of 16110 individuals were collected, belonging to 97 species, from which the dominant group was the gastropods with 11531 individuals (71.6%) and 67 species (69.1%), followed by bivalves with 4579 individuals (28.4%) and 29 species (29.9%). One only juvenile polyplacophoran (*Acanthochitona crinita*) was collected.

Although gastropods was the dominant group in the assemblage, the bivalve *Mytilaster minimus* was the dominant species throughout the studied period (15.6% of total abundance), followed by the gastropods *Tricolia miniata* (11.6%), *Bittium reticulatum* (11.5%), *Gibbula racketsi* (10.4%) and *Rissoa similis* (9.8%). The high abundance of juveniles of soft bottom species, such as the bivalves *Venerupis aurea*, *Tapes rhomboides* and the gastropods *Nassarius corniculum*, *Haminaea orbignyana*, and also of juveniles of hard bottom species, such as the dominant *M. minimus*, *Petricola lithophaga* or the gastropod *Fissurella nubecula*, point out the important role of this type of habitat as nursery for species which will later move to other habitats. The presence of *Mitrella psilla*, a West African alien species for the Mediterranean, with 363 individuals (2.5% of total abundance) highlights the importance of the algae as vehicle and/or receptor habitat for alien species.

Species richness displayed significant seasonal changes between 30 (winter) and 18 spp. sample<sup>-1</sup> (summer and autumn). Abundance also displayed significant seasonal differences, being maximal in winter 2009 (~550 indiv. sample<sup>-1</sup>). The Shannon-Wiener diversity index showed similar values around 3 bits throughout the year but the Evenness index displayed significant seasonal changes with values between ~0.6 and ~0.8. Multivariate analyses indicated the presence of significant seasonal differences of the composition (presence/absence) and structure (abundance) of this molluscan assemblage.

**POSTER**

**Malacofauna of the advanced middle Pleistocene in the Jarama valley: The Valdocarros site (Madrid, Spain)**

**Aparicio M T<sup>1</sup>, Panera J<sup>2</sup>, Rubio-Jara S<sup>2</sup>, Pérez-González A<sup>3</sup>**

(1) Dept. de Biodiversidad y Biología Evolutiva. Museo Nacional de Ciencias Naturales (C.S.I.C.).C/ José Gutiérrez Abascal, 2. 20006 Madrid (Spain) Email: teresa@mncn.csic.es

(2) Dept. de Prehistoria y Arqueología. Universidad Nacional de Educación a Distancia. C/ senda del Rey 9. 28040 Madrid. Email: joaquin.panera@gmail.com, srbiojara@hotmail.com

(3) Centro Nacional de Investigación sobre Evolución Humana (CENIEH). Paseo de la Sierra de Atapuerca s/n, 09002 Burgos. Email: alfredo.perez@cenieh.es

Little work has been done on the Quaternary history of non-marine Mollusca in Spain, despite of the particular geographical position of the Iberian Peninsula relative to North-west Europe during the glacial stages of the Quaternary climate. It is possible that the Iberian Peninsula suffer a warming influence from the Atlantic surface currents that may have provide a refuge for some temperate elements of modern fauna and flora of North-west Europe. In this contest Valdocarros represent an extensive (836 m<sup>2</sup> excavated surface) and minutely excavated site in central Spain that had provide interesting information about different faunas assemblages and human lithic industry. Valdocarros is located in the Arganda Complex Terrace in the Jarama valley of Madrid (Spain). The site can be placed in the advanced middle Pleistocene (MIS 8-7 ca., 300-200 ka).

One hundred and eighty samples of the terrestrial and freshwater snails from Valdocarros site were analyzed in this work. A total of thirty-one species could be identified, twenty of terrestrial and eleven of freshwater taxons. About two thirds of species are of very small size and three quarters are similar to the actual ones, so that confirming the antiquity of these taxons. This molluscan assemblage suggest a temperate climate in open areas and with riverside vegetation. We will discuss the importance of the molluscan fauna association from this site and the climatic and biogeographical implications from the results.

**POSTER**

**Conservation and global management of the critically endangered species  
*Orculella bulgarica* (Gastropoda: Orculidae) in Andalusia (Iberian Peninsula)**

**Arrébola, J.R., Cárcaba, A., Ruiz, A.**

Dpto. Fisiología y Zoología. Fac. Biología. Univ. Sevilla. Avda. Reina Mercedes, 6.  
41012-Sevilla mastus@us.es

Until 2005 the distribution range for *Orculella bulgarica* (Hesse) was based only on known fossil or recent shells found in Eastern Europe and Iberian Peninsula. There was no availability for any biologic data from extant population and the ecological preferences of *O. bulgarica* had been interpreted differently. In the year 2005, the first four extant subpopulations were found in Andalusia (Southern Spain). Some months later, three of the four subpopulations finally disappeared and consequently the number of mature individuals and the extension and the quality of its habitats were drastically reduced. Taken these findings into account we stated that the risk of extinction for this species was extremely high and highlight the importance to apply a well designed conservation program for it. Recently another extant population has been found in Turkey.

One of the main goals of the Programme for Conservation and Sustainable Use of Land Snails of Andalusia (1998-2011), sponsored by the Ministry of Environment of the Junta de Andalucía, is the preservation of threatened species. From 2005 to 2010, different conservation actions were developed in order to recuperate this species. A complex model was applied that help us to find out seven new living subpopulations that expand the knowledge of its range in Andalusia. In some of the subpopulations we performed censuses and other ecological studies to identify the habitat preference for this species and to find out how the population was age-structured. These subpopulations experienced a population increase during the period of the study. We also identified the periods of reproduction and growth during the annual cycle. These findings coupled with an inferred good capacity of recolonization make us to think that if the habitat conditions are maintained, the viability of future translocations should be very high. We performed an assay of translocation during 2009-10 and our preliminary results were extremely positive. During this period of time, a breeding captivity (laboratory scale) has also been able to complete the species life cycle. Finally, all data have been used to assess IUCN red list in terms of conservation status of the species.

**POSTER**

**Distribution and conservation of native freshwater bivalves from several northern tributaries of Ebro basin.**

**Ayala, I<sup>1</sup>, Madeira, MJ<sup>2</sup>, Reyes, R<sup>1</sup>, Carreras, J<sup>3</sup>, Araujo, R<sup>4</sup>.**

- (1) Asociación ACEBI. C/ Palencia 24 5l. Vitoria. Spain. E-mail: ikerayala@yahoo.es
- (2) Universidad del País Vasco. Facultad de Farmacia. Dpto. de Zoología y Biología Celular Animal. C/ Paseo de la Universidad, 7. 01006 Vitoria. Spain. E-mail: mariajose.madeira@ehu.es.
- (3) Diputación Foral de Álava. Dpto. de Medio Ambiente, Sección de Biodiversidad. Plaza de la Provincia, s/n - 01001 Vitoria. Spain. E-mail: jcarreras@alava.net
- (4) Museo Nacional de Ciencias Naturales (CSIC). Dpto. de Biodiversidad y Biología Evolutiva. C/ José Gutiérrez Abascal, 2. 28006. Madrid. Spain. E-mail: rafael@mncn.csic.es

Freshwater mussels populations provide an interesting case to study the impact of river habitat deterioration on distribution of native populations. Four species of freshwater mussels (naiads) presently inhabit the Ebro basin which, with other names, were already cited by Fritz Haas: *Margaritifera auricularia*, *Unio mancus*, *Potomida littoralis* and *Anodonta anatina*. *P. littoralis* is a species still widely distributed over the country and in all Spanish basins, and *U. mancus* lives also in other Spanish Mediterranean rivers. Studies on the *Anodonta* populations of the Ebro basin are not yet conclusive, but they do not belong to the species *A. cygnea* as is commonly assumed. These native mussel species are heavily threatened by changes in the ecosystem caused by loss of habitat due to agricultural, urban and suburban development, as well as declines in the host fish population that many need in order to reproduce. However, it is necessary more studies to get a better understanding of the situation of these naiads in River Ebro tributaries which could be considered as possible reservoirs for these species. The aim of this work is to study the current distribution and conservation conditions of the freshwater mussels (naiads) inhabit different tributaries of the Ebro river system, all of them located in Alava, a province of northern Spain in the southern part of the Basque Autonomous Community. According with results several freshwater mussels populations have disappeared within the last 30 years and nowadays can be considered practically extinct in several tributaries.

**POSTER**



## Distribution and conservation of the threatened freshwater mollusks of Andalusia

**Barea-Azcón, J.M.<sup>1</sup>, Araujo, R.<sup>2</sup>, Arconada, B.<sup>3</sup>, Ballesta, I.<sup>4</sup>, Delicado, D.<sup>2</sup>, Irurita, J.M.<sup>5</sup>, Machordom, A.<sup>2</sup>, Moreno, D.<sup>6</sup>, Ramos, M.A.<sup>2</sup>, Reis, J.<sup>7</sup> y Toledo, C.<sup>2</sup>.**

- (1) Agencia de Medio Ambiente y Agua de Andalucía. C/ Joaquina Eguaras Nº 10, Bajos del Edificio Victoria. 18013-Granada (Spain). jbarea@agenciamedioambienteyagua.es.
- (2) Departamento de Biodiversidad y Biología Evolutiva. Museo Nacional de Ciencias Naturales (CSIC). C./ José Gutiérrez Abascal Nº 2. 28006. Madrid (Spain). rafael@mncn.csic.es, annie@mncn.csic.es, diana@mncn.csic.es, m.ramos@mncn.csic.es y carlostc@mncn.csic.es.
- (3) Aguas de las Cuencas Mediterráneas S.A. C./ José Gutiérrez Abascal Nº 2. 28006. Madrid (Spain). barconada@acuamed.es.
- (4) Department of Fish and Wildlife Conservation, 100. Cheatham Hall. Virginia Tech, Blacksburg, VA 24061-0321. (USA). irene10@vt.edu.
- (5) Departamento de Geodiversidad y Biodiversidad. Consejería de Medio Ambiente (Junta de Andalucía). C./ Marqués de la Ensenada, 1. E-18071. Granada (Spain). josem.irurita@juntadeandalucia.es.
- (6) C/ Araña, Apartamento Las Dunas Nº 2. 04150-Cabo de Gata, Almería (Spain). dmorenolampreave@yahoo.es.
- (7) Centro de Biología Ambiental. Departamento de Biología Animal. Faculdade de Ciências da Universidade de Lisboa, 1749-016 Lisboa, Portugal. joareis@gmail.com.

The Red Book of Andalusian Invertebrates includes a total of 16 threatened species of freshwater mollusks according to the criteria established by the IUCN Red List. The objective of the present work is to provide an updated review of the distribution of these endangered species as a result of a more extensive sampling. For five of the species (*Theodoxus baeticus*, *Arganiella wolffi*, *Iberhoratia gatoa*, *Iberhoratia morenoi* and *Islamia henrici*) there were no changes in the number of registered sites. The known distribution of all other species has expanded: in two of them (*Milesiana schueleii* and *Pseudamnicola gasulli*) the changes were lower than 25%, between 25 and 50% for three species (*Pseudamnicola falkneri*, *Potomida littoralis* and *Unio delphinus*), between 50 and 75% for another two species (*Pseudamnicola sturmi* and *Unio gibbus*) and one genus (*Melanopsis* ssp.), and above 75% in two cases (*Boetersiella davisii* and *Unio tumidiformis*). Regarding *Pseudamnicola hydrobiopsis* not alive specimens were located and might be it is already extinct. We have obtained 158 new locations in total, which represent on average an increase of 44.9% on the number of sites published three years ago.

We also describe some actions of habitat management carried out in the last years. These actions consist in the restoration of river habitats through riparian vegetation recovery, the adequacy and cleanliness of water sources and springs, the recreation of natural habitats under controlled conditions, the maintenance of captive populations and the improving of public awareness and education. In several of these actions the land owners and the local governments were involved in order to improve their implication in the conservation process as a part of our recovery program. Finally, we recommend several guidelines that should mark the lines of work in the short term.

Most of this work has been funded by the Regional Ministry of the Environment, Junta of Andalusia and the European Union (European Agriculture Rural Development Fund) through the "Program of actions for the conservation of threatened invertebrates in Andalusia".

POSTER

**Dynamics of pathways in the oranian steppe after a period of fencing in the area of Naâma (Algeria)**

**Benaradj, A<sup>1</sup>, Mederbal, K<sup>1</sup>, Benabdeli, K<sup>1</sup>, Bouazza, M<sup>2</sup> & Baghdadli, D<sup>3</sup>**

B.P. 100 RP Bechar (08000) Algeria

<sup>1</sup>Laboratory Search for Biological and Geomatics, University of Mascara (Algeria)

<sup>2</sup>Laboratory of Plant Ecology and Management Natural Ecosystems,  
University of Tlemcen (Algeria)

<sup>3</sup>University Mostaganem  
kbenaradj@yahoo.fr

The south-oranian steppe of Naâma Steppe south of Oran (Algeria) is a representative example of dry lands threatened by the scourge of desertification. The intervention measures to this alarming situation are to promote inverse processes of degradation by the recovery and rehabilitation of degraded steppe by fencing it off. This technique promotes natural regeneration; the most appropriate to induce the recovery of natural steppe biological species.

After this assessment, the fencing has a positive impact in terms of biological feedback (increase the recovery rate of vegetation, the floristic richness, density, the phytomass and the improvement of physical and chemical soil properties).

**Keywords:** Steppe, south-oranian, Naâma, Algeria, biological recovery, fencing off, desertification.

**POSTER**

**Distribution and population densities of the limpet *Patella rustica* Linnaeus, 1758 (Mollusca: Gastropoda) along the Tunisian coasts**

**Boukhicha, J<sup>1</sup>, Tlig-Zouari, S<sup>1</sup> & Ben Hassine, O<sup>K1</sup>**

**(1).** Research Unit of Biology, Ecology and Parasitology of Aquatic Organisms, Faculty of Sciences of Tunis, Tunis El Manar University, 2092 Tunis, Tunisia, Email1: boukhicha.jihen73@gmail.com, Email2: s.tligzouari@gmail.com, Email3: kalthoum.benhassine@gmail.com

*Patella rustica* Linnaeus, 1758 is a gastropod mollusc whose distribution range extends from the Mediterranean to the Atlantic coasts. It occupies the rocky shore with other limpet species. In order to determine the distribution and the population densities of this species along the Tunisian coastline, 22 localities from 10 different sectors which extend from Tuniso-Algerian to Tuniso-Lybian frontier were surveyed. At each station hosting the species, the density of *P. rustica* was performed by means of five 10m horizontal transects (1m wide) parallel to the shoreline. Thus, individuals were counted and the density was determined by averaging the densities recorded in the 5 transects. The results revealed that the distribution of *P. rustica* is limited to the north part of the Tunisian coast and that the densities vary from one station to another. The species occupies the supralittoral and the upper mediolittoral. The width of its habitat, in the vertical perspective, is much important when wave exposure is considerable. Possible factors responsible of the horizontal and the vertical distribution of this species were suggested and discussed.

**POSTER**

### The living Scaphopods from the Valencian Community coast (Spain)

**Cádiz, L.<sup>1</sup> & Martínez-Ortí, A.<sup>2</sup>**

(1). Dept. CC Aplicadas y Tecnológicas. Facultad de Ciencias Experimentales; Univ. Católica de Valencia; c/ Guillem de Castro, 94; 46001-Valencia, Spain, Email: Laura.cadizbarrera@gmail.com

(2). Dept. Zoología; Facultat de Ciències Biològiques; Univ. València; c/ Dr. Moliner, 50; 46100-Burjassot, Valencia, Spain and Museu Valencià d'Història Natural, Email: amorti@uv.es

The Iberian scaphopods are little known in molluscs, where it has been a total of 32 species. Of these 12 are the Order Dentalia (families Fustiariidae: 1 sp. Entaliidae: 9 spp. Gadiliniidae: 2 spp.), and 20 of Order Gadilida (families Gadilidae: 15 spp. Pulsellidae: 2 spp. Entalinidae: 3 spp.). In this study we have found scaphopods specimens in 127 sampling points, during the campaigns of 2005, 2006 and 2008, of the Valencian coast, of which only 62 have been found scaphopods, corresponding to two genera and six species. It also includes a literature review of previous records in the Valencian coast and samples deposited in the Museu Valencià d'Història Natural of Valencia and the Instituto de Ecología Litoral of Alicante. The specimens were collected with a dredge Holme-Maquintalla bilateral anchor, at depths between 5 and 20 m on substrates of medium to fine sand and many of them dominated by the Mediterranean seagrass endemic *Posidonia oceanica*. We identified a total of 343 samples (297 samples + 46 deposited in MVHN and IEL) which all belong to the Order Dentalida (families Fustiariidae and Dentaliidae). The highest abundance was recorded on the coast of the province of Castellón, representing 79% of the collected specimens, and *Antalis inaequicostata* most abundant species (53.5%) and *Antalis dentalis* (26.3%). Furthermore we found for first time *Antalis novemcostata* in the Mediterranean Sea and a new species for science (*Antalis* sp.), from the coast of Castellón province.

**POSTER**

***Limenandra nodosa* Haefelfinger and Stamm, 1958 is not a worldwide spread  
aeolid nudibranch**

**Carmona, L.<sup>1</sup>, Gosliner, T.M.<sup>2</sup>, Pola, M.<sup>3</sup>, Cervera, J.L.<sup>1</sup>**

(1) Departamento de Biología, Facultad de Ciencias del Mar y Ambientales,  
Universidad de Cádiz. Polígono Río San Pedro, s/n, Ap.40. 11510 Puerto Real  
(Cádiz), Spain, Email: leila.carmona@uca.es, lucas.cervera@uca.es

(2) Department of Invertebrate Zoology, California Academy of Sciences, 55 Music  
Concourse Drive, Golden Gate Park, San Francisco, CA 94118, USA, Email:  
TGosliner@calacademy.org

(3) Laboratorio de Biología Marina, Departamento de Biología, Edificio de Biología,  
C/ Darwin, 2, Universidad Autónoma de Madrid, 28049 Madrid, Spain, Email:  
marta.pola@uam.es

Unpublished molecular phylogenetic analysis of nudibranchs in the Aeolidiidae conducted by the authors has revealed the existence of an undescribed and sibling species from the Pacific Ocean with the Atlantic/Mediterranean *Limenandra nodosa* Haefelfinger and Stamm, 1958, the type species of the genus. The external and internal features of the undescribed species are similar to those of *L. nodosa*. However, *p*-uncorrected distance for the COI gene between the two species is 9.2%, thus indicating strong divergence between the geographically separate species.

**POSTER**

**Contribution to the knowledge of morphological variations of Quaternary records of *Theba impugnata* from Lanzarote (Canary Islands)**

**Castillo, C<sup>1</sup>., García-Gotera, C.M<sup>1</sup>., Ibáñez, M<sup>1</sup>., De la Nuez, J<sup>2</sup>., Quesada, M<sup>2</sup>., Alonso, M.R<sup>1</sup>., La Roche, F<sup>3</sup>., Valido, M.J<sup>4</sup>.**

- (1). Dept. Biología Animal, (2). Dept. Edafología y Geología, (3). Dept. Análisis Matemático; Univ. La Laguna; Avd. Astrofísico Francisco Sánchez s/n, 38206-La Laguna, Tenerife, Spain; cmgotera@ull.es; ccruiz@ull.es; mibanez@ull.es; malonso@ull.es. jnuezpes@ull.es; mquesada@ull.es. froche@ull.es  
 (4). Dirección General de Ordenación e Innovación educativa. C/ León y Castillo, 57; 35003-Las Palmas de Gran Canaria, Spain, manolovalido@gmail.com

In the 19<sup>th</sup> century, Mousson described a new living endemic species of the genus *Theba* in the north of the island of Lanzarote, named *Theba impugnata*, and also distinguished a morphological variety that he called *T. impugnata* var. *subgeminata*, for individuals with more rounded and less keeled shells. A century later, Gittenberger and Ripken also found the variety *subgeminata* alive on La Graciosa islet and in the north of Lanzarote (from Famara to Jameos del Agua) and they considered it as an extreme form of *Theba impugnata*, both of them having similar frequencies. They found in most of the localities samples of the *T. impugnata* together with *T. geminata*. The study of eleven fossil sites on Lanzarote dated between 38 and 3.5 Ky – using the aminoacid racemisation method calibrated with <sup>14</sup>C - contributes to characterizing the fossil record of *T. impugnata* and reveals new data about its morphological variability: a) the oldest record of *T. impugnata* is dated around 31 Ky at the northeast of Lanzarote (Mala section at 25 m asl) and morphologically corresponds to the *subgeminata* variety; b) specimens similar to the *T. impugnata* holotype are only represented in the fossil record at the top of the Famara massif (Mirador del Río, 470 m asl), together with *subgeminata*; c) a new morphotype has been discovered at the base of these cliffs with an age of 27 Ky, that only appears as a fossil, with an ornamentation like “*impugnata*” but larger in size and a different shape from the described type, in this section this morphotype coexisted with *T. i. var. subgeminata*, except at the lower level; d) in all the fossil sites the *impugnata* variety morphotypes appeared together with *T. geminata*, which is always more abundant, except in the most recent locality (3.5 Ky) at the top of Famara (Gayo, 460 m asl). These preliminary results indicate that the most angular and keeled shell morphotypes are restricted to the Macizo de Famara, with evident morphological differences depending on altitude, whereas *T. i. var. subgeminata* is the most common form in the fossil record and not an extreme form, as indicated by Gittenberger and Ripken. Therefore, it is necessary to further investigate these morphotypes to evaluate if these morphological differences are due to ecological or evolutive causes.

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**POSTER**

### **Intraperiostracal crystallization in the bivalve *Neotrigonia***

**Checa, AG<sup>1</sup>, Salas, C<sup>2</sup>, Harper, EM<sup>3</sup>**

(1) Depto. Estratigrafía y Paleontología, Facultad de Ciencias, Universidad de Granada, Avenida Fuentenueva s/n, 18071-Granada, Spain, Email: [acheca@ugr.es](mailto:acheca@ugr.es)

(2) Depto. Biología Animal, Facultad de Ciencias, Campus de Teatinos, 29071-Málaga, Spain, Email: [casanova@uma.es](mailto:casanova@uma.es)

(3) Dept. Earth Sciences, University of Cambridge, Downing Street, Cambridge CB2 3EQ, United Kingdom, Email: [emh21@cam.ac.uk](mailto:emh21@cam.ac.uk)

The microstructure and pattern of shell calcification are gradually emerging as significant characters in systematics and evolution within and between molluscan groups. In *Neotrigonia* the shell consists of aragonitic bosses immersed within the periostracum, which are continuous into the outer aragonitic fibrous prismatic layer, internal to which a nacreous layer is secreted. We have studied the initiation of the periostracum as well as its subsequent stages of development and calcification in *Neotrigonia gemma* Iredale, 1924 and *N. lamarcki* (Gray, 1838). The periostracum emerges from a spiral-shaped periostracal groove, which is located between the middle (MMF) and outer mantle folds (OMF). A thin dark pellicle is initially formed adhered to the surface of the MMF. The pellicle later moves to the inner surface of the OMF, where a translucent layer begins to be secreted below the dark pellicle. Twinned aragonite plates are already being secreted at this position within the periostracum. During the free periostracum stage, the dark layer thickens at the expense of the translucent layer. The platy aragonite crystals thicken in coordination with the dark periostracal layer and coarsen until becoming transformed into big prisms separated by dark periostracal walls. The organic walls are not secreted beyond the shell margin, whereas the prisms continue to grow inwards and coalesce. Once the outer prismatic layer is completed, an internal nacreous layer is secreted.

In conclusion, the initial bosses and the external part of the prismatic layer is fully intraperiostracal. This reinforces the relationships with other groups which have periostraca with similar structures and which have the ability to form intraperiostracal calcified objects, like unionoids and anomalodesmatans.

**POSTER**

### Phylogeography of the genus *Xerocrassa* in the Iberian Peninsula

Chueca, LJ<sup>1</sup>, Arrébola, JR<sup>2</sup>, Martínez-Ortí, A<sup>3</sup>, Madeira, MJ<sup>1</sup> & Gómez-Moliner, BJ<sup>1</sup>

(1). Dept. Zoología; Facultad de Farmacia; Univ. País Vasco; Paseo de la Universidad nº 7; 01006- Vitoria, Spain. Email: benjamín.gomez@ehu.es

(2). Dept. Fisiología y Zoología; Facultad de Biología; Univ. Sevilla; c/ Profesor García González s/n. 41012-Sevilla, Spain.

(3). Museu Valencià d'Història Natural. Passeig de la Petxina, 15. E-46008 Valencia (Spain) and Departamento de Zoología. Facultad de Ciencias Biológicas. Universitat de València.

The genus *Xerocrassa* Monterosato, 1892, has an east-west discontinuous distribution along the Mediterranean region with two known diversification areas. The genus has one of its radiation points in the Ibero-Balearic area, with several endemic species. In this region there are about 29 described species, some of them with several subspecies. Besides, there are probably several more taxa awaiting description. Our understanding of the origins and history of species have been greatly advanced by new DNA methods that allow to progress in the knowledge of interspecific relationships and intraspecific diversity and to build hypotheses about the biogeographic and evolutionary processes leading to speciation. Their limited vagility together with their abundance in the fossil record and their great diversification make molluscs excellent organisms to address studies on evolution.

The species belonging to the genus *Xerocrassa* have been described based mostly on shell morphology, which can be very different in some species and can represent shell adaptations to habitat characteristics. In this work we present a molecular phylogeny of the genus in the Iberian Peninsula with the aim to resolve its taxonomy and to resolve the phylogeography in the western part of its distribution range.

Two mitochondrial genes (COI & 16S rRNA) have been selected for the phylogenetic reconstructions. This analysis has included the following species *Xerocrassa barceloi*, *X. betulonensis*, *X. cardonae*, *X. caroli*, *X. chiae*, *X. cobosi*, *X. derogata*, *X. edmundi*, *X. frater*, *X. geyeri*, *X. grata*, *X. jimenezensis*, *X. molinae*, *X. montserratensis*, *X. murcica*, *X. penchinati*, *X. ripacurcica*, *X. roblesi*, *X. subrogata*, and *X. turolensis*.

**POSTER**



## Diversity of malacofauna on different plant species in the region of Tlemcen (Algeria)

**Damerdji, A.**

Dept. Ecology- Environment; Facultad of SNV/STU; Univ.Tlemcen - BP : 119-13000-Tlemcen, Algeria, E-mail : damerdji\_halim@yahoo.fr

The region of Tlemcen is located in the north-western Algeria where the climate impact results in the degradation of the forest in mattoral, open training consists of drought-tolerant plants such as: *Ampelodesma mauritanicum*, *Chamaerops humilis*, *Calycotome spinosa*, *Juniperus oxycedrus*, *Cistus salvifolius* and *C.ladaniferus*. Three other aromatic species are considered: *Rosmarinus officinalis*, *Thymus ciliatus* and *Marrubium vulgare*. We propose an approach to achieve diversity of gastropoda found at the 9 plant species. Richness is estimated at 21 malacological on *Calycotome spinosa*, 19 on *Thymus ciliatus*, 18 respectively on the *Chamaerops humilis* and *Rosmarinus officinalis*, to 13 on the *Ampelodesma* and last about 11 species of sage leaved *Cistus* and 10 species on the *Cistus* gum. The species are divided into four families: *Milacidae*, *Sphincterochilidae*, *Helicidae*, and *Subulinidae*. Second and fourth families comprise a single species: These respectively *Sphinterochila candidissima* and *Rumina decollata*. The *Milacidae* are represented on the *Ampelodesma mauritanicum*, *Calycotome spinosa*, *Juniperus oxycedrus* and *Marrubium vulgare*. *Helicidae* on the family, the most diverse contains 2 subfamilies: those *Helicinae* and *Helicellinae*. The first sub-family is represented by 7 species on the *Ampelodesma* and 12 species on *Calycotome*. The second sub-family (*Helicellinae*) comprises 6 species on *Chamaerops*, 3 on the *Ampelodesma mauritanicum* and 2 on the *Cistus ladaniferus*. We are looking Gastropoda species specific to each plant and the species that are common.

**POSTER**

**Overview of the European diversity of genus *Pseudamnicola* (Gastropoda: Hydrobiidae) and its endemic radiation in the Ibero-Balearic region**

**Delicado, D<sup>1</sup>, Machordom, A<sup>1</sup>, Wilke, T<sup>2</sup>, Ramos, MA<sup>1</sup>**

(1) Museo Nacional de Ciencias Naturales, CSIC, Madrid, Spain. Email: diana@mncn.csic.es, annie@mncn.csic.es, m.ramos@mncn.csic.es

(2) Department of Animal Ecology & Systematics, Justus Liebig University, Giessen, Germany. Email: Tom.Wilke@allzool.bio.uni-giessen.de

Paulucci (1878) proposed the new genus *Pseudamnicola* to distinguish European species from American species of *Amnicola* Gould & Haldeman 1840. *Pseudamnicola* comprises a group of minute freshwater snails distributed throughout Europe, western Asia and northern Africa, belonging to the family Hydrobiidae (Stimpson 1865). Currently, this genus contains two subgenera: *Pseudamnicola* (*Pseudamnicola*), distributed in the Mediterranean basin and *Pseudamnicola* (*Corrosella*) (Boeters 1970) found only in Western Europe. Previous studies have demonstrated that Spain is one of the European countries with the largest number of known Hydrobiidae taxa, though a complete deep revision of the family in this area is still pending. Of 30 *Pseudamnicola* species reported for Europe, 11 are described from the Ibero-Balearic region, making this area a hotspot for the genus. In spite of being one of the most diverse genera of hydrobiids, there are few works that combine molecular analyses with detailed morphological descriptions, mainly due to the small size and simplified anatomy of *Pseudamnicola* ssp.

The current work focuses on a revision of this genus by combining morphological, biogeographical and molecular studies (mitochondrial genes 16S and COI). Preliminary analyses indicate the existence of five new *Pseudamnicola* species in southern Spain (Betic Mountains), demonstrating the high degree of biodiversity and endemism in this genus. On a Europe-wide level, a phylogenetic analysis of the genus is being performed indicating the existence of two or even three monophyletic independent lineages, corresponding to the two previously described subgenera, and a probable third one. Species of *Pseudamnicola* (*Pseudamnicola*) and *Pseudamnicola* (*Corrosella*) are well supported although relationships within these clades are less well resolved, raising the need for more rapidly evolving molecular markers. Joining these results with the deduced biogeographic patterns and representative apomorphies of each species should lead to a more comprehensive evolutionary history of the group.

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**POSTER**

**Inference of phylogenetic patterns of the land snail *Albinaria* in the islet of Dia (Crete, Greece): insights from mitochondrial and nuclear DNA**

**Dimopoulou, A<sup>1,2</sup>, Poulakakis, N<sup>1,2</sup>, Vardinoyannis, K<sup>2</sup>, Mylonas, M<sup>1,2</sup>**

(1) Department of Biology, University of Crete, Vassilika Vouton, GR-71409, Irakleio, Crete, Greece, E-MAIL: [aggeliki\\_dimopoulou@yahoo.com](mailto:aggeliki_dimopoulou@yahoo.com)

(2) Natural History Museum of Crete, University of Crete, Knossos Av., GR-71409, Irakleio, Crete, Greece

*Albinaria* (Gastropoda, Clausiliidae) is a pulmonate genus distributed in the north-eastern Mediterranean, exhibiting a high degree of morphological and molecular differentiation, especially in southern Greece and in the external insular Hellenic arc. It is the most "speciose" genus within the family of Clausiliidae in the area and has served as a model for studies of ecological and morphological differentiation, molecular evolution, and phylogeography. Nevertheless, many aspects remain uncertain, given the large number of taxa whose classification has not yet been evaluated with solid synapomorphic characters. In the island of Crete and its satellite islets, 31 species have been identified. Four (*A. retusa*, *A. torticollis*, *A. jaeckeli*, *A. teres*) are present in the islet of Dia, the first three of which are endemics. Here, we combined DNA (mitochondrial and nuclear genes) analysis and Bayesian analytical approaches to evaluate the phylogenetic relationships, assess the genetic distinctiveness and cohesiveness of all described species and reconstruct a comprehensive phylogeographic scenario for the evolutionary history of the *Albinaria* species of the islet of Dia.

**POSTER**

## Chinese pond mussel (*Anodonta woodiana*) in Europe - generalist strategy of host fish use as a crucial trait driving its invasiveness

**Douda, K<sup>1,2</sup>, Vrtílek, M<sup>3</sup>, Slavík O<sup>1</sup>, Reichard M<sup>3</sup>**

- (1) Dept. of Applied Ecology; Water Research Institute TGM; Podbabská 30, Prague, CZ 160 00, Czech Republic; Email: douda@vuv.cz  
(2) Fac. of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 1176, Prague CZ 165 21, Czech Republic  
(3) Inst. of Vertebrate Biology, Academy of Sciences of the Czech Republic, Květná 8, Brno, CZ 603 65, Czech Republic

Chinese pond mussel *Anodonta* (*Sinanodonta*) *woodiana* (Lea, 1834) is freshwater bivalve species native to East Asia, but recently reported as invasive in many countries of Europe. It has complex life cycle involving obligatory parasitic larval stage (glochidia), which develops on fishes. Despite that the larval phase has a key influence on species reproduction and dispersal (via fish vectors), there is a lack of knowledge on the role of parasitic stage in *A. woodiana* invasion dynamics. This study experimentally evaluated the compatibility of *A. woodiana* parasitic larvae with potential host fish species in its newly invaded range and quantified the effect of the host spectrum breadth on host availability, using a case analysis based on fish distribution in the Czech Republic. We further described seasonal dynamic of *A. woodiana* glochidia production in a temperature regime of Central European lowland river. Our results showed that *A. woodiana* is a broad generalist; it was able to complete development on all eight fish host species tested, either co-invasive (*Pseudorasbora parva*, *Carassius gibelio*) or native (*Leuciscus cephalus*, *Rutilus rutilus*, *Gobio gobio*, *Barbus barbus*, *Rhodeus amarus*, *Cyprinus carpio*), which considerably increased host availability, and thus also reproduction success and dispersal abilities. There was no apparent limitation of *A. woodiana* reproduction by ambient temperature under typical conditions of a Central European lowland river; production of ripe glochidia was found for a period of 6 months that included ambient temperature ranging from 15 to 27°C. We predict increasing pressure to native ecosystems and mainly to native unionids. In conclusion, we demonstrated that generalist strategy of host use during its parasitic stage and successful reproduction in environmental conditions rendered previously as suboptimal predispose *A. woodiana* for successful invasions in Europe and other continents.

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**POSTER**

## Hybrid mating between the invasive pest slug *Arion lusitanicus* and the native *A. rufus*

Dreijers, E, Reise, H, Hutchinson, JMC

Senckenberg Museum of Natural History Görlitz; PF 300 154, 02806 Görlitz, Germany, E-mail: malakologs@gmail.com

The slug species known as *Arion lusitanicus* or *A. vulgaris* has immigrated into most European countries and become an important agricultural and horticultural pest. It has been observed repeatedly that the native *Arion rufus* disappears at sites where *A. lusitanicus* has established strong populations, although systematic studies have still to be published. Observations of morphological intermediates by our group and others have suggested that *A. lusitanicus* hybridises with *A. rufus* and the northern *A. ater*, but interspecific mating with *A. lusitanicus* has never been proven. Considering the big interspecific differences in the morphology of the distal genitalia and in how they interact during copulation, it has been hard to envisage how mixed couples might manage to transfer sperm. Our study investigated this. In autumn 2010, 36 mature and subadult *A. lusitanicus* and 36 *A. rufus* were collected from the wild and used for mating trials involving three different combinations of partners: two *A. rufus* (henceforth RR), two *A. lusitanicus* (LL), or mixed couples. Courtship behaviour was video recorded, and some couples were killed during or shortly after copulation to study the anatomy during mating and whether spermatophores were transferred. Of the 186 couples set up (40 RR, 39 LL, 107 mixed) 59% showed some kind of mating behaviour. The percentage of couples in which at least one partner showed interest in mating was similar in LL and mixed couples. Nor do LL and mixed couples differ significantly in the proportion that everted their genitalia. Of those everting their genitalia, the percentage of mixed couples that broke off mating prematurely was not significantly different from that of RR couples. But overall, the 5 mixed couples that showed full copulation formed a significantly smaller proportion of those set up (5%) than in intraspecific couples (30% in RR and 26% in LL). Of these 5 mixed couples, at least two successfully exchanged spermatophores reciprocally. The duration of copulation in successful mixed couples was similar to that in *A. rufus*, which is half as long as in *A. lusitanicus*. The video recordings and the anatomy of the mixed pair killed during copulation show how slugs overcome the evident difficulty of cross-species spermatophore exchange.

POSTER

**Malacofauna communities structure in the intertidal zone of the Gabes Gulf  
(Tunisia)  
(Areas of Gabes and Zarzis)**

**El Gmati, A, Tlig-Zouari, S, Ben Hassine, O.K**

Research Unit of biology, Ecology and Parasitology of  
Aquatic Organisms, Faculty of Science of Tunis, University of Tunis El Manar, 2092  
Tunis, Tunisia

E-mails: arwa.gmati@yahoo.fr, s.zouaritlig@gmail.com;

The Gulf of Gabes, located in southern Tunisia. It has suffered, for forty years, from the impact of various anthropogenic activities. Within this context, the study of the malacofauna in this region is worth studying, in order to evaluate the diversity of this community and describe its structure and state of health. For that, 13 stations located between Gabes and Zarzis, were investigated: 12 stations in the north of the studied area (M1 and M2 in Matouia; O3, O4, and O5 in Oudhref; G6, G7 and G8 in Gannouche; CHE9 in Chott Essallem; L10, L11, and L12 in Limaoua) and only one station in the south (in Lemsá beach, located in southern Zarzis). Sampling was carried out, in autumn 2009, in the intertidal zone, at low tide, using a quadrat and a corer with a surface of 1 m<sup>2</sup> and 0.25 m<sup>2</sup> respectively. This inventory revealed the presence of 29 mollusc species: 2 polyplacophora, 12 bivalvia, and 15 gastropoda. In Gabes area, the collected fauna was mainly dominated by two bivalvia species, *Donax semistriatus* (Linnaeus, 1758) and *Donax trunculus* (Linnaeus, 1758). As for Zarzis zone, it appeared to be characterized by the prevalence of two gastropoda species, *Pyrene scripta* (Lamarck, 1822) and *Cerithium vulgatum* (Bruguiere, 1792). Furthermore, the high densities of the invasive species *Pinctatda radiata* (Leach, 1814) which was noted in the localities of Gannouche (G7), Limaoua (L10, L11, L12), and Lemsá (Z13) could be related to the organic pollution, which was found in these localities. The trophic structure of this malacofauna community highlights, in all the localities of the studied area, the presence of five groups, with the prevalence of suspension-feeders. Besides, three ecological groups (GI, GII, GIII) were identified with the dominance of the first group (GI). This distribution could be attributed to the overwhelming numerical dominance of the species *Donax trunculus* and *Donax semistriatus*. In addition, the low average values of diversity indices ( $H' = 0.88$  bits; and  $J' = 0.33$ ) shows a low diversity. This result seems to be linked to an extreme pollution in the majority of stations and a strong unbalanced community, except for the station of Chott Essallem (CHE9) which is an azoic one.

**POSTER**

**Phylogeographical patterns of the endemic Iberian land snail genus  
*Pyrenaearia* (Pulmonata: Hygromiidae)**

**Elejalde, MA<sup>1</sup>, Backeljau, T<sup>1</sup>, Gómez-Moliner, BJ<sup>2</sup>**

(1) Royal Belgian Institute of Natural Sciences, Vautierstraat 29, B-1000 Brussels, Belgium, Email: mirenarantzazu.elejalde@ehu.es,

thierry.backeljau@naturalsciences.be

(2) Dpto. Zoología y Biología Celular Animal, Facultad de Farmacia, Univ. País Vasco, Paseo de la Universidad 7, 01006 Vitoria-Gasteiz, Spain, Email:

benjamin.gomez@ehu.es

The genus *Pyrenaearia* is endemic in the north Iberian Peninsula, where it occurs in the Cantabrian Mountains and the Pyrenees. Species of this genus usually live at high altitudes in open limestone habitats and they subsist in restricted geographical areas. Based on their distribution patterns, the 16 recognized nominal species in the genus can be divided in six species groups (1) six morphospecies are endemic in the Cantabrian Mountains, (2) one species is restricted to the Basque Mountains, (3) another five morphospecies are endemic in the central and western Pyrenees, (4) two species are confined to the eastern pre-Pyrenees, (5) one species lives in the mountains of Tarragona and (6) one species inhabites in the south of the Ebro river valley. However, the taxonomic validity of several of these species is not clear because the delineation of *Pyrenaearia* sp. is based mostly on shell characters that can be profoundly influenced by environmental factors.

The aim of this work is (1) to infer the phylogeny of *Pyrenaearia* using DNA sequence data, (2) to estimate the time of the radiation in the genus, and (3) to assess biogeographic patterns in order to understand the evolutionary processes that may have caused the *Pyrenaearia* radiation.

Samples were collected nearly all over the distribution range of the genus and whenever possible topotypes were included in the analysis. A fragment of two mitochondrial genes (COI and 16S rDNA) and a nuclear gene (ITS1) was used for the analysis.

The molecular analysis revealed four clades, which were highly congruent with shell morphology and geographic distribution patterns. One clade comprized seven morphospecies from the Pyrenees, mountains of Tarragona, south of the Ebro river and the Basque Mountains. Their taxonomy and nomenclature, however, are still confused. A second clade was endemic in the Cantabrian Mountains and consisted of five morphospecies. The two remaining clades only involved morphospecies from the Pyrenees (resp.two and one species). The split of the four *Pyrenaearia* clades took place in the Pleistocene or even still earlier in the Pliocene. Subsequent speciation within the four clades probably occurred during Pleistocene cycles of climate cooling and warming that were particularly intense during the last 500,000 years. The most recent speciation events may be dated around the last deglaciation phase, resulting in the shrinkage of the distribution range of cold adapted species.

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**The reproductive biology of the banana slug, *Ariolimax buttoni*  
(Stylommatophora: Arionidae) inferred by microsatellite DNA variation**

**Elejalde, MA<sup>1</sup>, Leonard, JL<sup>2</sup>, Pearse, JS<sup>2</sup>, Janssens, C<sup>1</sup>, Van Houtte, N<sup>3</sup>, Breugelmans, K<sup>1</sup>, Jordaens, K<sup>4</sup> and Backeljau, T<sup>1</sup>**

(1) Royal Belgian Institute of Natural Sciences, Vautierstraat 29, B-1000 Brussels, Belgium, Email: mirenarantzazu.elejalde@ehu.es,

karin.breugelmans@naturalsciences.be, thierry.backeljau@naturalsciences.be

(2) Joseph M. Long Marine Laboratory, 100 Shaffer Rd, University of California-Santa Cruz, Santa Cruz, CA 95060, USA, Email: jlleonar@ucsc.edu, pearse@biology.ucsc.edu

(3) Evolutionary Ecology Group, University of Antwerp, Groenenborgerlaan 171, B-2020 Antwerp, Belgium, Email: natalie.vanhoutte@ua.ac.be

(4) JointExperimental Molecular Unit, Royal Museum for Central Africa, Leuvensesteenweg 13, B-3080 Tervuren, Belgium, Email: kurt.jordaens@africamuseum.be

Terrestrial pulmonate slugs are hermaphroditic and often are capable of both outcrossing and self-fertilization. This mixed breeding system may severely affect population genetic structuring and taxonomic differentiation, particularly if selfing is the prevailing reproductive mode and/or if there is geographic variation in the balance between selfing and outcrossing. Currently little is known about the breeding system(s) of Banana slugs (*Ariolimax*), a group of taxonomically ill-defined slugs living along the West Coast of North America, from California to southern Alaska. Yet, information on the breeding biology of these slugs could help to improve their taxonomic interpretation in the context of the biological species concept. Therefore we started a preliminary breeding program and microsatellite DNA study of *Ariolimax buttoni* derived from two populations (Staten Island [SI] and Tomales Bay [TB], California, USA). Individual slugs were collected from the field and then maintained in the laboratory. From the offspring of these animals, 40 individuals from the Staten Island population and 40 from the Tomales Bay population were isolated and randomly assigned to three mating treatments: 1) eight individuals from Staten Island parents and eight from Tomales Bay parents, were raised in complete isolation to check for possible selfing, 2) four pairs SI x SI and four pairs TB x TB, and 3) four mixed pairs SI x TB. We used a total of 28 microsatellites to study genotypic variation and parentage in the offspring of these mating experiments. This showed that all parents from SI had one and the same homozygous genotype, whereas parents from TB showed two homozygous genotypes (both different from the SI genotype). Yet, all offspring from matings among parents with different genotypes were homozygous, thus suggesting that *A. buttoni* may commonly reproduce by self-fertilization. If this high prevalence of selfing is a common feature all over the distribution area of *A. buttoni*, then we expect a high degree of population structuring and differentiation in this taxon, as is suggested by a phylogenetic analysis of mtDNA. Still, the amount of population structuring in nuclear DNA markers and its taxonomic implications remain to be assessed.

M.A Elejalde was supported by a postdoctoral fellowship from the Gobierno Vasco.

**POSTER**



**Updated global distribution of the highly endangered marine species *Patella ferruginea* (Gastropoda: Patellidae): an example of biodiversity loss in the Mediterranean Sea.**

**Espinosa, F<sup>1</sup>, Rivera-Ingraham, GA<sup>1</sup>, Maestre, M<sup>1</sup>, González, A<sup>1</sup>, Bazairi, H<sup>2</sup>, García-Gómez, JC<sup>1</sup>**

(1). Laboratorio de Biología Marina. Univ. Sevilla; Avda. Reina Mercedes 6, 41012-Sevilla, Spain, Email: free@us.es

(2). Laboratoire de Zoologie et Biologie Générale, faculté des Sciences, Univ. Mohamed V-Agdal, B.P. 1014, Rabat, Morocco, Email: hoceinbazairi@yahoo.fr

*Patella ferruginea* is the most endangered marine macroinvertebrate in the Western Mediterranean shores, where it is under serious risk of extinction. Unfortunately, the information regarding the status of the different populations is scarce, fragmented and not always easily available. Moreover, most of them were published more than 25 years ago. The present study reports an update information about the global status of this highly endangered species with important remarks on the future management and conservation. In this sense, a lot of localities have been prospected in Corsica, Sardinia, Tuscany, Sicily, Egadi and Pantelleria islands, as well as, in Zembra archipelago and Tunisian coasts. The species becomes extinct from Italy mainland and Sicily, whereas isolated individuals can be found in Egadi and Pantelleria islands. Regarding Corsica and Sardinia the populations are small and fragmented, showing an alarming recession during the last 25 years. On the other hand, the population from Zembra archipelago appears as a source population, although the status of the species through Tunisian coasts is highly endangered. The information provided here and those studies from the literature indicate the problematic status of the species, which only remains with healthy populations in some hot spots through Northern African coasts. The useful of MPAs to keep the species in safe is discussed. Additionally, the species has shown to be very sensitive to the degree of protection, whereas the type of substrate (natural or artificial) has not a strong influence by itself.

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**POSTER**

**Comparison between the structures of the gills of *Spondylus spinosus* and *Lithophaga lithophaga* (Bivalvia: Mollusca)**

**Falakali Mutaf, B<sup>1</sup>, Aksit, D<sup>2</sup>**

1. Akdeniz University, Faculty of Aquatic Sciences and Fisheries, Dept. Basic Aquatic Sciences. Dumlupinar Blv., 07059 Antalya/Turkey. E-mail: fmberia@akdeniz.edu.tr

2. Akdeniz University, Faculty of Aquatic Sciences and Fisheries, Dept. Marine Biology. Dumlupinar Blv., 07059 Antalya/Turkey. E-mail: denizaksit@akdeniz.edu.tr

*Spondylus spinosus* L.1758 and *Lithophaga lithophaga* L.1758 which are common in the littoral zone of the Mediterranean Sea. They live attached to any available substratum, *S. spinosus* cements on, while *L. lithophaga* buries within calcareous rocks. Morphology of the gills of the specimens collected from Antalya Bay were studied comparatively by scanning electron microscopy.

Gills were composed of heterorhabdic filaments in *S. spinosus*, while homorhabdic filaments existed in *L. lithophaga*. Ctenidial axes, distribution pattern of the ciliary discs and interlameller junctions were observed to differ in two species. The lamellae showed a prominent ciliary structure only on their frontal surface in either of them. Those morphological characteristics of the organ point out structural significance on particular assignments of the gills, in addition to their respiratory role, attributed to their suspension feeding at adult age are different in two species.

**POSTER**

**Reproductive cycle of the Azorean endemic land snail *Oxychilus (Drouetia) brincki* Riedel, 1964 (Gastropoda: Pulmonata)**

**Ferreira, AF<sup>1</sup>, Frias Martins, AM<sup>1</sup>, Cunha, RT<sup>1</sup>, Melo, P<sup>2</sup>, Rodrigues, A<sup>3</sup>**

- (1). CIBIO-Açores; Departamento de Biologia; Universidade dos Açores; 9501-801 Ponta Delgada, São Miguel, Açores, Portugal, Email: frias@uac.pt
- (2). Departamento de Biologia; Universidade dos Açores; 9501-801 Ponta Delgada, São Miguel, Açores, Portugal. Email: pmelo@uac.pt
- (3). CIRN-Açores; Departamento de Biologia; Universidade dos Açores; 9501-801 Ponta Delgada, São Miguel, Açores, Portugal, Email: rodrigues@uac.pt

Land snails represent an important component of the endemic fauna of the Azores and their reproductive cycles are relevant to the understanding of the evolutionary phenomena that lead to their speciation. One population of *Oxychilus (Drouetia) brincki* (Riedel, 1964), an endemic species from Santa Maria Island (Azores) was analyzed along one year, to study the reproductive cycle and to assess the validity of three morphometric parameters as maturation diagnostic characters. *Oxychilus brincki* has a reproductive cycle with an active reproductive season between May and October/November; the residual values of mature oocytes between February and April allow reproduction to occur throughout the year. Our observations on gonadal maturation show that there is a functional protandric tendency and that the photoperiod probably functions as a trigger to the maturation process, for temperature acts mainly as a regulatory factor. Contrary to other terrestrial pulmonate snails that have a well demarcated reproductive cycle, Azorean species have an active reproductive season during almost all year. The positive correlation between morphometric parameters (maximum diameter and number of whorls) can be useful to define the reproductive maturation status particularly on active reproductive season, thus providing a reliable tool for studies of life history and conservation.

**POSTER**

### Distribution of land snails in Gran Canaria (Canary Islands) during Upper Pleistocene and Holocene

**García-Gotera, C.M<sup>1</sup>., Castillo, C<sup>1</sup>., Ibáñez, M<sup>1</sup>., De la Nuez, J<sup>2</sup>., Quesada, M<sup>2</sup>., Alonso, M.R<sup>1</sup>., La Roche, F<sup>3</sup>., Valido, M.J., Cedrés, J<sup>5</sup>.**

- (1). Dept. Biología Animal, (2). Dept. Edafología y Geología, (3). Dept. Análisis Matemático; Univ. La Laguna; Avd. Astrofísico Francisco Sánchez s/n, 38206-La Laguna, Tenerife, Spain; cmgotera@ull.es; ccruiz@ull.es; mibanez@ull.es; malonso@ull.es. jnuezpes@ull.es; mquesada@ull.es. froche@ull.es  
 (4). Dirección General de Ordenación e Innovación educativa. C/ León y Castillo, 57; 35003-Las Palmas de Gran Canaria, Spain, manolovalido@gmail.com  
 (5). Instituto de Enseñanza Secundaria Lomo de La Herradura. Nicolás Copérnico s/n, 35210-Telde, Gran Canaria, Spain,

Quaternary changes of the population of three land snail species of Helicidae one belonging to the endemic *Hemicycla* genus and the other two to the genus *Theba* have been studied in eighteen localities of Gran Canaria Island (Canary Islands). The sites have been dated between 44 Ky and 9.6 Ky by amino acid racemisation calibrated with <sup>14</sup>C datations. In the Upper Pleistocene, *T. arinagae* were very abundant in the land snails associations of the east and south east - exceeding a 45% relative abundance - and his distribution area extended to the north east of the island at least along the lower Holocene. At the present this species is restricted to a small location in the southeast of island of Gran Canaria, and is considered as a threatened species. The other *Theba* species (*T. grasseti*) was located from west (maximum relative abundance) to northeast of the island, whereas this species lives today only in La Isleta and the surroundings of Las Palmas de Gran Canaria city (north-northeast of the island). Also, the studied fossil record indicates that both *Theba* taxa were in sympatry in the Jinámar locality (northeast), in contrast to the current distribution where they do not coexist and are much separated one of another. Respect to *Hemicycla*, the fossil population of *H. saulcyi* is spread out on the north of Gran Canaria from Gáldar to La Isleta, being considered as an essential species with a relative abundance of 15% in the latter site, together with *H. glasiana* and *Pomatias adjunctus*, which characterized a unique Upper Pleistocene land snail association. However, extant *H. saulcyi* only preserves a reduced population in La Isleta and has been classified as a critically endangered species, according to the IUCN criteria. This work provides new evidences to evaluate the land fauna changes during the Quaternary in the Canary Islands, because of some detected changes in the land snails of Gran Canaria: drastic geographic distribution reduction of *Theba* and *Hemicycla* cited species and the change from sympatry to allopatry of *T. arinagae* and *T. grasseti* that could have been produced during Middle or Upper Holocene, since both *Theba* species existed together at least until 9.6 Ky.

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**POSTER**

**Molecular Systematics and Evolution of the Helicoidea (Gastropoda, Stylommatophora) of the western Palearctic**

**Gómez-Moliner, BJ<sup>1</sup>, Razkin, O<sup>1</sup>, Martínez-Ortí, A<sup>2</sup>, Arrébola, JR<sup>3</sup>, Muñoz, B<sup>4</sup> & Madeira, MJ<sup>1</sup>**

(1). Dept. Zoología; Facultad de Farmacia; Univ. País Vasco; Paseo de la Universidad nº 7; 01006- Vitoria, Spain. Email: benjamín.gomez@ehu.es

(2). Museu Valencià d'Història Natural. Passeig de la Petxina, 15. E-46008 Valencia (Spain) and Departamento de Zoología. Facultad de Ciencias Biológicas. Universitat de València.

(3). Dept. Fisiología y Zoología; Facultad de Biología; Univ. Sevilla; c/ Profesor García González s/n. 41012-Sevilla, Spain.

(4). Departamento de Biología Animal 1, Facultad Biología, Universidad Complutense de Madrid, Spain

The Helicoidea, Rafinesque, 1815, is the most diverse group of the terrestrial molluscs of the western Palearctic, with its distribution center being located in the Mediterranean region where it locally can represent more than half of the molluscs biodiversity. It contains several families and genera of uncertain phylogenetic relationships.

The classification of the Helicoidea taxa is mainly based on the morphology of shell and reproductive system, but there are still some controversies between the main classification systems. In addition the analysis of the possible ways of evolution within Helicoidea requires other sources of information. In this work we are using the molecular techniques to progress in the resolution of the taxonomy, phylogeny, and evolution of this interesting group.

The main objective of this work is to determine the phylogenetic relationships between all these genera distributed throughout the western Palearctic, as well as to verify the monophyly of taxa defined within the Helicoidea.

We show the results of the analysis of 65 genera belonging to six families (Sphincterochilidae, Eloniidae, Helicodontidae, Trissexodontidae, Higromiidae, and Helicidae). Two mitochondrial genes (COI & 16S rRNA), and one nuclear gene fragment (5.8S - ITS-2 - 28S rRNA) has been selected for this study. The combined sequences obtained are approximately 2600 nucleotides in length. The phylogenetic reconstructions were made using the Neighbour Joining Algorithm and Bayesian Approach.

**POSTER**

***Vertigo moulinsiana* (Dupuy, 1849) and *Vertigo angustior* (Jeffreys, 1830) in Banyoles lake**

**Gómez-Moliner, B<sup>1</sup>, Campos, M<sup>2</sup> & Camós, I<sup>2</sup>**

- (1). Department of Zoology and B.C.A. Faculty of Pharmacy. University of the Basque Country. C/ Paseo de la Universidad, 7. E-01006 Vitoria-Gasteiz (Spain), Email: benjamin.gomez@ehu.es,
- (2). Consorci de l'Estany (Lake Consortium). Plaça dels Estudis 2. E-17820. Banyoles, Girona (Spain), Email: mcampos@consorcidelestany.org, icamos@consorcidelestany.org.

The samples taken at the end of the 20th century noted the presence of *V. moulinsiana* and *V. angustior* in the environment of Banyoles lake (Ramos et al, 2001), the only two species of terrestrial mollusc listed in Annex II of the Directive of Habitats (Directive 92/43 EC) which live in Catalunya. The presence of *V. moulinsiana* was confirmed again during recent samplings (Prieto et al, 2009), but not that of *V. angustior*.

During the autumn of 2010 a new sampling was undertaken to prove whether both species were still present in the area surrounding Banyoles lake and to determine the area they occupied. The sampling confirms the presence of both species of terrestrial mollusc. Moreover, it shows that *V. moulinsiana* is widely distributed throughout the area surrounding Banyoles lake, appearing in all the sampling stations where the marshy vegetation appears well preserved.

However, the presence of *Vertigo angustior* is more scarce, appearing in only two of the sampling points, particularly in very abundant density in the permanent carstic pond "Estanyol de la Cendra".

From the data obtained in the sampling carried out by staff from the University of the Basque Country's Zoology Laboratory and included in the Consorci de l'Estany action plan, it can be considered that the Banyoles Lake system represents one of the best enclaves, if not the best, in the Iberian Peninsula for the conservation of *V. moulinsiana* and *V. angustior*, two species of community interest.

**POSTER**

## Characterization of haemocytes from freshwater mussels (*Bivalvia: Unionoida*) and the invasive species *Corbicula fluminea* using cytometry and microscopy

Hinzmann, M<sup>1,2</sup>, Lopes-Lima, M<sup>1,2</sup>, Cerca, F<sup>2</sup>, Teixeira, A<sup>3</sup>, Varandas, S<sup>4</sup>, Machado, J<sup>1,2</sup>

(1)Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR) - Universidade do Porto, Universidade do Porto, Rua dos Bragas, 289, 4050-123 Porto, Portugal

(2)Instituto de Ciências Biomédicas de Abel Salazar (ICBAS) - Universidade do Porto, Largo Professor Abel Salazar, 2, 4099-003 Porto, Portugal

Email:lopeslima@aquicultura.com

(3)CIMO-ESA-IPB – Mountain Research Centre, School of Agriculture, Polytechnic Institute of Bragança, Campus de Santa Apolónia, Apartado 1172, 5301-854 Bragança, Portugal

(4)CITAB-UTAD - Centre for Research and Technology of Agro-Environment and Biological Sciences, University of Trás-os-Montes and Alto Douro, Forestry Department, Apartado 1013, 5001-811 Vila Real, Portugal.

Freshwater bivalves from the order Unionoida have been suffering from the impact of multiple factors mainly from anthropogenic origin (canals, dams, pesticides, and other toxic compounds, climatic modification, invasive and pathogenic species). One of the physiological systems that may be affected by these factors is the immune system of these organisms, and its main components, the haemocytes.

Five native species of the Unionidae family were object of study in this work: *Anodonta cygnea*, *Anodonta anatina*, *Unio delphinus*, *Potomida littoralis* and *Margaritifera margaritifera*, which abundances, in Portugal, have been declining in the last century, to the point that *Margaritifera margaritifera* is already facing extinction.

The classification of bivalve's immune cells is not fully consensual among researchers. Using different techniques (microscopy and flow cytometry) it is possible to distinguish the main cellular components of the haemolymph, the haemocytes. Depending on the technique used, different groups of haemocytes may be established according to the parameter chosen: size and granularity of the cell, content with more acidophilic or basophilic properties or even the cells DNA quantity. Cytometry revealed to be a valuable technique since it allowed to analyse also the cells by shape and granularity, confirming the groups established by microscopic techniques, but also allow us affair about these cells origins, the different cell types may correspond to different states of the cell cycle of a single cell line, that may change according to the organisms immune system needs. The main obstacle was the high individual variability of each bivalve specimen, making the abundances of each cell type to change considerably between organisms of the same species.

At least two populations of cells were well differentiated, granulocytes and hyalinocytes in all species studied. The main difference among the different species of Unionoida was mainly in terms of relative abundances. When comparing these species with the invasive species *Corbicula fluminea* the major difference was in the total cells number, that in these organisms is ten times higher, maybe this is one of the many advantages of these species in relation with the native species.

**POSTER**

## **Floodplain mollusc assemblages of the Ohře River (Czech Republic) over time and space**

**Horácková, J<sup>1</sup>, Juříčková, L<sup>2</sup>, Ložek, V<sup>3</sup>**

(1, 2, 3). Department of Zoology, Faculty of Science, Charles University in Prague, Viničná 7, 128 43-Prague, Czech Republic, E-mails: jitka.horackova@gmail.com, lucie.jurickova@seznam.cz

The analysis of fossil mollusc successions has been poorly used for the study of floodplain forest development in time. The Ohře River is partly situated in the Bohemian Cretaceous System yielding sediments suitable for fossilization right in floodplain deposits. Such conditions are rare in Central Europe. The recent molluscan assemblages of all floodplain forests on the 256 km long Ohře River were compared with five fossil mollusc successions situated in the floodplain. The species diversity was commented from the point of view of its development in the past. The incomplete mollusc assemblages of the lower river part seem to be the result of an old agricultural settlement impact. This is why the fully developed floodplain forest assemblages occur in the upper non impacted part of the Ohře River only. The lower Ohře River floodplain probably looked like the mosaic of open and forest habitats during the last 2500 years.

The research was supported by the projects of the Czech Science Foundation no. P504/10/0688 and the Grant Agency of Charles University no. 40007.

**POSTER**



***Clausilia dubia* (Draparnaud, 1805) in the Eastern Alps: phylogeography and subspecies classification (Gastropoda: Pulmonata: Clausiliidae)**

**Jaksch, K<sup>1,3</sup>, Kruckenhauser, L<sup>2</sup>, Duda, M<sup>1</sup>, Harl, J<sup>2</sup>, Sattmann, H<sup>1</sup>, Haring, E<sup>2,3</sup>**

(1) Third Zoological Department, Museum of Natural History, Burgring 7, 1010 Vienna, Austria; Email: katharina.jaksch@nhm-wien.ac.at

(2) First Zoological Department, Museum of Natural History, Burgring 7, 1010 Vienna, Austria; Email: luise.kruckenhauser@nhm-wien.ac.at

(3) Department of Evolutionary Biology, University of Vienna, Althanstraße 14, 1090 Vienna, Austria; Email: elisabeth.haring@nhm-wien.ac.at

Among clausilid species numerous subspecies were described in the past due to their patchy distribution and their complex morphology. Especially the clausilial structures in the aperture are highly differentiated. In case of *Clausilia dubia* (Draparnaud, 1805) 16 subspecies are listed solely for Austria. In the present project morphological data (different shell characters) and molecular data (partial sequences of the mitochondrial genes for COI) were investigated in parallel for the first time to assess phylogeographic patterns. It was our aim to evaluate whether the described subspecies are genetically and/or morphologically differentiated. Moreover we wanted to find out whether the morphological and the genetic results are in accordance. We analyzed 150 individuals of *Clausilia dubia*, collected at 55 sampling sites in the north-eastern Calcareous Alps of Eastern Austria. In this area 12 subspecies are expected to occur. Of these 12 subspecies only seven could be distinguished morphologically. In the tree derived from the DNA sequence data at least four clades become apparent. However, none of these clades corresponds to any of the described subspecies. As these data are rather preliminary, it is premature to draw taxonomic and nomenclatorial consequences.

**POSTER**

**Selfing in geographically separated populations of *Cylindrus obtusus*  
(Gastropoda: Pulmonata: Helicidae)**

**Kruckenhauser L<sup>1</sup>, Sattmann H<sup>1</sup>, Däubel B<sup>1</sup>, Cadahia L<sup>1</sup>, Zopp, L<sup>1,2</sup>, Haring E<sup>1</sup>**

(1) Museum of Natural History Vienna, Burgring 7, A-1010 Vienna, Austria. E-mail: luise.kruckenhauser@nhm-wien.ac.at

(2) Department of Evolutionary Biology, University of Vienna, Althanstrasse 14, A-1090 Vienna, Austria

*Cylindrus obtusus* (Helicidae) is a hermaphroditic landsnail, endemic in the Austrian Alps, which is restricted to high elevations and limestone. As a specialist of high alpine rocky habitats, *C. obtusus* has a quite patchy distribution area which may become even further reduced in the future due to global warming. Previous investigations revealed geographic differences in the genital apparatus. To find out whether these anatomical differences reflect a genetic differentiation, which might be an indication for distinct glacial refugia, we investigated a 650 bp fragment of the COI sequence (200 individuals) and 9 microsatellite loci (500 individuals from 29 populations) from samples covering the whole distribution range of the species. The COI sequences showed a geographic differentiation between eastern, central and western populations. However, genetic distances are small (max. 1.7 %). The microsatellite analysis reveals a high differentiation between the populations implying restriction of gene flow. The highest genetic variability was found in the central populations. Remarkable nearly all individuals from the eastern populations, are homozygous at all microsatellite loci (although different alleles were found within populations). The most plausible explanation for this finding is an altered mode of reproduction. Further investigations (see also Abstract of Laura Zopp) shall elucidate whether this lack of heterozygotes is caused by selfing and if so, why it occurs at such a high frequency.

This work has been funded by the Austrian Science Foundation (P19592-B17) and the "Freunde des Naturhistorischen Museums Wien".

**POSTER**

### Comparison at *Mytilus chilensis* Oocytes and D Larvae from two natural populations latitudinally separated

**Lagos, L<sup>1,3†</sup>, Uriarte, I<sup>2,3</sup>, Yany, G<sup>4</sup>, Farías A<sup>2,3</sup>, Martínez-Pita, I<sup>5</sup>**

- 1) Hatchery de Invertebrados Marinos, Universidad Austral de Chile, Sede Puerto Montt, Chile. Email: luis.lagos@yahoo.es
  - 2) Instituto de Acuicultura, Universidad Austral de Chile. P.O. Box 1327, Puerto Montt, Chile. Email: iuriarte@spm.uach.cl
  - 3) CIEN Austral, Puerto Montt, Chile
  - 4) Escuela de Ciencias del Mar, Pontificia Universidad Católica de Valparaíso. Avda. Altamirano, 1505, Valparaíso, Chile. Email: gyany@ucv.cl
  - 5) I.F.A.P.A. Centro "Agua del Pino" Consejería de Agricultura y Pesca, Junta de Andalucía. Ctra. El Rompido - Punta Umbria, km. 3,8 Cartaya (Huelva). Email: ines.martinez@juntadeandalucia.es
- †Programa Doctorado Acuicultura, Potificia Universidad Católica de Valparaíso

*Mytilus chilensis* have different reproductive cycles vary by latitudinal location, and great potential dispersion, with low genetic and morphological differentiation. The Punta Arenas population has the highest differentiation degree. Oocytes and D larvae were obtained from *M. chilensis* broodstocks from natural banks of Punta Arenas and Chiloé, conditioned to  $9 \pm 0.5$  °C and  $15 \pm 0.5$  °C, fed with *Isochrysis galbana* and *Chaetoceros neogracile* in a 1:1 ratio. We evaluated both in oocytes and D larvae the percentage of protein and total lipid, the percentage of total fatty acids in lipid and the DHA/EPA and n-3/n-6 fatty acids ratio. With the data was determined the homogeneity of variance (Levene test) and performed a two-way ANOVA followed by Tukey post-test (software Statistica 7.0). The hypothesis was the oocytes and D larvae obtained in the conditioning of different natural banks broodstocks had similar composition of protein, lipid and fatty acid content. The protein content of oocytes showed no significant differences among populations and temperatures. In D larvae the protein content was higher at 15 °C and D larvae of Punta Arenas had highest protein percentage. The percentage of total lipid in oocytes and D larvae was higher at 15 °C in both populations. The percentage of total fatty acids in eggs and D larvae showed no significant differences among populations and temperatures. The DHA/EPA ratio was higher for Punta Arenas oocytes and D larvae at 15 °C, but Chiloé oocytes and D larvae was higher DHA/EPA ratio at 9 °C. The n-3/n-6 fatty acid ratio was higher in oocytes at 9 °C while D larvae showed no significant differences among populations and temperatures. The results indicate that both populations of *M. chilensis* have similar composition both eggs and D larvae at the studied temperatures, with generally higher percentages of protein and lipid at 15 °C, being recommended to use it for conditioning temperature.

This study was funded by Innova-CORFO Project 07CN13PPD - 240, and sponsorship of CONICYT.

**POSTER**

### **New malacological data in Navarre**

**Larraz, ML<sup>1</sup> & Zuazu, FJ<sup>2</sup>**

(1). Department of Zoology & Ecology. Sciences Faculty, University of Navarra, Apdo. 177, E-31080, Pamplona, Navarra, Spain. E-mail: mlarraz@unav.es

(2). Natural Sciences Society "Gorosti". Street Calderería 34, bajo, 31001, Pamplona, Navarra, España. E-mail: pantxoazu@gmail.com.

The study of biodiversity is a constant process in which new research provides data about species' distribution.

The presence of animal and vegetal species in a particular area is a dynamic issue that changes with time due to the effects of environmental changes and human actions.

Tracking the presence or absence of a species and its population is very important in order to properly manage its conservation and protection.

The knowledge of the malacological fauna in a particular region is constantly evolving and so, hard research work sometimes gets rewarded.

Although Navarre's malacological fauna is already known (e.g. ORTÍZ de ZÁRATE LÓPEZ & ORTÍZ de ZÁRATE ROCANDIO, 1949; LARRAZ & JORDANA, 1984; LARRAZ & EQUISOAIN, 1993; ALTONAGA *et al.*, 1994), some species with a singular size or particularly rare – which were either missed in previous works or appeared after these were published - can still be found.

In the present work we reveal the presence of species of the families Hygromiidae, Sphincterochilidae and Ferussaciidae. The localities where these were found suggest movements from warmer places towards the north.

**POSTER**

**A new alien marine gastropod from tropical West Africa established in southern Mediterranean Spain**

**Luque, ÁA<sup>1</sup>, Barrajón, A<sup>2</sup>, Remón, JM<sup>3</sup>, Moreno, D<sup>3</sup>, Moro, L<sup>4</sup>**

- (1). Laboratorio de Biología Marina; Dpto. de Biología; Univ. Autónoma; Darwin, 2; 28049 Madrid, Spain, E-mail: angel.luque@uam.es
- (2). Nuzas, 14; 29010 Málaga, Spain, E-mail: alboranbarrajon@hotmail.com
- (3). Egmasa/Consejería de Medio Ambiente; Parque Comercial Málaga Nostrum; Edif. Galia Center; Jaén 9, 3<sup>a</sup> pl.; 29004 Málaga (Spain). E-mail: jremon@egmasa.es, dmoreno@egmasa.es
- (4). Servicio de Biodiversidad, Gobierno de Canarias; José de Zárata y Penichet, 5 – bajo; 38071 Santa Cruz de Tenerife (Spain). E-mail: lmoraba2@gmail.com

We report the occurrence in the Málaga harbour (South of Spain) of an established population of the gastropod *Marginella glabella* (Linné, 1758), native on West African Atlantic coasts of Morocco to Senegal and also present at the Canary Islands. This is the third gastropod species with a tropical Atlantic origin found as an established population in the Mediterranean. It is a true invasive species, preying actively on autochthonous molluscs, but has potentially scarce self-dispersal ability due to its direct development. It seems to be restricted to the inner fishing port of the Málaga harbour, where is common. It is hypothesized that this species was introduced during the 1990's as within port discarded by-catch of Málaga-based trawlers, which at that time were fishing on the Atlantic coast off Morocco and the Canary-Saharan bank.

**POSTER**

**Status and conservation of *Margaritifera auricularia* (Spengler, 1793) species and other native freshwater bivalves from the Ebro basin (Spain).**

**Madeira, MJ<sup>1</sup>, Ayala, I<sup>2</sup>, Araujo, R<sup>3</sup>.**

- (1) Universidad del País Vasco. Facultad de Farmacia. Dpto. de Zoología y Biología Celular Animal. C/ Paseo de la Universidad, 7. 01006 Vitoria. Spain. E-mail: mariajose.madeira@ehu.es.
- (2) Asociación ACEBI. C/ Palencia 24 5l. Vitoria. Spain. E-mail: ikerayala@yahoo.es
- (3) Museo Nacional de Ciencias Naturales (CSIC). Dpto. de Biodiversidad y Biología Evolutiva. C/ José Gutiérrez Abascal, 2. 28006. Madrid. Spain. E-mail: rafael@mncn.csic.es

Freshwater mussels populations provide an interesting case to study the impact of river habitat deterioration on distribution of native populations. The aim of this work is to study the current distribution and conservation conditions of the freshwater mussels (naiads) inhabit the Ebro river. Although not the longest Spanish stream, the Ebro river and its tributaries occupy the biggest basin of the country, with an area of 86,098 km<sup>2</sup> and a length of 910 km. Four species of freshwater mussels (naiads) presently inhabit this basin which, with other names, were already cited by Fritz Haas: *Margaritifera auricularia*, *Unio mancus*, *Potomida littoralis* and *Anodonta anatina*. The most relevant of them is the endangered *Margaritifera auricularia*, a species practically extinct in Europe. Only few decades ago, the species was still present in many localities in Spain; however, its present-day distribution is largely restricted to the Canal Imperial de Aragón with a population of near 4,000 specimens, and some scarce populations in other areas of the river. In this context, the effective conservation of the native bivalves of the Ebro river is jeopardized not only by the massive presence of alien mollusc and fish but also by the untenable human development of the area. Water regulation and detraction in conjunction with the destruction of the last habitats of this ecosystem draw a distressing scene where the first victims will be freshwater mussels.

**POSTER**

**Taxonomic study of the genus *Iberellus* based on the morphology of shell and reproductive system, and DNA sequences**

**Madeira, MJ<sup>1</sup>, Chueca, LJ<sup>1</sup>, Quintana, J<sup>2</sup>, Forés, M<sup>3</sup> & Gómez-Moliner, BJ<sup>1</sup>**

(1). Dept. Zoología; Facultad de Farmacia; Univ. País Vasco; Paseo de la Universidad nº 7; 01006- Vitoria, Spain. Email: benjamín.gomez@ehu.es

(2) C/ Gustau Mas, 79-1er; 07760 Ciutadella de Menorca, Balearic Islands. Spain

(3) C/ 31 de Diciembre, 36-Ático 2ª; 07004 Palma de Mallorca. Balearic Islands.  
Spain

*Iberellus* (Hesse, 1908) is an endemic genus (subgenus of *Allognathus* for other authors) of the Balearic Islands with a few populations which were introduced in historical times into the Iberian Peninsula and South France. It is naturally distributed in the five main Balearic Islands, Mallorca, Menorca, Ibiza, Cabrera, and Formentera, being also distributed in a few small islets around the archipelago. As many as five species or subspecies have been described within the genus. Because of its endemism and its distribution in the different islands it is a group of high interest both, in terms of evolution and biogeography.

The first question to solve before starting evolutionary and biogeographical studies is to get a correct delimitation and denomination of the taxa involved in this genus. With this objective, we have collected several samples of *Iberellus* coming from all the Balearic Islands and islets where the genus has been reported, including specimens from Tarragona in the Iberian Peninsula, the only known locality of the continent where the introduced specimens have survived until now. In this work we give the results of the taxonomic studies we are conducting, including data about shell morphology, reproductive system anatomy, and nucleotide sequences of two mtDNA fragments (COI and 16S). The sister taxon *Allognathus* has also been included, in order to know the phylogenetic relationships of these two genera."

**POSTER**

**Molluscan assemblages in littoral soft bottoms of the Site of Community Importance “Acantilados y Fondos Marinos de Calahonda-Castell de Ferro” (Alboran Sea)**

**Marina, P<sup>1</sup>, Baro, J<sup>1</sup>, Rueda, JL<sup>1</sup>, Salas, C<sup>2</sup>, Gofas, S<sup>2</sup>, López, F<sup>1</sup>, Moya, F<sup>1</sup>, Laiz-Carrión, R<sup>1</sup>, García, T<sup>1</sup>**

- (1). Centro Oceanográfico de Málaga; Instituto Español de Oceanografía; Puerto Pesquero s/n; 29640 Fuengirola, Málaga, Spain. Email: pablo.marina@ma.ieo.es  
 (2). Departamento de Biología Animal; Universidad de Málaga; Campus de Teatinos s/n; 29071 Málaga, Spain. Email: casanova@uma.es

The Site of Community Importance (SCI) “Acantilados y Fondos Marinos de Calahonda-Castell de Ferro” (Granada, southern Spain) was established in December 2000 as a contribution for maintaining coastal biodiversity of the Mediterranean biogeographic region. Nevertheless, information on the benthic communities of this SCI is still scarce and because of that the interdisciplinary project RECALA (Instituto Español de Oceanografía with the financial support of Andalusian Government) is studying, among other topics, the infralittoral and circalittoral benthic communities for establishing a new Marine Protected Area. The composition and structure of molluscan assemblages inhabiting soft bottoms were studied in relation to sediment characteristics. Twelve stations were sampled using a small rock dredge (each sampling area ~ 117 m<sup>2</sup>) in four transects at three different depths, corresponding to infralittoral (down to 30-35 meters depth), upper circalittoral (35-60 m depth) and lower circalittoral (more than 60 m depth) bottoms. A total of 141 molluscan species have been identified in preliminary samples, with gastropods being the dominant group with 80 species, followed by bivalves (57 spp.), scaphopods (3 spp.) and chitons (1 sp.). In relation to abundance, gastropods (47.7%) and bivalves (51.7%) were balanced, especially in circalittoral bottoms. Species richness ranged from 47 spp. sample<sup>-1</sup> (infralittoral) to 30 spp. sample<sup>-1</sup> (lower circalittoral). Values of diversity of Shannon-Wiener were higher than 3 bits in most assemblages, with top values (more than 4 bits) in those occurring in infralittoral bottoms. In the BIOENV analysis, the assemblages displayed a high correlation with depth and with some characteristics of the sediment (% gravel, mud, medium and fine sand). Several species found in this study are considered as rare in the Mediterranean or in other areas (e.g. *Gibberula turgidula*, *Hadriana craticulata*, *Johania retifera*) or in this depth range (e.g. *Alvania testae*, *Diaphana cretica*, *Poromya granulata*). Information on the spatial distribution of these molluscan assemblages and that of other faunistic groups that are under study (e.g. decapods, echinoderms, fishes) may contribute in a further effective protection and conservation policies for this SCI.

**POSTER**



**Taxonomical clarification status of the Iberian endemic *Xerocrassa montserratensis/betulonensis* (Gastropoda, Pulmonata, Hygromiidae)**

**Martínez-Ortí, A<sup>1</sup> & Bros, V<sup>2</sup>**

(1). Dept. Zoologia; Facultat de Ciències Biològiques; Univ. València; c/ Dr. Moliner, 50; 46100-Burjassot, Valencia, Spain and Museu Valencià d'Història Natural, Email: amorti@uv.es

(2). Oficina Tècnica de Parcs Naturals; Diputació de Barcelona; c/ Urgell 187; 08036-Barcelona, Spain and Museu de Ciències Naturals; Barcelona, Email: broscv@diba.cat

*Helix montserratensis* (currently *Xerocrassa montserratensis*) is an Iberian hygromiid described by Hidalgo in 1870 from Montserrat (Barcelona province) and two very similar taxa were described, based only on several conchological characters, as varieties of this taxon: *Helix montserratensis betulonensis* Bofill, 1879 from Santa Coloma de Gramanet (Barcelona) and a less known taxon, *Helix montserratensis delicatula* Bofill, 1898 from La Mata (Sant Llorenç del Munt, Barcelona). Traditionally, *Xerocrassa betulonensis* was considered for a long time a subspecies of *X. montserratensis*, although some authors as Altimira (1971) and Puente (1994), rising to the rank of species, based on several anatomical data of the reproductive system, but made on few specimens. In this paper we review the material type of the three taxa deposited in the Museu de Ciències Naturals of Barcelona and the Muséum National d'Histoire Naturelle of Paris, and we carry out a detail study of the morpho-anatomical characteristics of the shell and reproductive system of specimens collected in several localities where the three taxa treated are considered living, including their typical localities, and we presents the morphometric data obtained. Also reviewed a large number of samples assigned to these taxa deposited in the mollusc collections of the Museu de Ciències Naturals of Barcelona. The results obtained allow us to clarify the taxonomic status of *X. betulonensis* and *X. m. delicatula*, which are in fact the same species, *X. montserratensis*, which should be considered as junior synonyms. Finally, a map shows the geographical distribution of this species and has made known his conservation status and category according to IUCN criteria.

**POSTER**

## **Broodstock conditioning of the mussel *Mytilus galloprovincialis* with three different diets**

**Martínez-Pita, I, Sánchez-Lazo C**

I.F.A.P.A. Centro Agua del Pino, Consejería de Agricultura y Pesca, Junta de Andalucía. Ctra. Punta Umbría-Cartaya, km. 12, 21459, Huelva, Spain. E-mail: ines.martinez@juntadeandalucia.es

Interest in mussel culture has been increased in Andalusia (Southern Spain) during the last years but seed density in the coast is very low. Consequently, hatchery culture to obtain high quality seed has begun to develop. Conditioning is one of the phase of bivalve culture and it allows mature adults in control laboratory conditions. The aim of this study is conditioning mussels with three different diets: A (T-Isochrysis), B (Chaetoceros) and C (T-Isochrysis + Chaetoceros). Mussels were brought to the hatchery from Gibraltar Strait in January 2011 and they were divided in three groups, each one was fed with one different diet during six weeks. 10 individuals were used to calculate initial condition index (CI) and 15 more to know gonadal development stage by histological analyses. Then the three groups and one more from the field (control group) were induced to spawn by thermal shocks. Condition index (CI), developmental stage, number of eggs per female in an hour and half, percentage of individuals spawned, fertilised eggs and hatchling and number of D-larvae were calculated. CI values were significantly higher in groups A and C with respect to initial sampling. At the beginning of the experiments adults were in four different stages: initial gametogenesis (stage I), advanced gametogenesis (stage II), ripe (stage III) and postspawned (stage V); however after conditioning a synchronisation was occurred and all individuals were in stage II or III. Mussels from all groups spawned but in different percentage, A 91 %, B 74 %, C 44 % and control group 62 %. Conditioned females spawned between five and three millions eggs while females from the field only one million. Fertilisation percentage was similar in all the groups with values between 93 and 95 %. Hatching and D-larvae were only obtained in group C and control group, both parameters were higher in group C. Our results show that conditioning mussel in hatchery is successfully with all the diets and better than in the field, since the synchronization is reached. Among the three diets it seems that diet A is better since higher percentages of ripe and active individuals were found as well as higher values of CI and number of eggs.

This work has supported by the Research Project "Viabilidad del cultivo de mejillón en Andalucía a partir de semilla producida en criadero", given by the Junta of Andalusia (P09-CVI-479).

**POSTER**

## Epifaunal molluscs on three hydrozoan species (Cnidaria, Hydrozoa) in the Ría de Ferrol (Galicia, NW Iberian Peninsula)

**Moreira, J<sup>1,2</sup>, Varela, C<sup>2</sup>, Díaz-Agras, G<sup>2</sup>, Urgorri, V<sup>2</sup>**

- (1). Dept. de Biología; Facultad de Biología; Univ. Autónoma de Madrid; E-28049 Madrid, Spain. Email: [juan.moreira@uam.es](mailto:juan.moreira@uam.es)
- (2). Estación de Biología Mariña da Graña; Universidade de Santiago de Compostela; E-15590 Ferrol, Spain. Email: [catuxia@yahoo.es](mailto:catuxia@yahoo.es)

In the marine environment, the presence of seaweeds, sponges, hydrozoans, mussels and ascidians increases the complexity of the habitat thus providing other organisms with shelter, food and protection against predators, also contributing to increase local biodiversity. In many cases, those organisms act as "hard" substratum in places where the latter is not available, such as it happens in soft bottoms.

Hydrozoans constitute an important habitat for many epifaunal organisms, both sessile and mobile, including amphipods, molluscs and bryozoans. Their structural features and temporal dynamics influence greatly the associated epifaunal assemblage thus generating a high degree of specialization in the epibionts. The presence of hydrozoans also contributes to increase local biodiversity by hosting species which otherwise are not present in nearby habitats. For example, hydrozoans favour the settlement of bivalves of commercial interest and some species of nudibranchs depend on them for feeding and reproduction.

The benthic fauna of the Ría de Ferrol (Galicia, NW Iberian Peninsula) is among the best known and most diverse of the Galician rias. This benthic diversity is related to the peculiar physical environment and hydrographic regime, which results in a great variety of habitats both in hard and soft substrata. In addition, the whole hydrodynamic conditions of the ria suggest a good renewal of water which favours a rich sessile epifauna composed by sponges, ascidians and hydrozoans. Among the latter, *Sertularella polyzonias*, *Aglaophenia pluma* and *Kirchenpaueria pinnata* are the most frequent species. Studies on the epifauna of hydrozoans in the coasts of Galicia are scarce but those point out that, for instance, sertularids support a diverse associated fauna. Therefore, it can be expected that other similar species of hydrozoans may support the same or greater biodiversity. In this communication, the main aims are to describe the composition and temporal evolution of the epifauna associated to the aforementioned hydrozoans after samples collected monthly during a one-year period, and to test whether there are differences in diversity and composition of the epifaunal assemblage between the three species.

**POSTER**

**Conquista 1952 – 2011? New insights into the invasion process of an invasive slug (Gastropoda, Pulmonata, Arionidae)**

**Müller, J<sup>1</sup>, Buck, C<sup>1</sup>, Klussmann-Kolb, A<sup>1</sup>, Pfenninger, M<sup>2</sup>**

- (1) Dept. Phylogeny and Systematics; Institute for Ecology, Evolution and Diversity; Goethe-University Frankfurt am Main; Siesmayerstraße 70; 60323 Frankfurt, Germany; Email: jc.mueller@stud.uni-frankfurt.de; chbuck@rz.uni-frankfurt.de, klussmann-kolb@bio.uni-frankfurt.de
- (2) Molecular Biology Laboratory, Biodiversity and Climate Research Center, Senckenberganlage 25, 60325 Frankfurt, Germany; Email: pfenninger@bio.uni-frankfurt.de

The perception of an invasion of Central Europe by the slug *Arion lusitanicus* (Mabille 1868), a gastropod with origin on the Iberian Peninsula, was primarily based on an ever increasing number of sightings since the early 1950's. Identification of the invader as *Arion lusitanicus* was mainly based on morphology, like color of the body and foot, and/or anatomical characters of the genital apparatus. In this study we used phylogenetic and population genetic approaches, by sampling 68 European locations containing 377 specimens to gain insight into the species invasion process. However, the results clearly showed, that the slug is an undescribed species, similar to *Arion lusitanicus* and *Arion rufus* var. *vulgaris* Moquin-Tandon 1855. Moreover, we could show that the expansion of the slug did not originate from the Iberian Peninsula, furthermore, that likely no invasion took place at all. Haplotype distribution suggests, that the perceived invasion is more likely due to a population expansion by rapid increase of population sizes and numbers. However, this latter conclusion is pending on additional statistical phylogeographical analysis.

**POSTER**

## Assessing the population effects of the maintenance channel works in the naiads of the Imperial Channel of Aragón.

**Muñoz-Yanguas MA<sup>1</sup>, Catalá, C<sup>2</sup>, Elbaile, E<sup>2</sup>, Salinas, C<sup>2</sup>; Nakamura, K<sup>2</sup>**

- (1) Dept. Medio Ambiente; Servicio Provincial de Zaragoza; Gobierno de Aragón; Paseo María Agustín 36; 50071-Zaragoza, Spain, Email: mamunnoz@aragon.es  
(2) SODEMASA; Avda. César Augusto 14; 50004-Zaragoza, Spain.

The Imperial Channel of Aragón (CIA) shelter the most important known populations of the critically endangered freshwater bivalve *Margaritifera auricularia*. Since 1996 the Environment Department of the Government of Aragón has been developing protection and conservation actions in this channel. Other species composing the studied naiad community are: *Unio mancus*, *Anodonta anatina* and *Potomida littoralis*. The annual channel maintenance works in the CIA involves severe restrictions in the channel water flow for up to a month, every year, with an increase of the bivalve mortality risk due to drying or freezing. In addition, maintenance works includes the construction of locks and breakwaters leading to further alteration of the habitats. Another important threat has been the recent colonization of the allochthonous invasive bivalve species (i.e. *Corbicula spp.* and *Dreissena polymorpha*). The main management conservation measures to avoid direct mortality of *M. auricularia* have been the translocations of individuals and a safe minimum water level in the channel during the maintenance works.

Several new constructive projects are being evaluated in the CIA. These interventions produce changes on the banks of the channel. In this study we have compared naiads population density in areas with different types of banks or influenced by lock gates, compared to others where no action was taken. The naiads community was studied in 56 locations in different channel types (stone breakwaters, concrete walls, natural land margins and areas affected by locks) through transversal transects with a width of 50 cm. We have compared the average density of different species in different channel types and studied the spatial relationship between species using linear correlations and ordering the set through correspondence analysis. The results show four main habitat types for naiads in the sense of reducing the density of freshwater bivalves drastically in areas with lockgate or increase the number of dead individuals in areas where breakwaters have been built on the right bank; in contrast the greatest density of living *P. littoralis* were observed in ground margins; lock gates favoured the invasive *D. polymorpha* growing over living naiads.

The *M. auricularia* rescue and translocation have been a successful measure. This measure along with the use of safe low-water levels decreased significantly the mortality rates for this species in recent years. The construction of breakwaters seems to have been safe for the species under rescue and translocation (i.e. *M. auricularia*) but not so for *P. littoralis* and *U. mancus*, suggesting that the same management actions must be undertaken.

**POSTER**

## Diversity and distribution of mollusk assemblages of the Grand Banks of Newfoundland and Flemish Cap (Northwest Atlantic Ocean)

**Murillo, FJ<sup>1</sup>, Salas, C<sup>2</sup>, Gofas, S<sup>2</sup>, Valdés, A<sup>3</sup>, Patrocinio, T<sup>1</sup>, Serrano, A<sup>4</sup>**

- (1). Prog. Pesquerías Lejanas; Centro Oceanográfico de Vigo; Instituto Español de Oceanografía; Apartado 1552. 36280-Vigo, Spain, Email: javier.murillo@vi.ieo.es
- (2). Dept. Biología Animal; Facultad de Ciencias; Universidad de Málaga; Campus de Teatinos s/n. 29071-Málaga, Spain, Email: casanova@uma.es
- (3). Dept. Biological Sciences; California State Polytechnic University; 3801 West Temple Avenue. Pomona, California 91768-4032, USA, Email: aavaldes@csupomona.edu
- (4). Centro Oceanográfico de Santander; Instituto Español de Oceanografía; Promontorio San Martín s/n. 39004-Santander, Spain, Email: aserrano@st.ieo.es

The distribution and species composition of the mollusk fauna of the Grand Banks of Newfoundland and the Flemish Cap is described based on Spanish/EU bottom trawl groundfish surveys carried out on board the *RV Vizconde de Eza* between May and July 2007. A total number of 288 hauls were studied: 110 for the Grand Banks and 178 for the Flemish Cap. 82 species of mollusks were collected between 45 and 1450 m depth (1 Solenogastre, 1 Polyplacophora, 42 Gastropoda, 23 Bivalvia, 1 Scaphopoda and 14 Cephalopoda). The species richness found was higher in the Grand Banks (68 species) than in the Flemish Cap (42 species). A cluster analysis was applied based on presence/absence using the Bray-Curtis similarity index for each area. In the Grand Banks of Newfoundland three different assemblages are found: the first consists of the shallowest trawls carried out on the continental shelf, between 45 and 110 m depth and it is typified by the gastropods *Buccinum cf. ciliatum*, *Colus terraenovae*, *Dendronotus cf. dalli* and the bivalve *Mesodesma arctatum*. The second assemblage groups trawls of the upper slope, between 140 and 450 m depth, and is characterized by the gastropods *Arrhoges occidentalis*, *Buccinum undatum*, *Scaphander punctostriatus* and the cephalopods *Illex illecebrosus* and *Rossia palpebrosa*. The third assemblage is the deepest, between 450 and 1450 m depth and the most representative species are the cephalopods *Gonatus fabricii*, *Illex illecebrosus*, and the gastropods *Buccinum hydrophanum* and *Turrisipho lachesis*. In the Flemish Cap two assemblages are found: the first appears shallower than 450 m depth, on the top of the Bank, characterized by *Illex illecebrosus* and the nudibranch *Aldisa zetlandica* whereas the second groups the trawls deeper than 450 m; there the cephalopods *Gonatus fabricii*, and *Teuthowenia megalops* and the gastropod *Buccinum hydrophanum* are the most common species. In both areas bathymetry seems to be the key factor structuring these assemblages.

A noteworthy record is that of 5 specimens of the rare nudibranch *Doridoxa ingolfiana* between 120 and 1094 m depth; the family Doridoxidae could play a key role in basal nudibranch phylogeny and until now only a few specimens had been documented since the original description in 1899.

**POSTER**

**Studies on the reproductive cycle of freshwater mussel, *Anodonta anatina*, from Tâmega River, Portugal**

**Nogueira, M<sup>1</sup>, Hinzmann, M<sup>2,3</sup>, Lopes-Lima, M<sup>2,3</sup>, Machado, J<sup>2,3</sup>, Varandas, S<sup>4</sup>,  
Teixeira, A<sup>5</sup>**

- (1) ESA-IPB – School of Agriculture, Polytechnic Institute of Bragança, Campus de Santa Apolónia, Apartado 1172, 5301-855 Bragança, Portugal, Email: monicareisnogueira@gmail.com
- (2) ICBAS/UP - Instituto de Ciências Biomédicas Abel Salazar Largo Prof. Abel Salazar, 2, 4099-003 Porto, Portugal Email: mfhinzmann@hotmail.com, jmachado@icbas.up.pt
- (3) CIIMAR/UP – Centro Interdisciplinar de Investigação Marinha e Ambiental. Rua dos Bragas, 289, 4050-123 Porto, Portugal Email: lopeslima@aquicultura.com
- (4) CITAB-UTAD - Centre for Research and Technology of Agro-Environment and Biological Sciences, University of Trás-os-Montes and Alto Douro, Forestry Department, Apartado 1013, 5001-811 Vila Real, Portugal, Email: simonev@utad.pt
- (5) CIMO-ESA-IPB – Mountain Research Centre, School of Agriculture, Polytechnic Institute of Bragança, Campus de Santa Apolónia, Apartado 1172, 5301-855 Bragança, Portugal, Email: amilt@ipb.pt

Freshwater mussels (Bivalvia: Unionoida) are one of the most endangered faunal groups in the world. Near than 90% of the European populations disappeared since the beginning of twentieth century. Anthropogenic alterations of aquatic habitats such as dams, partitioning, invasive species, pollution, among others, are the reasons of these species decline. To understand the life-cycle and mainly the reproductive and larvae brooding of these species, is of key importance for their conservation. This work focused on the species *Anodonta anatina* from Tâmega River, Portugal. We studied the reproductive development cycle by monthly observation of animal's gills and gonads during one year. These animals were essentially dioecious with occasional hermaphroditism, with separate male and female follicles. Gametogenesis is continuous with intense maturation and elimination of female and male gametes from February to April; in hermaphrodite organisms the maturation of follicles is lagged. Gravid females were collected from September to March, glochidia from this species need a long time of maturation in the gill, being the release peak from February to March. Although this species is widespread in Portugal its distribution range is now fairly reduced reaching its higher densities in the river Tâmega. Additionally, due to the construction of a new national dam system, being three of them in river Tâmega, a better knowledge on the biology and ecology is needed to manage the conservation of the remaining populations.

**POSTER**

**Defence against oxidative stress in *Helix pomatia* and *Helix aspersa* snails: a comparative approach****Nowakowska, A, Caputa, M, Rogalska, J**Department of Animal Physiology, Institute of General and Molecular Biology,  
N. Copernicus University, 87-100 Toruń, Poland, email: noann@umk.pl

Land snails are exposed to estivation/arousal cycles, determined by external conditions such as temperature and/or humidity, and each arousal is accompanied by oxidative stress. In their antioxidative defence the snails exhibit different strategies and previous investigation have shown that there are some interspecies differences in regulation of activities of antioxidant enzymes. We hypothesised that *H.pomatia* and *H.aspersa* snails have a well-developed capacity of defence against both prolonged periods of ventilation-arrest-induced hypoxia as well as reoxygenation-induced oxidative injury. To test the snails' ability to modulate their antioxidant defence during estivation/arousal cycle we examined activities of antioxidant enzymes and concentrations of glutathione and TBARS (as products of lipid peroxidation) in the hepatopancreas, kidney and foot in five groups of snails (i) estivating, (ii) aroused from estivation, (iii) 24 h post arousal snails and (iv) in two control groups of active snails (collected from the field and second was kept in laboratory). In both species estivation evoked changes in activity of total and selenium-dependent glutathione peroxidase but activity of catalase, glutathione reductase and glutathione transferase were unchanged. Activity of catalase in estivating snails, instead of the expected increase, showed a tendency to diminish. Extremely low activities of catalase in the foot were usually associated with extremely high activities of both forms of the peroxidase. Estivation did not affect concentration of glutathione, which reflects the relative stability of activities of glutathione-related enzymes. Relatively high glutathione concentration, recorded in both species, suggests that glutathione plays an important role in scavenging of reactive oxygen species from their organs. TBARS concentration was unaffected by estivation/arousal cycle in both species of snails. Moreover, in the present investigation concentration of TBARS remained unchanged in the kidney, hepatopancreas and foot. In conclusion, both species of snails maintain relatively high activities of the antioxidant enzymes and accumulate glutathione, which prevents oxidative damage to their organs.

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**POSTER**



**Effectiveness' comparison between two different morphometric methods applied in the shell of the genus *Iberus* (Helicidae)**

**Olmedo, C.<sup>1</sup>, Polo, I.<sup>1</sup>, Refoyo, P.<sup>1</sup>, Requero, A.<sup>1</sup>, Muñoz, B.<sup>1</sup>**

(1) Dept. Zoología y Antropología Física; Facultad de CC. Biológicas; Univ. Complutense de Madrid; C/ José Antonio Novais, 12; 28040-Madrid, Spain, Email: cos@bio.ucm.es

The controversial taxonomy of the genus *Iberus*, Monfort 1810, endemic of the oriental half of the Iberian peninsula with a mediterranean distribution was solved by Elejalde *et al.* (2008) using molecular methods.

We have developed two morphometric analysis based on this taxonomy to obtain similar outcomes using less expensive methods, the morphometric and morphogeometric analysis on the basis of the Fourier's series.

We have compared the effectiveness of these two methods and can conclude that the second method works better than the classical morphometric analysis because is easier, and introduce fewer errors although the results of both methods are similar and don't have significant differences.

**POSTER**

**Molecular characterization of Iberian populations of *Elona quimperiana* (Mollusca: Gastropoda) and modeling of its distribution area**

**Osés, A., Gurrutxaga, M., Razkin, O., Gómez-Moliner, B.J.**

Department of Zoology and Animal Cellular Biology, Faculty of Pharmacy, University of the Basque Country, Vitoria, Spain

Email: alvaro.oses@hotmail.com

*Elona quimperiana* (Mollusca:Gastropoda) is one of the terrestrial snails included in the Habitats Directive 92/43/CEE, being a species of community interest. It is also listed in the IUCN Red List of European Union and in the Appendix II of the Berne Convention. Its distribution area covers de north of the Iberian Peninsula, from the Galician Atlantic coast to the western Pyrenees. There are also various isolated populations in La Rioja (North of Iberian System) and in the French Brittany. Recent studies based on DNA sequentiation (Vialatte et al, 2008) have identified two different lineages, called the *Spain-Brittany* lineage, which occupies the central and western peninsular range and French Brittany, and the *Basque* lineage, which appears in the eastern range. Nevertheless, the contact zone of these two lineages remains unknown.

The main objectives of this study are to know the contact zone of both lineages in the Iberian Peninsula, to characterize by DNA sequentiation the lineage of the populations of La Rioja, as well as other isolated populations, and finally to model the potential distribution of this species for the Iberian Peninsula.

Two mitochondrial gene fragments, COI (635 bp) and 16S (480 bp) have been used to the molecular characterization of the new populations, followed by the phylogenetic reconstructions. The software MaxEnt has been used to model the potential range of this species, estimating the probability of occurrence of the species from layers of GIS information, seeking the maximum entropy distribution, capturing it in a raster.

**POSTER**

## First record of Inoceramid Bivalves in the Lower Jurassic of the Iberian Peninsula

**Paredes, R<sup>1</sup>, Comas-Rengifo, MJ<sup>2</sup>, Duarte, LV<sup>1</sup>**

- (1). Dept. de Ciências da Terra & IMAR-CMA; Faculdade de Ciências e Tecnologia; Univ. Coimbra; Portugal; Largo Marquês de Pombal, 3000-272 Coimbra, Portugal; Email: rparedes@dct.uc.pt; lduarte@dct.uc.pt
- (2). Dept. de Paleontología; Facultad de Ciencias Geológicas; Univ. Complutense; C/ José Antonio Novais 2, 28040 Madrid, Spain; Email: mjcomas@geo.ucm.es

Inoceramidae GIEBEL, 1852 (Bivalvia, Praecardioida) had a first appearance in the Sakmarian (~294 Ma) and became extinct in the K-T Mass Extinction (65 Ma). They comprehend taxa which become more diverse during the Cretaceous period. This family comprises species of the larger bivalves ever recorded. Inoceramidae have been used as important biostratigraphic markers, mostly in successions with absence of ammonites records of the Middle Jurassic and Upper Cretaceous.

Concerning the Lower Jurassic, few records of Inoceramidae have been reported to Early Toarcian (~184 Ma). In this work we show the first record of *Pseudomytiloides* KOSCHELKINA, 1963 in the Upper Sinemurian (~197 Ma) of the western Iberian Margin (Lusitanian Basin). No earlier records in the marine series of the Mesozoic Iberian basins are known at present time. These occurrences are observed in some levels (~10 m) of *Raricostatum* ammonite Zone (Upper Sinemurian), included in marly limestone deposits rich in organic matter. *Pseudomytiloides* specimens occur in association with *Oxytoma inequalis* (J. SOWERBY, 1819) in thin layers with total organic carbon reaching 7 wt%. Although the aragonitic inner parts were transformed by the diagenetic process, pavements with *Pseudomytiloides* original shell were preserved due the outer ostracum calcite layer. Rarely the specimens are articulated or in butterfly position, most of them are disarticulated and all exhibit compressed valves.

The exceptional preservation of organic matter is related to the oxygen depletion in the water column. The presence of Inoceramids exclusively in those levels is evidence that they were selected benthonic fauna with preference for those environmental conditions. Their autecology is related to oxygen-deficient waters. A large gill area is the adaptative character that maximized oxygenation. The presence of these bivalves in the Lower Jurassic of Lusitanian Basin is restricted and occurrences are associated with the low diverse benthic communities in hemipelagic conditions, as this report confirms.

This work has been supported by project PTDC/CTE-GIX/098968/2008 (financed by FCT-Portugal and COMPETE-FEDER).

**POSTER**

### **Morphogeometric analysis of *Iberus marmoratus* complex**

**Polo, I.<sup>1</sup>, Refoyo, P.<sup>1</sup>, Olmedo, C.<sup>1</sup>, Muñoz, B.<sup>1</sup>**

(1) Dept. Zoología y Antropología Física; Facultad de CC. Biológicas; Univ. Complutense de Madrid; C/ José Antonio Novais, 12; 28040-Madrid, Spain, Email: ipolorol@bio.ucm.es

The genus *Iberus*, Monfort 1810, is endemic of the oriental half of the Iberian peninsula with a mediterranean distribution that shows a controversial taxonomy. In 2008, Elejalde *et al.* try to solve this taxonomy using molecular analysis, and concluded that there are two complexes, *I. gualtieranus* and *I. marmoratus*. The *Iberus marmoratus* complex is formed by the less size representatives, including the species *I. guiraoanus*, *I. ortizi*, *I. angustatus*, *I. marmoratus*, and a species not yet describe (Elejalde *et al.*, 2005 and Elejalde *et al.*, 2008).

In order to make a morphological characterization of each of these species, the shells collections belonging to Hidalgo, Paz y Membiela, Ortiz de Zárate, García San Nicolás and Cobos, deposited in the Natural Science Museum of Madrid, have been digitalized.

We have based on the morphogeometric study through Fourier's series analysis to obtain the morphological data. After this, we obtain a discriminant function which let us differentiate each one of the five groups, *Iberus guiraoanus*, *I. ortizi*, *I. angustatus*, *I. marmoratus* and *I. sp1*, throughout a factorial discriminant analysis and can observe significant differences.

For that and to conclude, the discriminant function obtained could be considered as an appropriate method to distinguish the diverse species differentiated with molecular analysis by Elejalde *et al.*, 2005 and Elejalde *et al.*, 2008.

**POSTER**

### Present situation of unionids in the lower Ter

**Pou-Rovira, Q<sup>1,2</sup>, Campos, M<sup>2</sup>, Llopart, X<sup>1</sup>, Feo, C<sup>2</sup>, Boix, D<sup>3</sup>, Carabús, MP<sup>4</sup>, Ramos, S<sup>5</sup>, Araujo, R<sup>6</sup>**

- (1). Sorelló, Estudis al Medi Aquàtic. Plaza dels Estudis 2. E-17820. Banyoles, Girona (Spain), Email: mcampos@consorcidelestany.org
- (2). Consorci de l'Estany. Plaza dels Estudis 2. E-17820. Banyoles, Girona (Spain), Email: mcampos@consorcidelestany.org, cfeo@consorcidelestany.org, qpou@consorcidelestany.org
- (3). Institut d'Ecologia Aquàtica (Universitat de Girona); Campus de Montilivi. 17071-Girona. Email: dani.boix@udg.edu
- (4). Parc Natural del Montgrí, les Illes Medes i el Baix Ter (Generalitat de Catalunya).
- (5). Serveis territorials a Girona del DARPAMN (Generalitat de Catalunya).
- (6). Dept. de Biodiversidad y Biología Evolutiva. Museo Nacional de Ciencias Naturales (CSIC). C./ José Gutiérrez Abascal 2. E-28006. Madrid (Spain), Email: rafael@mncn.csic.es,

In the Ter river basin, 5 unionid species have been cited: *Potomida littoralis* (Cuvier, 1798), *Unio mancus* (Lamarck, 1819), *Unio ravoisieri* (Deshayes, 1847), *Anodonta anatina* (L, 1758), and *Anodonta woodiana* (Lea, 1834). The latter is a recent introduction. Between 1995 and 2010, several specific surveys were carried out, always below the Pasteral dam, both in the Ter river and in several of its tributaries, including Lake Banyoles. Moreover, during 2010 a thorough freshwater bivalves prospection campaign was performed in the alluvial plain of lower Ter, including the river and secondary water masses, mainly irrigation channels associated with the traditional system of agricultural irrigation. The prospections were done by manually on the river bed bottom. Evidence shows that all native species in the basin are still present, though their general conservation status is precarious, with populations intensely fragmented, and densities often low and heavily aged for lack of recruitment. The most endangered species in the basin is *P. littoralis*; it was only detected in 4 locations, always in extremely low densities. *U. mancus* and *A. anatina* appear in fragmentary form in some tributaries of the Ter river, Lake Banyoles, as well as the alluvial plane area. *U. ravoisieri* was only located in Lake Banyoles, where nowadays presents a very low density. By contrast, the exotic *A. woodiana* is expanding and occupies already the whole alluvial plain and the lower course of the Ter river, where it is very abundant. The present distribution of all these species is presented here, together with an analysis of the causes of the native species' regression.

On the other hand, a project for the recovery of the original biodiversity of the Banyoles lake (basin Ter) has presently been initiated the project "PROYECTO ESTANY" (LIFE08 NAT/E/000078), which includes, among other actions, the reproduction in captivity of the molluscs species of the Unionidae family.

**POSTER**

## **Molecular Systematic of *Pyramidula* (Gastropoda, Pulmonata): Congruences and incongruences between the morphological and phylogenetic species concepts**

**Razkin, O., Madeira, M J, Gómez-Moliner, B J**

Departamento de Zoología y Biología Celular Animal. Facultad de Farmacia, Universidad del País Vasco, Vitoria, Spain. Email: oihanarazkin@hotmail.com

*Pyramidula* is a genus of terrestrial gastropods whose distribution extends to almost all Europe, Mediterranean area, Central Asia and Japan. Species have a trochoid shell, from high to flattened, with a broad umbilicus. They are small, not exceeding 3 mm in diameter, inhabiting on limestone rocks. It includes six morphospecies: *Pyramidula pusilla* is the most widespread and common in Europe, occupying the entire Mediterranean region and Central and Western Europe. *P. rupestris* occurs in the entire Mediterranean region and Central Asia. *P. umbilicata* has a Lusitanian-atlantic distribution. *P. jaenensis* is an endemism of the Iberian Peninsula. *P. chorismenostoma* with the body whorl separated from the rest of the shell is present in Greece, Crete, Aegean islands and Western Turkey. *P. cephalonica* occurs in Croatia, Greece and Turkey. There is a controversy about a seventh form (*P. hierosolymitana*) from Israel, which some authors consider as a distinct species and others as a subspecies of *P. rupestris*.

Until now, the identification of the species has been based exclusively on shell parameters, particularly shell high and diameter and umbilicus width. These parameters are highly correlated and they could be not enough to resolve the taxonomy, thus the need of complementary characters becomes evident.

The aim of the present study is to review the taxonomy and phylogeny of the genus using molecular markers, specifically the sequences data from two mitochondrial gene fragments, COI (635 bp) and 16S (480 bp). The preliminary results based on the analysis of 70 specimens belonging to five morphoespecies of the genus collected along its distribution area, including the Iberian Peninsula, Central Europe, Balearic and British Islands and Turkey are presented. The phylogenetic results based on these molecular data are compared with the morphospecies currently considered.

**POSTER**

### **Morphogeometric analysis of *Iberus gaultieranus* complex**

**Refoyo, P.<sup>1</sup>, Polo, I.<sup>1</sup>, Olmedo, C.<sup>1</sup>, Muñoz, B.<sup>1</sup>**

(1) Dept. Zoología y Antropología Física; Facultad de CC. Biológicas; Univ. Complutense de Madrid; C/ José Antonio Novais, 12; 28040-Madrid, Spain, Email: pa.refoyo@bio.ucm.es

The *Iberus gaultieranus* complex (Elejalde *et al.*, 2008), an endemic genus of the half oriental part of the Iberian peninsula with a typical mediterranean distribution and a controversial taxonomy, is made up of the greater genus size representatives, including *I. gaultieranus*, *I. carthaginensis*, *I. campesinus*, *I. alonensis*, and two species not yet described (Elejalde *et al.*, 2005 and Elejalde *et al.*, 2008).

In order to characterize morphologically each one of these species, the collections of Hidalgo, Paz y Membiela, Ortiz de Zárate, García San Nicolás and Cobos deposited in the Natural Science Museum of Madrid have been digitalized, being a total of 536 individuals.

The morphogeometric study through Fourier's series has been followed to obtain the morphological data of the shells. A factorial discriminant analysis procedure was carried out and was obtained a discriminant function that let us differentiate each one of the groups that show significative differences.

The discriminant function obtained seems to be a suitable method to use in the differentiation of the diverse species studied throughout molecular analysis made by Elejalde *et al.*, 2005 and Elejalde *et al.*, 2008.

**POSTER**

**Reproductive biology of *Cymbula nigra* (Gastropoda: Patellidae)**

**Rivera-Ingraham, GA, Espinosa, F, González, M, Burgos, V, García-Gómez, JC**  
Laboratorio de Biología Marina. Dept. Fisiología y Zoología. Universidad de Sevilla.  
Avenida Reina Mercedes 6, 41012. Sevilla, Spain. Email: grivera@us.es

*Cymbula nigra* (da Costa, 1771) is the largest patellid limpet in the Mediterranean Sea, reaching up to 13.3 cm of shell length. The species has been catalogued as “endangered” by the Barcelona and Berne Conventions, and is considered “vulnerable” by the Andalusian Red List of endangered species. However, its biology and ecology are poorly known. The present study deals with the reproductive aspects of the species. Between 2009 and 2010, 2 individuals per size class (considered in 1-cm intervals) were monthly collected from Ceuta, were *C. nigra* presents important populations. A total of 157 individuals were used during the study. Gonads were dissected, weighted and preserved in Bouin’s Liquid for a minimum of 48 hours and then stored in 70% Ethanol. Through macroscopic and histological analysis of the gonads, a total of 4 maturity stages could be differentiated. Sexually mature individuals were found throughout the entire year, although showing two maximum peaks: one between October and January and a less important event in March-April. This is also supported by GSI values, which reached maximum values during these periods of time. Both males and females were found for each size class considered, although sex-ratio (males:females) values decrease with shell size. Furthermore, females showed significant larger sizes than males suggesting that *C. nigra* is in fact a protandric species. By using a scanning electron microscope, the ultra-structure of mature gametes was observed. Spermatozoon heads had a mean length of  $2.53 \pm 0.22 \mu\text{m}$  and showed two invaginations. They also have four mitochondria surrounding the base of the flagellum. Mature oocytes have a polygonal form and their density ( $308 \pm 86$  eggs/mg gonad) and diameter ( $175.46 \pm 22.09 \mu\text{m}$ ) were constant throughout all size classes. There was a clear positive correlation between the size of the individual and its gonad weight, best-explained by an exponential model. Results indicated that a 9-cm female would be contributing to the reproduction event with the same oocytes as 13 females of 4.5 cm of shell size. The reproductive effort was similar for both sexes, established at 17.53% and 19.77% of the somatic weight for males and females, respectively.

**POSTER**



**Seasonal abundance of the Atlantic bobtail squid *Sepiolo atlantica* in Galician waters (NE Atlantic)**

**Rodrigues, M<sup>1</sup>; Troncoso, JS<sup>1</sup>; Guerra, A<sup>2</sup>**

- (1). Departamento de Ecología y Biología Animal, Universidad de Vigo, Vigo, Spain, Email: marcelorodrigues@uvigo.es
- (2). ECOBIOMAR, Instituto de Investigaciones Marinas (CSIC), Vigo, Spain

The variation in population abundance is one of the central themes of ecology and a basis for descriptive and experimental approaches to environmental science. The most natural way to focus research on population dynamics is to take the individual, with the possible subdivision into sex and age classes. This approach was adopted in the present study. The main aim of this work was to gain a better understanding of the changes in abundance of *Sepiolo atlantica* from two different depth zones at Areamilla beach (Ría de Vigo, NE Atlantic) using SCUBA dive, testing the hypothesis that its abundance varies through the seasons. Sampling was carried out monthly at two sandy submersed zones between December 2007 and November 2009. A total of 505 specimens of *S. atlantica* (204 juveniles, 149 males and 152 females) were collected. The mean annual abundance of the species was 0.0190.01 ind./m<sup>2</sup> from December 2007 to November 2008, and 0.0290.01 ind./m<sup>2</sup> from December 2008 to November 2009. Abundances were not significantly different between the two depth zones for each year, nor for seasons. However, total abundance was significantly different between seasons. Abundance showed a seasonal pattern with the lowest values in summer. For each season populations were formed by specimens of different size during the two sampling years, as well in both depth zones. Spawning occurs throughout the year. Two peaks of recruitment, one in summer and another in autumn, were observed. Whether seasonal differences in abundance are due to migration of the individuals from shallow to deeper zones related to changes in bottom temperature is discussed.

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**POSTER**

**Spatial distribution, movement and growth of *Siphonaria denticulata* in different micro-habitats within subtropical rocky shores of eastern Australia**

**Rueda, JL<sup>1</sup>, Skilleter, G<sup>2</sup>**

- (1). Centro Oceanográfico de Málaga; Instituto Español de Oceanografía; Puerto Pesquero s/n; 29640 Fuengirola, Málaga, Spain. Email: jose.rueda@ma.ieo.es  
(2). School of Biological Sciences; The University of Queensland; St Lucia Campus; Brisbane, 4072 QLD, Australia. Email: g.skilleter@uq.edu.au

The pulmonate limpet *Siphonaria denticulata* is a dominant grazer on intertidal rocky shores in eastern Australia (southern Queensland to New South Wales). Little is known about its ecology in subtropical areas, but such studies would provide an opportunity for contrasts with populations in well studied temperate regions (New South Wales). The spatial distribution of this gastropod was studied on 6 subtropical shores (SE Queensland) in relation to different microhabitats (pools, exposed rock), shore levels and wave exposure. Abundance and size distribution (shell length) of this gastropod as well as macroalgal abundance (based on Chl<sub>a</sub> measurements) were measured in those different microhabitats, tidal levels and sites. Growth and movement of individuals inhabiting different microhabitats (low and high shore pools, exposed rock with high and low food available) were also measured for medium size tagged individuals (10-15 mm) on 4 different shores in SE Queensland. Densities of individuals of *S. denticulata* were larger on exposed rock low on the shore and in pools high and low on the shore. Distances displaced by *S. denticulata* varied among the microhabitats, being less on exposed rock (<10 cm) than in pools (values up to 50 cm). Growth of individuals also varied among the different microhabitats, with the greatest growth rates (0.5-1 mm . month<sup>-1</sup>) in low shore pools (high food available and submersion time) compared with on bare rock. Growth was minimal (< 0.5 mm . month<sup>-1</sup>) on exposed rock low on the shore, in sites with only small amounts of macroalgae available. This study highlighted the variation in performance and abundance of these limpets among different microhabitats and on different shores, indicating that these components of spatial variation need to be included in studies aimed at comparisons among shores at different latitudes and climatic conditions.

This study is funded by an Australian Research Council Discovery grant and by a postdoctoral contract from the Ministerio de Ciencia e Innovación of Spain (exp2007-1164).

**POSTER**

**Studies on the diet of breeding *Iberus g. gualtieranus* (Gastropoda, Helicidae) under laboratory conditions: effects on growth, activity and mortality**

**Ruiz, A., Cárcaba, A., Arrébola, JR.**

Dpto. Fisiología y Zoología. Fac. Biología. Univ. Sevilla. Avda. Reina Mercedes, 6.  
41012-Sevilla mastus@us.es

The endemic *Iberus g. gualtieranus* from eastern Andalusia is an endangered terrestrial snail. Only one geographically restricted autochthonous population is known in the world: the Sierra de Gador (Almería, Spain). In this area, the irrational and uncontrolled catches for gastronomic purposes and other different pressures originated by human activities have led this snail to a critical and surely irreversible situation. Our studies showed a low density of individuals in this population that could reach the minimum size on which the population could not recovery without human action. Breeding the snail in captivity would allow the reinforcement of the population in the future. The species life cycle has been accomplished in the laboratory obtaining important and hopeful results. In general terms, the most important result has been the production of specimens of adult size in a short period of time (c. 4-5 months) after hatching which is much longer in the nature (c. 24 months). Particularly, the selection of the right food is one of the most important factors that have contributed to achieve this objective. In this communication, we showed the effects of two specialized diets on the growth, the activity and the mortality of *I. g. gualtieranus* young specimens that have previously born in the laboratory. We performed eight different experimental conditions combining the feed, the environmental conditions (photoperiod, temperature and relative humidity) and the origin of the laboratory-raised juveniles according to the geographic area of their parents. The results showed significantly different growth rates according to the diet but we did not found difference in mortality or activity rates. The feed which gave the best results was Helinove® from Berton Alimentation Animale (France).

**POSTER**

**Symbionts and parasites of *Digitaria digitaria* (Bivalvia: Astartidae) from southern Spain: How many species can live on another one?**

**Salas, C<sup>1</sup>, Marina, P<sup>1</sup>, Tirado, C<sup>1</sup>**

(1). Departamento de Biología Animal, Universidad de Málaga, Campus de Teatinos s/n, 29071 Málaga, Email: casanova@uma.es

*Digitaria digitaria* is a small astartid living in bioclastic bottoms from southern Spain, which shell is very characteristic due to the presence of oblique ribs. During a study on its reproduction, several symbionts and parasites were found on the shells and in the soft body. A total of 1148 individuals were studied, from which 732 individuals were histologically processed and the other 416 individuals were dried for biomass analyses. All the shells were measured and analysed for recording epizootic organisms. According to their localization, the symbionts were classified in: (a) *Epizootic symbionts, with few or unnoticeable pathogenic effects*. These include the organisms present on the shell, such as the hydroid *Monobrachium parasitum*, living in the posterior side, around the inhalant and exhalant apertures; other small hydroids found in the inter-rib spaces and some protozoans, possibly Peritrichia, in the ventral margin of the valves. The periostracal pits systematically contained prokaryotes (now under study). (b) *Parasites in soft parts, some of them with pathogenic effects*. The most frequent parasite was the protistan *Martelia cf. refringens*, found inside the stomach epithelium and digestive tubules in 96% of the studied individuals. The presence of this parasite in the entire digestive gland in individuals of all sizes seems to indicate that there is no lethal influence on *D. digitaria*, contrary to what happens in oysters or mussels. In the gill, prokaryotic inclusion bodies were frequently found, while turbellarians appeared in low numbers between the gill filaments. Trematodes of the family Bucephalidae were also found as parasites in the gonads of 22 individuals (females and males), and their presence resulted in the atrophy of the gonad follicles.

**POSTER**

**Megabenthic mollusca collected in the bathyal zone of the NW Iberian Peninsula by the “ECOMARG” programme**

**Salas, C<sup>1</sup>, Gofas, S<sup>1</sup>, Luque ÁA<sup>2</sup>, Serrano, A<sup>3</sup>**

(1) Dpto. Biología Animal, Facultad de Ciencias, Universidad de Málaga, E-29071-Málaga, Spain. Email: casanova@uma.es

(2) Laboratorio de Biología Marina, Departamento de Biología, C/ Darwin, 2 Universidad Autónoma, E-28049-Madrid. Email: angel.luque@uam.es

(3) Centro Oceanográfico de Santander, Instituto Español de Oceanografía, Apdo. 240

Promontorio San Martín, s/n, E-39080-Santander, Spain. Email: aserrano@st.ieo.es

The ECOMARG project is aimed to the integrated study of the benthic-demersal ecosystem in the Galician and Cantabrian continental margins, with particular attention to three target areas presented or candidate as deep-sea marine protected areas: Le Danois bank, locally known as “El Cachucho” fishing ground off the coast of Cantabria, the Avilés canyon in Asturias and the Galicia bank off northwestern Galicia. The outcome should be to document vulnerable marine habitats, which are currently more accessible due to the new fishing technologies. The species reported here are representative of the large size fraction (> 10 mm) sampled with the beam trawl and rock dredge.

Le Danois bank (Cachucho) is culminating around 450-600 m. The most abundant molluscs are highly representative of the bathyal fauna of the Bay of Biscay: gastropods of the families Trochidae (*Calliostoma* cf. *occidentale*), Turbinidae (*Cantrainea peloritana*) and Buccinidae (*Colus gracilis*, *Turrisiphon fenestratus*), epifaunal bivalves (*Asperarca nodulosa*, *Limopsis aurita*, *Delectopecten vitreus*, *Lima marioni*, *Spondylus gussoni*) settled on dead coral and the scaphopod *Antalis agilis* characteristic of a community of bathyal mud. Several noteworthy species were collected, e.g. the deep-sea oyster *Neopycnodonte zibrowii* alive on hard substrate in a depth of 685 m, the mussel *Idas lamellosus* on a piece of sunken wood and the septibranchs *Allogramma formosa*, *Verticordia acuticostata* and *Polycordia gemma* on soft bottoms. The occurrence of two species of nudibranchs in several samples is unusual in deep water and probably related to the abundance of sponges on the hard bottoms.

The Galicia bank is a large seamount culminating around 600 m and separated from the Iberian shelf by a channel ca. 2500 m deep. Therefore hemipelagic sediments predominate on soft bottoms and deep-water corals thrive on the hard substrates. The most abundant large molluscs are the gastropods *Ranella olearium* and the epifaunal bivalves *Asperarca nodulosa*, *Spondylus gussoni* and *Lima marioni*, but here the infaunal bivalves are hardly, if at all, represented. Therefore some more unusual species were collected, e.g. the polyplacophoran *Connexochiton platynomenus* and the gastropods *Calliostoma obesulum* and *Coralliophila richardi*.

**POSTER**

**Larval settlement of the carpet-shell clam *Ruditapes decussatus* (Linnaeus, 1758) in response to chemical cues**

**Sánchez-Lazo, C<sup>1</sup>, Ruiz-Azcona, P<sup>1</sup>, Moreno, O<sup>1</sup>, Martínez-Pita, I<sup>1</sup>**

(1) IFAPA Centro Agua del Pino. Carretera Punta Umbría-Cartaya Km. 3.8. CP 21495, Huelva, Spain. clara.sanchez@juntadeandalucia.es

The clam *Ruditapes decussatus* is widely distributed along the coastal and estuarine areas of Europe and North Africa and has a high commercial value. Nevertheless, culture of *R. decussatus* depends exclusively on wild seed harvesting, and thus, industry production is clearly limited by its availability. Bivalve hatcheries are a reliable solution to dependence on natural seed. However, bivalve artificial production is often constrained by difficulties associated with settlement and metamorphosis of larvae.

The aim of the present study was to identify chemical cues affecting *R. decussatus* larval settlement. Competent larvae were treated with KCl, acetylcholine chloride (ACh), gamma-aminobutyric acid (GABA), dihydroxyphenyl L-alanine (L-DOPA) and epinephrine at different concentrations. After 48±2h, larvae were examined for settlement and mortality. L-DOPA had no effect on *R. decussatus* larval settlement. KCl, ACh and GABA significantly increased settlement at one or more than one of the concentrations tested. In contrast, epinephrine inhibited larval settlement behaviour.

This is the first time a chemical cue has been proved to be implicated in the settlement behaviour of *R. decussatus* larvae. The results of the present study have potential commercial implications for enhancing *R. decussatus* seed supply through aquaculture production.

This work was funded by the Subprograma de Formación de Personal Investigador en Agroalimentación en los Centros de Investigación INIA-CCAA (Government of Spain) and by the project “Viabilidad del cultivo de mejillón (*Mytilus galloprovincialis*) en Andalucía a partir de semilla producida en criadero” (Junta de Andalucía).

**POSTER**

## **An overview of repetitive DNA sequences from the bivalve *Donax trunculus***

**Šatović, E, Plohl, M**

Division of Molecular Biology; Ruđer Bošković Institute; Bijenička 54; 10002 Zagreb, Croatia, Email: esatovic@irb.hr; plohl@irb.hr

Genome of the clam *Donax trunculus* harbors 8 already described low-abundant (up to 2%) satellite DNA sequences. In order to amend our knowledge about composition of repetitive DNAs in this organism, genomic libraries were constructed and recombinant colonies were screened by hybridization with complete genomic DNA of *D. trunculus* used as a probe. Extracted sequences were categorized into six groups, with respect to different types of repetitive DNA. First group harbored genomic fragments consisting of tandemly repeated satellite DNA monomers only. In the second group, satellite DNAs were attached to non-repetitive and yet uncharacterized sequences of the mollusk genome. Few clones from these two groups were identified as members of a BIV160 satellite DNA family, a large group of sequences widely spread in bivalve species and related to the MITE-like mobile element *Pearl* of oysters. BIV160 family is about 540 million years old, thus representing the oldest described satellite DNA. Because of this interesting feature these sequences were further investigated by constructing specific primers which yielded 42 new satellite monomers. Few other clones from the second group of sequences were found to contain some of the previously characterized low-copy satellites (DTHS1, DTHS3 and DTE). One clone from the same group contained yet undescribed satellite DNA that was further analysed by constructing specific primers and extracting 67 additional monomers. New satellite shows structural similarity to CvG mobile element from *Crassostrea virginica* that is also a part of the same aforementioned *Pearl* mobile element family of oysters. Next three groups of genomic fragments retrieved by this method showed similarity to different types of mobile elements; one to different families of DNA transposons and the other two to LTR and non-LTR retrotransposons. The last group of sequences is comprised from more than one type of repetitive DNA, containing different combinations of elements found in the former 5 groups.

Obtained results show coexistence of a variety of repetitive DNA sequences in the *D. trunculus* genome, without predominance of a particular type, while similarities among them indicate the role of transposable elements in formation and spreading of satellite repeats.

**POSTER**

**Characterization of invasive snails *Lithoglyphus naticoides* and *Potamopyrgus antipodarum* (Gastropoda: Hydrobiidae), based on cytogenetic data and DNA sequences**

**Stanevičiūtė, G, Stunžėnas, V, Petkevičiūtė, R**

Institute of Ecology of Nature Research Centre, Akademijos 2, LT-08412, Vilnius, Lithuania, Email: grasta@ekoi.lt; stunzenas@ekoi.lt; romualda@ekoi.lt

The prosobranch family Hydrobiidae is a cosmopolitan group of small aquatic snails with more than 1000 species found in permanent freshwater habitats (a few taxa occur in brackish waters). Hydrobiid gastropods *Lithoglyphus naticoides* (C. Pfeiffer, 1928) and *Potamopyrgus antipodarum* (Gray) are invasive in the European freshwaters. *Potamopyrgus antipodarum* is known to have both all - female, fully parthenogenetic populations and others with males in various proportions. In *L. naticoides* the sexes are separate (dioecious). Snails for investigation were collected in Lithuania, Estonia, Poland, Belarus and analysed using genetic methods - karyology and DNA sequence analysis. Three investigated populations of *P. antipodarum* occurring in different ecological conditions (freshwater, brackish water, sea water) were parthenogenetic. The chromosome set of *P. antipodarum* ( $2n=52$ ) was identical in all investigated populations. The karyotype was composed of gradually decreasing in size bi-armed chromosomes (except 8-10<sup>th</sup> subtelocentric pairs). The 26<sup>th</sup> pair was heteromorphic, composed of large submetacentric and smaller subtelocentric chromosome and presumably represents sex chromosomes. In the past, authors reported several different mitotic chromosome numbers for freshwater *P. antipodarum* – from 20-22 up to 52 chromosomes. It was reported, that New Zealand high-male populations are diploid with  $2n = 34$  and reproduce sexually, while New Zealand low-male populations and all those from Europe and Australia have  $2n = 52$  or 46 and reproduction is largely parthenogenetic. The haplotypes of 16S mitochondrial gene of *P. antipodarum* obtained in this study were identical with two known European haplotypes (haplotype **t** and **z**). New haplotype was recorded in *P. antipodarum* population from lake Wigry (Poland). Chromosome set of *L. naticoides* revealed the modal diploid chromosome number  $2n=34$ ; 16 pairs were bi-armed and one pair (4<sup>th</sup>) was subtelocentric. Diploid chromosome number 34 is frequent in Gastropoda. Sex chromosomes have been found in many gastropods, but not in this case. The karyotypes and haplotypes of 16S mitochondrial gene of *L. naticoides* were identical in all investigated populations.

This research was funded by a grant (No. LEK-10/2010) from the Research Council of Lithuania.

**POSTER**



**Parasitic flukes of invasive mollusc *Lithoglyphus naticoides* in the Central Europe; research based on parthenitae morphology, karyology and ribosomal DNA sequences**

**Stunžėnas, V., Stanevičiūtė, G., Petkevičiūtė, R**

Institute of Ecology of Nature Research Centre, Akademijos 2, LT-08412, Vilnius, Lithuania, Email: stunzenas@ekoi.lt; grasta@ekoi.lt; romualda@ekoi.lt

The prosobranch snail *Lithoglyphus naticoides* (C. Pfeiffer, 1928), an invasive species for Central Europe, originated from the Ponto-Caspian region, is intermediate host for more than 10 species of trematodes, however, the species diversity of parasitic flukes in this mollusc still require investigation. During a few years of *L. naticoides* population investigation in Lithuania (dammed up Nemunas River near Kaunas), and additional sampling from water bodies in Belarus (lakes Lukomskoe and Lepelskoe) and Hungary (Danube River near Budapest), we detected 8 fluke species previously described in other studies - *A. muehlingi*, *Xiphidiocercaria* sp. 1, *Xiphidiocercaria* sp. 2, *Sanquinicola* sp., *Paleorchis* sp., *Notocotylus* sp., *Crowcrocaecum skrjabini*, *Spelotrema* sp. - and 3 new species: adult of *Aspidogaster conchicola*, parthenitae of *Echinochasmus* sp. and metacercariae of *Tetracotyle* sp. (Strigeidae). In this work we present the first molecular characterization of the detected flukes based on ITS-2 and 28S rDNA sequences and results of karyological analysis. The karyotypes have been established and the new sequences have been compared with close related taxa previously published by other authors and phylogenetic relationships were inferred.

This research was funded by a grant (No. LEK-10/2010) from the Research Council of Lithuania.

**POSTER**

**Genetical and morphological diversity in genus *Cochlodina* (Gastropoda: Clausiliidae)****Szalontayova, V<sup>1</sup>; Rihova, D<sup>1</sup>; Petrusek, A<sup>2</sup>; Jurickova, L<sup>1</sup>**

- (1). Dept. of Zoology, Faculty of Science, Charles University Prague, Vinicna 7, 128 44, Prague 2, Czech Republic; veronika.szalontayova@gmail.com
- (2). Dept. of Ecology, Faculty of Science, Charles University Prague, Vinicna 7, 128 44, Prague 2, Czech Republic; petrusek@cesnet.cz

The species of European land snail genus *Cochlodina* (Gastropoda: Clausiliidae) are generally known to have small distribution areas. *C. laminata* seems to be an exception, with a range covering most of Europe, except its warmest and coolest parts. This species also exhibits great intraspecific variability, both in genetics and morphology. Interestingly, the morphological variability is higher in the Carpathian (in the area of potential Central European refugia), than in the Western Europe affected by ice shield mostly. Our preliminary study on this genus shows that in *C. laminata* there is a significant intraspecific radiation lacking any more distinct features for easy recognition. The realized relationships within this species are thought to be a product of migratory processes in the evolutionary past of the species.

*C. laminata* seems to be a complex of cryptic species, among which hybridisation could be possible or genetically very variable species due to various glacial refugia of particular populations. Intermediate forms between *C. laminata* and *C. dubiosa corcontica* were also observed at the sites where both of these species live, which could also be a result of hybridisation. Intermediate morphotypes were associated with haplotypes of both *C. laminata* as well as *C. dubiosa corcontica* haplotypes, which strongly supports hybridisation between these two clausiliids. Our aim is to investigate the genetical and morphological variability within genus *Cochlodina*, concentrating mostly on *C. laminata* with combined molecular and morphological approach.

16S rDNA analysis has been carried out on 81 individuals of genus *Cochlodina*, collected all over Europe (Austria, Czech Republic, Italy, Romania, Slovakia, Slovenia) so far. Several clusters have resulted from the neighbor-joining analysis that has been carried out. However, to carry out a more detailed study, we will need to obtain more material and only then the further investigations by molecular methods (COI, 16S rDNA, AFLP) and a combined molecular and morphological analyses can be implemented to uncover the true cause of this variability.

Therefore we would appreciate any help with collecting material and delivering it to address referred above, either live or stored in 96% ethanol.

**POSTER**

## **Analysing diversity and assemblages of benthic subtidal molluscs from South Shetland Islands (Antarctica)**

**Troncoso, JS<sup>2</sup>, Aldea, C<sup>1,2</sup>**

(1) Centro de Estudios del Cuaternario de Fuego-Patagonia y Antártica (Fundación CEQUA), Universidad de Magallanes, Avenida Bulnes 01890, Punta Arenas, CHILE.

E-mail: cristian.aldea@cequa.cl.

(2) Departamento de Ecología y Biología Animal, Facultad de Ciencias del Mar, Universidad de Vigo, E- 36310, Vigo, ESPAÑA. E-mail: cristian-aldea@uvigo.es, troncoso@uvigo.es.

In the last couple of years frequent studies have been made on the benthos assemblages living in the Southern Ocean, but few studies have dealt on molluscan assemblages and ecology, starting of extensive data and standard sampling methods. The South Shetland Islands, although being one of the most conspicuous and explored areas in the Southern Ocean, respond to this pattern too. Here we analyse the diversity and malacological assemblages in the southernmost part of the South Shetland Archipelago (mainly Livingston, Deception and Low islands) contributed by the BENTART (1994, 1995, 2003 y 2006), GEBRAP (1996) and CIEMAR (1999-2000) Spanish Antarctic cruises. Those expeditions were achieved using a standard methodology of benthic sampling (box corer, Agassiz trawl, epibenthic sledge, rock dredge and SCUBA diving), embracing 73 sampling sites at depths between 4 and 922 m. Species were identified, quantified and data were organized into station –and cruise– by species matrices. For each station, diversity indices were calculated. Then data were standardized in order to identify the main assemblages by means of non-parametric multivariate techniques of similarity, clustering and non-metric multidimensional scaling. A total of 4,010 individuals belonging to 76 species of gastropods and bivalves were recorded. Gastropods were weakly best represented in species richness (39 species vs. 37), but the bivalves broadly accounted the major abundance and the protobranch *Nuculana inaequisculpta* (739 individuals) was the most abundant species. Species richness varied from 1 to 20 species and diversity showed great variations at different sites. Fourteen groups of stations of medium similarities (~47%) and some differences in faunistic composition were observed. A complex system of assemblages was observed, suggesting a pattern of organization determined mainly by the composition of abundant species and depth, but more imperceptibly by the geographical proximity of sites.

**POSTER**

## **Influence of Urban Parks onto Malacological Richness**

**Urbańska, M**

Poznań University of Life Science, Institute of Zoology, Wojska Polskiego 28, 61-637  
Poznań,  
Poland, Email: urbanska@up.poznan.pl

In the paper research performed on the area of a 19th-century urban park for five years are presented. The former manor park in Radojewo is situated in the suburbs of a big town counted over 600,000 habitants so the anthropogenic impact is not neglected despite it is rather seldom visited. A hypothesis was advanced that there are factors that influence on mollusca richness.

The mollusca were collected using a method of squares, i.e., 25 samples of the size 0.20 ´ 0.20 m were gathered. 1764 specimens representing 41 species of snails were recorded. The snails were examined in both quantitative and qualitative manners. For the former method samples were taken five times per year in two subsequent years.

Using a database application several analytic and synthetic characters were calculated. The analytic indices were: abundance, density, uniformity, diversity using Shannon-Weaver and Simpson indices, modified Koch diversity index (ADI), normalized Simpson diversity index (TDI), constancy, dominance, mean shell dimensions, species-abundance histogram and dispersion. Among synthetic quantities the following formulas were used: constancydominance Q index, systematic value for species groups, fidelity, species coincidence, season similarity and segmentation based on discrimination index.

In order to extend the mollusca observations the weather data were also obtained. Additionally the soil tests were done. This allowed expressing fluctuations of calculated indices in a function of environment conditions. Results were also depicted in the form of dendrograms, association structures, species spectrum, age structure as well as diagrams of ecological valency.

It was proved that this urban park plays an important role in preserving local malacofauna. Due to presence of snail species rare for the region (*Acicula polita*, *Truncatellina costulata*, *Ceciliooides acicula*, *Nesovitrea petronella*, *Discus ruderatus* and *Limax cinereoniger*) and also species present on Natura 2000 list (*Vertigo angustior* and *Helix pomatia*) the park may be a part of species conservation projects. Many factors contributed to this, both natural – such as location in a fertile river valley and human-dependant – such as the chosen park form: English style and cessation of cultivation works.

**POSTER**

**Fish Ponds in Poland — Matched Habitats to Chinese Pond Mussel  
(*Sinanodonta woodiana*)**

**Urbańska, M<sup>1</sup>, Andrzejewski W<sup>1</sup>, Cichy A<sup>2</sup>, Gierszal H<sup>3</sup>**

(1) Institute of Zoology, Poznań University of Life Sciences, Wojska Polskiego 28,  
61-637 Poznań, Poland, Email: [urbanska@up.poznan.pl](mailto:urbanska@up.poznan.pl)

(2) Institute of General and Molecular Biology, Department of Invertebrate Zoology,  
Nicolaus Copernicus University in Toruń, Gagarina 9, 87-100 Toruń, Poland, Email:  
[anova@doktorant.umk.pl](mailto:anova@doktorant.umk.pl)

(3) Division of Applied Computer Science, Adam Mickiewicz University, Umultowska  
85, 61-614 Poznań, Poland, Email: [gierszal@amu.edu.pl](mailto:gierszal@amu.edu.pl)

In this paper we present results of field research performed since 2009 that aimed at learning the status of *Sinanodonta woodiana* (Lea, 1834) in Poland, i.e., in its transfer from the Far East to west. The studies were done in several artificial and natural fish ponds across the country. Apart from on-site searching using catching with a net and observing the pond shore the occurrence of mussels was investigated on the basis of a questionnaire survey that was addressed to 250 fish farms.

All collected data including biometry ones, grow rate, age structure, density and sexual maturity, showed that this alien species has well adapted to new habitats and it has even created a stable population. The oldest specimen (the age was determined on the external grow rings) was 9 years old. In examined populations female mussels were dominant and they reached as many as 80% of a sample collected from the pond. At the beginning of May 2011 even three years old female specimens were recognized being mature and glochidia in girls were found.

A quite great abundance of the Chinese pond mussel was discovered in Poland. Other species of *Unionidae* like the duck mussel (*Anodonta anatina*), the swan mussel (*Anodonta cygnea*) and the swollen river mussel (*Unio tumidus*) were present very seldom with *Sinanodonta woodiana*. In ponds where more species of *Unionidae* were found the quantitative ratio of the *Sinanodonta woodiana* to the other species of this family was maximum 1:3.

Many locations indentified during research done in Poland prove that environmental conditions in fish ponds are quite matched to breeding needs of *Sinanodonta woodiana* in spite of the temperate climatic zone in Central Europe. It seems that *Sinanodonta woodiana* population has a great chance to grow further, however, it may then become a threat for native species. A scale of this hazard is now unpredictable.

**POSTER**

### Highly diverse molluscan assemblages in fragmented *Posidonia oceanica* meadows in southern Spain

Urrea, J<sup>1</sup>, Gofas, S<sup>1</sup>, Rueda, JL<sup>1,2</sup>, Marina, P<sup>1,2</sup>, Salas, C<sup>1</sup>, Mateo, Á<sup>1</sup>

- (1). Departamento de Biología Animal, Universidad de Málaga, Campus de Teatinos s/n, 29071 Málaga, Email: biologiamarina@uma.es  
 (2). Centro Oceanográfico de Málaga, Instituto Español de Oceanografía, Puerto Pesquero s/n, 29640 Fuengirola (Málaga)

The molluscan assemblages inhabiting two fragmented meadows of *Posidonia oceanica* were studied during one year in southern Spain (Punta de Calaburras and Calahonda, Málaga). Samples were collected with an airlift sampler in 5 quadrats (50 x 50 cm) in each season and meadow. The faunistic list was composed by more than 170 molluscan species, highlighting the families Rissoidae (17 spp.), Pyramidellidae (10 spp.) and Trochidae (9 spp.) among the gastropods, and Veneridae (8 spp.) and Mytilidae (7 spp.) among the bivalves. The number of species in both areas were similar (around 140 spp.), from which 33 species were found exclusively in Calaburras (e.g. *Metaxia metaxae*, *Melanella petitiana* and *Galeomma turtoni*) and 28 species in Calahonda (e.g. *Alvania tessellata*, *Gibberula philippii* and *Gastrochaena dubia*), most of them being accidental species with only 1-2 individuals. The abundance of molluscs in Calahonda (10887 individuals) was higher than in Calaburras (6408 individuals) due to the massive recruitment of the bivalve species *Mytilus galloprovincialis* and *Hiatella arctica*.

The molluscan assemblage of Calaburras displayed significant seasonal variations, with maximum values of abundance, species richness and diversity in summer, while the evenness index was maximal in spring. The gastropods *Nassarius incrassatus*, *Gibbula ricketti*, *Nodulus contortus* and *Bittium reticulatum* were the most dominant and also some of the most frequent species during the year. The molluscan assemblage of Calahonda also displayed significant seasonal variations. It was dominated by two bivalve species, *M. galloprovincialis* and *H. arctica*, due to their recruitment peaks in summer, followed by *N. incrassatus* and *G. ricketti*. Here, the abundance and species richness were also maximal in summer, while the diversity and evenness indexes displayed their maximum values in spring and autumn respectively.

These results highlight the great diversity of invertebrates, in this case molluscs, that can be found inhabiting fragmented seagrass meadows of this area, with values of species richness as high as those of extensive *P. oceanica* beds. The above underscores the importance of protecting these fragmented meadows, especially in areas where *P. oceanica* reaches its geographical distribution limits.

POSTER

## Host fish suitability for the freshwater mussel *Anodonta anatina* in the river Tâmega (Douro catchment), Portugal

**Varandas, S<sup>1</sup>, Lopes-Lima, M<sup>2,3</sup>, Hinzmann, M<sup>3</sup>, Sousa, R<sup>2,5</sup>, Teixeira, A<sup>4</sup>, Cortes, R<sup>1</sup>, Machado, J<sup>2,3</sup>**

- (1). CITAB-UTAD – Centre for Research and Technology of Agro-Environment and Biological Sciences, University of Trás-os-Montes and Alto Douro, Forestry Department, Apartado 1013, 5001-811 Vila Real, Portugal, Email: simonev@utad.pt
- (2). CIMAR-LA/CIIMAR – Centre of Marine and Environmental Research, Laboratory of Ecotoxicology and Ecology, Rua dos Bragas 289, 4050-123 Porto, Portugal. Email: lopeslima@aquicultura.com, jmachado@icbas.up.pt, ronaldo.sousa@ciimar.up.pt
- (3). ICBAS – Instituto de Ciências Biomédicas de Abel Salazar, Universidade do Porto, Largo Prof. Abel Salazar, 2, 4099-003 Porto, Portugal. Email: lopeslima@aquicultura.com, jmachado@icbas.up.pt
- (4). CIMO-ESA-IPB – Mountain Research Centre, School of Agriculture, Polytechnic Institute of Bragança, Campus de Santa Apolónia, Apartado 1172, 5301-854 Bragança, Portugal. Email: amilt@ipb.pt
- (5). CBMA – Centre of Molecular and Environmental Biology, Department of Biology, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal. Email: ronaldo.sousa@ciimar.up.pt

European freshwater mussel populations have been completely eliminated or are severely threatened in many aquatic ecosystems due to impacts such as impoundments, pollution, climate change, introduction of non-indigenous species and other human impacts. In Portugal, the projected or on-going construction of new hydroelectric dams will detrimentally affect several freshwater mussel populations in the Douro river catchment. The highest density of *Anodonta anatina* in the Douro occurs in the river Tâmega tributary. The number of European studies on freshwater mussel biology increased considerably over the last few decades. However, these studies have mainly focused on protected species *Margaritifera margaritifera* and *Unio crassus* and scarce data exist for other species such as *A. anatina*. Very little information on the ecology of *A. anatina* is available but existing data indicate a significant decrease in density and distribution patterns. Another important ecological information gap concerns the identification of the host fish necessary for larval transformation and dispersion. *A. anatina* is normally considered a generalist due to its large larval size. Prior to this study, information on suitable host fish species was still unknown for Portugal. The aim of this work was to identify the host-fish species for *A. anatina* in the Douro catchment. Twelve fish species known to occur in this river were exposed to *A. anatina* glochidia and then removed to individual tanks until metamorphosis was completed. Additionally, fish samples were collected periodically for observation of the infestation process by microscopy. Results clearly showed that native fish species are better hosts of *A. anatina* (*Squalius carolitertii*, *Squalius alburnoides*, *Pseudochondrostoma duriensis*, *Luciobarbus bocagei* and *Salmo trutta fario*). Non-indigenous fishes (*Lepomis gibbosus*, *Micropterus salmoides* and *Gobio lozanoi*) are not suitable hosts with the exception of *Oncorhynchus mykiss*. Transformation time varied from species to species with a minimum of seven days in *P. duriensis* and a maximum of sixteen days in *O. mykiss*. The results reported in this study, together with on-going studies on the biology and physiology of this species, are crucial for establishing conservation management plans for *A. anatina* in the Douro catchment.

## **Land Snails in the Red Data Book of Threatened Animals of Greece**

**Vardinoyannis, K<sup>1</sup>, Giokas, S<sup>3</sup>, Mylonas, M<sup>1,2</sup>**

- (1) Natural History Museum of Crete, University of Crete, Knossos Av., GR-71409 Irakleio, Crete, Greece, *E-MAIL*: mollusca@nhmc.uoc.gr
- (2) Department of Biology, University of Crete, Vassilika Vouton, GR-71409 Irakleio, Crete, Greece
- (3) Department of Biology, University of Patras, GR 26500 Patras, Greece

Greece is one of the richest countries of Europe in land snails. The variety of ecosystems, the climate, the geomorphology, insularity, the complicated geologic history and the very long human influence are the main causes for its high land snail diversity.

Till now, 680 land snail species have been recorded in Greece, belonging in 38 families. It is impressive that among these species, only 30 species (4%) are common, and can be found all around the country. Most species have a restricted distribution within Greece, and more than half of them (55%) are Greek endemics.

In the “Red Data Book of Threatened Animals of Greece” that was published in 2010, 372 land snails have been included. 44% of them are under a certain category of threat – Critically endangered, Endangered, and Vulnerable. The main threats they face is the destruction of their habitat and invasive species.

**POSTER**



## Report about the biodiversity of Mollusca Solenogastres from NW Iberian Peninsula

Zamarro-Camino, M<sup>1</sup>, García-Álvarez, O<sup>2</sup>, Urgorri, V<sup>1, 2</sup>

<sup>1</sup> Departamento de Zooloxía e Antropoloxía Física. Facultade de Bioloxía. Universidade de Santiago de Compostela. E-15782 Santiago de Compostela. Spain.

E-mail: maria.zamarro@usc.es; vituco.urgorri@usc.es

<sup>2</sup> Estación de Bioloxía Mariña da Graña, Universidade de Santiago de Compostela, Rúa da Ribeira 1, E-15590 A Graña, Ferrol, Spain.

E-mail: ogarcia-alvarez@edu.xunta.es

In spite of the fact that Solenogastres are present on all marine bottoms, the knowledge of their distribution, biodiversity and biology is still limited. Most are small-sized, in the range of the meiofauna, usually found at depths under 50 m, often isolated. The sampling means are not always ideal for their collection and sorting. Their identification requires the study of their anatomy from serial cuts.

At present, more than 260 species are known, 40% described from Antarctic and Subantarctic waters. The Atlantic European coasts represent the second most studied area with 20% of the species. The efforts made in the last two decades to get to know this group of molluscs on the Iberian coasts have started to become fruitful. The species studied in the Atlantic area of the Iberian Peninsula, especially within Spain, represent already 50% of the species known in relation with all European species. And especially the studies carried out on the Galician coasts result in the fact that 55% of the Solenogastres known from the peninsular Atlantic coast are located in Galician waters.

The studies on Solenogastres collected in the Expeditions DIVA-ARTABRIA I at depths between 600-1000 m confirm and extend the distribution of 9 species already known and 11 species new to science are about to be published. This increases up to 70% the weight of the Solenogastres known for Galician waters in relation with the total amount from the Atlantic area of the Iberian Peninsula.

The constant description of new species of Solenogastres shows that its diversity has been underestimated. However, on the bottoms of Galicia, the new discoveries of species already quoted, can indicate that the knowledge of the diversity of these bottoms is closer. In these studies, a high specific richness of the genus *Hemimenia* Nierstrasz, 1902 and, to a lesser extent, of *Kruppomenia* Nierstrasz, 1903 and *Wirenia* Odhner, 1921 was found on the bathyal bottoms of the peninsular NW. These cogenetic species may present distribution areas with different evolution centres, but with overlapping margins.

**POSTER**

**Data about two new species of *Kruppomenia* (Mollusca, Solenogastres, Cavibelonia) from the DIVA-Artabria I (02-03) Expeditions**

**Zamarro-Camino, M<sup>1</sup>, Urgorri, V<sup>1,2</sup>, García-Alvarez, O<sup>2</sup>**

<sup>1</sup> Departamento de Zooloxía e Antropoloxía Física. Facultade de Bioloxía. Universidade de Santiago de Compostela. E-15782 Santiago de Compostela. Spain.  
E-mail: maria.zamarro@usc.es; vituco.urgorri@usc.es

<sup>2</sup> Estación de Bioloxía Mariña da Graña, Universidade de Santiago de Compostela, Rúa da Ribeira 1, E-15590 A Graña, Ferrol, Spain.  
E-mail: ogarcia-alvarez@edu.xunta.es

The DIVA-Artabria I (02-03) Expeditions have as their main aim the study of the biodiversity of the bathyal deep-sea benthos on the western coast of Galicia (NW Spain) in depths between 100-1000 m. Solenogastres are small marine vermiform molluscs, they have an aculiferous mantle covered with calcareous sclerites, a ventral pedal groove and a subterminal cavity.

The genus *Kruppomenia* Nierstrasz, 1903 is made up of seven species. In this communication we present the first data about two new species collected at a depth of 788-802 m.

*Kruppomenia* sp1. NW Spain (43°51,873'N; 8°53,683'W - 43°53,120'N; 8°53,301'W). Water depth: 788-802 m. Body up to 2.3 mm x 1.6-mm. Thick cuticle (50-65 µm). Without lumps or keels With hollow acicular sclerites. Common atriobuccal cavity. Pedal groove with a fold that does not get into the pallial cavity. Biserial radula made up of homodenticulate plates with 19 denticles. With a pair of lateral radular sacs. Ventrolateral foregut glandular organs (type C) made up of a pair of ampoules. With oesophagus. With seminal vesicle and receptacula seminis. Unpaired secondary genital opening. With 8 copulatory stylets without gland With prepallial spicules. With 8 respiratory folds. With a dorsoterminal sense organ.

*Kruppomenia* sp2. NW Spain (43°51,873'N; 8°53,683'W - 43°53,120'N; 8°53,301'W). Water depth: 788-802 m. Body up to 3.5 mm x 0.4-mm. Thick cuticle (50-65 µm). Without lumps or keels With hollow acicular sclerites. Common atriobuccal cavity. Pedal groove with a fold that does not get into the pallial cavity. Biserial radula made up of homodenticulate plates with 13-15 denticles. With a pair of ventral radular sacs. Ventrolateral foregut glandular organs (type C) made up of a pair of long ducts. Without oesophagus. Without seminal vesicle. With receptacula seminis. Unpaired secondary genital opening. With 2 copulatory stylets with gland Without prepallial spicules. With 9 respiratory folds. With a dorsoterminal sense organ.

**POSTER**

**Geographic differences in genital anatomy and histology among populations of *Cylindrus obtusus* (Draparnaud, 1805) (Gastropoda: Helicidae)**

**Zopp, L<sup>1,2</sup>, Kruckenhauser, L<sup>1</sup>, Haring, E<sup>1,2</sup>, Harl, J<sup>1,2</sup>, Schileyko, A<sup>3</sup>, Sattmann, H<sup>4</sup>**

<sup>1</sup> 1st Zoological Department, Natural History Museum, Vienna, A

<sup>2</sup> Department of Evolutionary Biology, University of Vienna, A

<sup>3</sup> Institute for Problems of Ecology & Evolution (RAS), Moscow, RU

<sup>4</sup> 3rd Zoological Department, Natural History Museum, Vienna, A

E-mail: laura.zopp@nhm-wien.ac.at

The hermaphroditic land snail *Cylindrus obtusus* (Draparnaud, 1805) is endemic of the Austrian Alps. Restricted to high elevations (1600 to 2500 m asl) it has a rather patchy distribution extending from Schneeberg to Großglockner. While shell morphology is more or less homogenous over the entire distribution range, previous qualitative analyses of anatomical traits of the distal female genital tract revealed two geographically distinct groups. Western populations show pairwise mucus glands of equal size whereas in eastern populations these glands are conspicuous shortened and (sometimes) asymmetrically to different degrees. This distinction is paralleled by genetic differences detected in preliminary microsatellite analyses: While in the western populations the genotype frequencies are in Hardy-Weinberg equilibrium, a significant excess of homozygotes is observed at all loci in the eastern populations. This finding suggests that the mode of reproduction may be different, assuming a high rate of selfing in the eastern populations. In the present study we used two different approaches to address this question. Quantitative measurements of the mucus glands and the stylophore were taken from more than 70 individuals collected from 16 populations. The results confirm the east-west division. This suggests possible functional differences. Therefore, a comparative histological investigation of the mucus glands was performed to assess the functionality of these structures in both groups. The combined results will help to evaluate differences in the reproductive mode in geographic groups of *Cylindrus obtusus*.

**POSTER**

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