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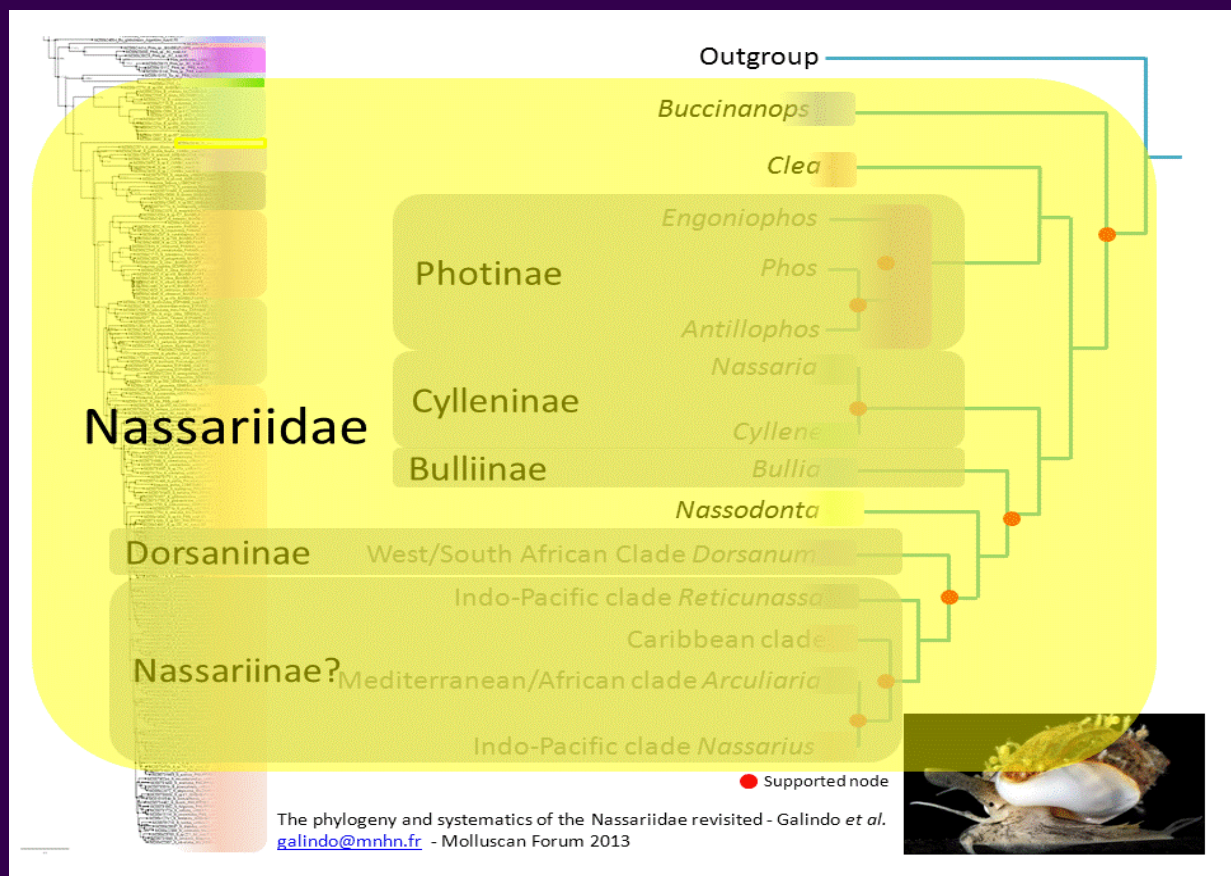
Contents

	Page
EDITORIAL	2
BOOK NOTICE	2
MOLLUSCAN FORUM	3—17
RESEARCH GRANT REPORTS	
EVGENIIA VEKHOVA: The significance of byssi and their morphological diversity within the superfamily Pterioidea	18
MARÍA JOSÉ PIO: The mechanical behaviour of the muricid radula	20
SHORT COMMUNICATION	
GEORG SCHIFKO: Two Minoan seal impressions with the hitherto oldest known depictions of a gastropod shell plate (operculum)	21

OBITUARY	
STUART 'BILL' BAILEY	23
TRAVEL GRANT REPORT:	
HANIEH SAEEDI	27
NEWS	28
RESEARCH OPPORTUNITIES	30
FORTHCOMING MEETINGS	31
SOCIETY AWARDS AND GRANTS	33
SOCIETY NOTICES	35

The phylogeny and systematics of the Nassariidae revisited (Gastropoda, Buccinoidea)
Lee Ann Galindo, Nicolas Puillandre and Philippe Bouchet, Département Systématique et Evolution,
 Muséum National d'Histoire Naturelle, Paris, France. See page 6.

Molluscan Forum 2013



EDITORIAL

It is with great regret that we note the deaths of two important contributors to the field of malacology, Professor Bryan Campbell Clarke FRS (1932 – 2014) and Dr Stuart ‘Bill’ Bailey 1942-2014

Bryan Clarke was a university teacher and a leading geneticist who investigated speciation in *Partula* land snails on the volcanic islands of the Eastern Pacific. The *Partula* species complex was devastated by the introduced carnivorous snail *Euglandina* in the latter part of the twentieth century. Along with Jim Murray and Michael Johnson, Bryan Clarke was one of the saviours of some of the *Partula* species described so exquisitely by Crampton.

Bill Bailey was a personal friend to many current and past members of the Council of the Malacological Society of London. Bill was a little older than I and we both became active in the Society at about the same time. He was an excellent colleague and I always enjoyed his company whether at work or at play. As a more senior academic, Bill helped me with welcome advice when I was getting into deep waters or when I was being particularly naïve in shallow waters. He was one of the people I was always pleased to see across a crowded welcome party at a conference, as I knew for the rest of the week he would be a focus of integrity, calm and common sense that could always be counted on. There is an Obituary to Bill on page 23

As some malacologists leave us, others enter the field. Outside of London, almost everyone in the UK seems to have grey hair these days so it is a relief to attend a conference such as the society’s Malacologists Forum (reported in this issue) and hear young people from a wider range of countries talking so enthusiastically about their subject. Posters and papers ranged in geography from the tropics (page 5) to Antarctica (page 11) to Ireland (page 7), and in fields ranging from taxonomic molecular biology (front cover) to adaptations to feeding on wood (page 11) to the curation of material from an 19th century French expedition (page 16). If part of the role of this Society is to engender an interest in malacology, then surely this eclectic Forum achieves the objective. The abstracts presented here are small introductions to research which will hopefully be reported more extensively in academic journals, and especially our own *Journal of Molluscan Studies*.

TAXONOMIC/NOMENCLATURAL DISCLAIMER

This publication is not deemed to be valid for taxonomic/nomenclatural purposes [see Article 8b in the International Code of Zoological Nomenclature 3rd Edition (1985), edited by W.D. Ride *et al.*].

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REVIEW

Michal Horsak, Lucie Jurickova & Jaroslav Picka (2013): *Molluscs of the Czech and Slovak Republics*. Nakladatelství Kabourek, Zlin. 264 pp, 68 colour plates. Hardback. www.kabourek.cz Price E60.

This fine new book provides a comprehensive account of the approximately 280 species of terrestrial and freshwater molluscs recorded from the Czech and Slovak Republics. All are illustrated with superb colour images, even the smallest *Vertigo* and *Pisidium*. There are many photographs of living animals and (where necessary for identification) images of shell microsculpture and drawings of reproductive anatomy. The pictures of slugs are particularly fine, especially those of the limacid *Bielzia coeruleans*, which is a spectacular blue-green or even violet when mature. All text is in both Czech and English. Descriptions are sufficient to ensure unambiguous identification and there are short accounts of ecology and distribution of each species, together with recent references and a large bibliography.

David Reid



Molluscan Forum 2013

Natural History Museum, London

28 November 2013

ORAL PRESENTATIONS

Schedule

09.15 - 10.00 *Registration & coffee*

10.00 - 12.30 **Session I: Phylogeny & Geography**

10.00 *Prof. Tony Walker: (President of Council) Welcome and introduction to the day*

10.10 James D. Burgon: Revision of *Paramelania*, an endemic genus from Lake Tanganyika, Africa: Integrating molecular, morphological, radular and ecological data.

10.30 Jonathan Fenn: A Systematic Species List of the Terrestrial Gastropoda of Vietnam, with additional distribution data from recent expeditions & surveys.

10.50 Lee Ann Galindo: The phylogeny and systematics of the Nassariidae revisited (Gastropoda, Buccinoidea)

11.10 - 11.30 *Coffee & poster viewing*

11.30 Inga Reich: The origin of the Irish *Geomalacus maculosus* - is the 'Kerry Slug' really a 'Kerryman'?

11.50 Tereza Kořínková: Cytogenetics of selected *Derocheras* (Gastropoda: Agriolimacidae) and *Arion* (Gastropoda: Arionidae) species.

12.10 Ludmila Sromek: The impact of glaciations on genetic diversity of pelagic molluscs - Antarctic *Limacina antarctica* and Arctic *Limacina helicina*

12.30 - 13.30 *Lunch break & poster viewing*

13.30 - 15.10 **Session II: Ecology & Environment**

13.30 Sonja Reich: Shells from seagrass meadows and coral carpets: How isotopic signals can help to distinguish palaeohabitats.

13.50 Fernando Aneiros: Analysing the differences between seasonal variation patterns of the mollusc assemblages in two muddy sand bottoms

14.10 Stephanie Deane: Temperature control of naturalised *Crassostrea gigas* in Poole Harbour, UK

14.30 Robert Mansfield: *Dreissena polymorpha* in Salford Quays: Are they useful in water management?

14.50 Claire Morley: Evaluating the effect of ocean acidification on Antarctic bivalves: a biomechanical approach using finite-element analysis

15.10 - 15.30 *Tea break & poster viewing*

15.30 - 17.00 **Session III: Physiology & Life History**

15.30 Reuben Shipway: The Billion Dollar Appetite: the anatomical adaptations and molecular mechanisms which allow the shipworm *Lyrodus pedicellatus* to feed exclusively from wood.

15.50 Amonsak Sawusdee: Effect of raised oyster reef structure upon physiological performance of European flat oysters *Ostrea edulis* (Linnaeus, 1758): Implication for oyster restoration.

16.10 Vladimir Skala: Nitric oxide production by haemocytes of two lymnaeid snails, *Lymnaea stagnalis* and *Radix lagotis*: the effect of various treatments, trematode infection and water conditions.

16.30 Álvaro Roura: The ecology of *Octopus vulgaris* paralarvae in the zooplankton.

16.50 *Prof. Tony Walker: Closing remarks.*

17.00 - 18.30 *Wine social & final poster viewing*

POSTERS

M. Carmen Cobo: Solenogastres from three abyssal basins of the South-East Atlantic Ocean.

Briony Eastabrook: Ancient forests in Malta: fact or fiction? A land snail analysis.

Egie E. Enabulele: Identification of *Lymnaea* and *Radix* species and their parasitic fauna from Tundry Pond, Hampshire

Lucía Barrio González: First data on the diversity of Fissurellids (Mollusca, Gastropoda, Fissurellidae) from the North Atlantic Ocean

Lucía Pedrouzo: Deep sea Solenogastres from hard bottoms of Galicia (NW of the Iberian Peninsula)

Sonja Reich: Gastropods indicate seagrass meadows at San Salvador (Bahamas).

Andreia Salvador: The voyage of La Bonite, 1836-1837. The dry material at the Natural History Museum, London

Rodrigo Brincalepe Salvador: The fossil gastropods of Sandelzhausen, Germany (Miocene, MN5); taxonomy, stratigraphy and future prospects

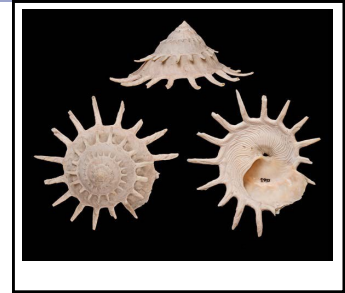
Rodrigo Brincalepe Salvador: The Kraken: from myth to science.

Marcos P. Señarís: A new species of *Falcidens* (Mollusca, Caudofoveata) from NW of the Iberian Peninsula.

Molluscan Forum 2013

Organised for the
Malacological Society of London
 and the
Natural History Museum, London
 by

Dr Jonathan Ablett, Natural History Museum and
 (email: j.ablett@nhm.ac.uk)
Professor Tony Walker, Kingston University



Lake Tanganyika, Africa: Integrating molecular, morphological, radular and ecological data.

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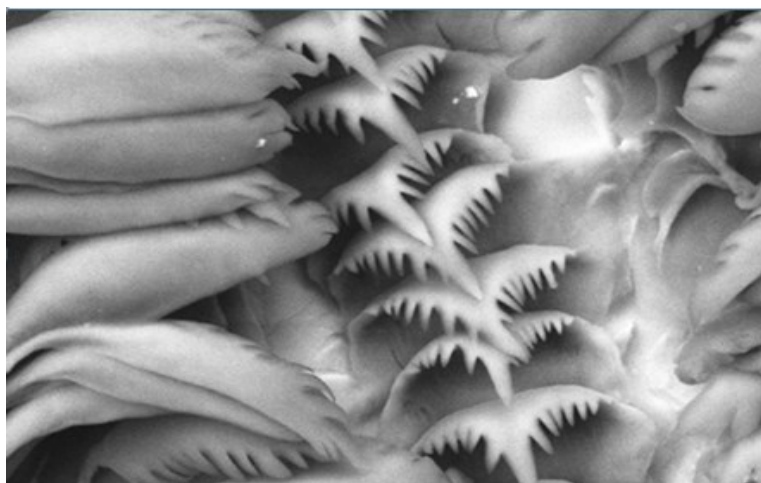
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Paramelania is a genus of endemic gastropods in Lake Tanganyika, east Africa that includes some of the largest and most elaborately ornamented shells of the 'Lake Tanganyika superflock', the most diverse and disparate extant freshwater gastropod radiation. While the elaborate marine convergent shells of many *Paramelania* have made them 'celebrity taxa' for the Tanganyikan mollusc fauna, their taxonomy is poorly systematized and they have long been recognised to be in need of revision.

Various past treatments have recognised anywhere between two and five species, and occasionally 'forms', largely based on inconsistent morphological assessments based on a small number of samples of often poor quality shells. Conchological diversity has often been considered (unjustifiably) to reflect only intra-specific variation or a plastic response and, as such, the only consistently recognised taxa have been the type species, *Paramelania damoni* Smith, 1881, and *P. iridescens* (Moore, 1898). This study represents the most complete and extensive examination of the genus to date and utilises data from all major collections of *Paramelania*: Royal Museum for Central Africa (Tervuren, Belgium), Royal Belgian Institute of Natural Sciences (Brussels), Natural History Museum, London and two active research collections. These collections combined comprise over 8395 shells from over 140 locations lake-wide, including the currently inaccessible Congo coast. From these we assembled a data set on distributions, depths and substrata, allowing the first synthesis of perspectives on ecology and biogeography. In particular, we used a criterion of sympatry to help determine species limits. Moreover, one recent research collection held tissue samples for five morphologically distinct putative taxa suitable for both molecular and radular investigations. COI and 16s sequence and radular variation were congruent with *a priori* fine morphological discrimination based on shells. Using a molecular and radular 'key' to help understand shell morphological variation, combined with extensive sampling and a criterion of sympatry, our results find a minimum of 21 morphologically distinct taxa, (15 undescribed) as well as several 'morphs' with uncertain taxonomic status and in need of further investigation.



SEM images of radula of *P. crassigranulata* showing long pointed cusps on rachidean teeth.



A systematic species list of the terrestrial Gastropoda of Vietnam, with additional distribution data from recent expeditions & surveys

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The modern terrestrial malacological diversity of Vietnam is relatively poorly recorded. This list builds upon previous similar works, combining species check-lists from Vietnam, primarily those of Schileyko (2011) and Thang (2008). Unpublished distributional data from recent expeditions by the Natural History Museum and recent surveys by Vietnamese scientists of some of the national parks are incorporated into a comprehensive species list of all recorded terrestrial gastropods in Vietnam. Where possible, the current location of type specimens has been recorded. Taxonomy and systematic positions of species has been updated where necessary. The list includes 862 species and subspecies, representing 165 genera.



The phylogeny and systematics of the Nassariidae revisited (Gastropoda, Buccinoidea)

Lee Ann Galindo, Nicolas Puillandre and Philippe Bouchet

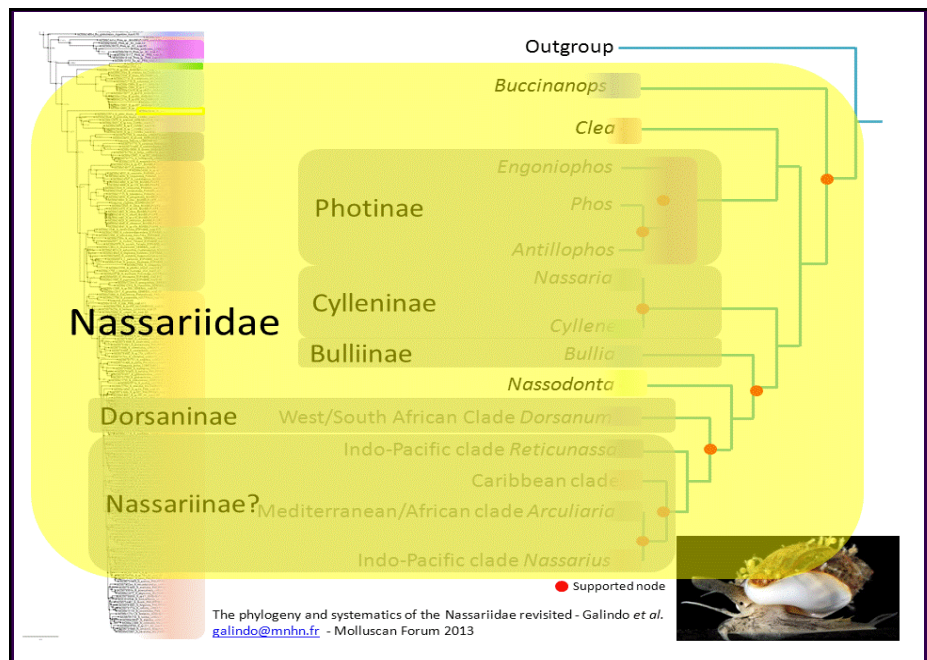
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The Nassariidae are a group of scavengers that are diversified on soft bottoms as well as on rocky shores, and are the subject of numerous research papers in ecology, ecotoxicology, paleontology and one species is even a model organism in biology. A weak and/or apparently continuous variation in shell characters has resulted in a confused taxonomy, with complex synonymy lists.

Over 1,320 nominal recent species have been established, of which 420 are regarded as valid. Above species level, the state of the art is equally hazy, with four subfamilies and seven genera currently considered valid, and many other names in the graveyard of synonymy. Two global phylogenies – including fossils – have been based on shell morphology, and a single molecular phylogeny is based on fewer than 20 species. We have conducted a molecular analysis based on three 3 mitochondrial (COI, 16S, 12S) and two nuclear (28S, H3) markers. Our dataset includes 215 putative nassariid species, comprising 6 of the 7 genera considered valid, and 24 nominal genera are represented by their type species.

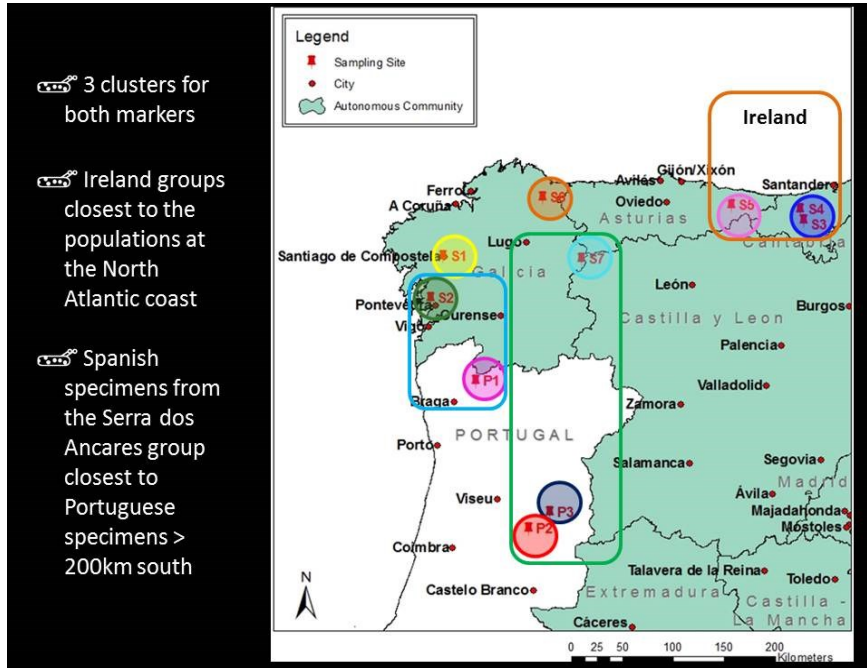
The monophyly of the Nassariidae as classically construed is not confirmed, and a previous hypothesis that included Phos and Nassaria in the family is accepted. The phylogeny reveals that fresh-water *Clea* (currently considered a buccinid) is a member of the Nassariidae clade. Support for subfamilies validity is discussed. Within the Nassariinae, the tree unexpectedly demonstrates that species from the Atlantic and the Indo-Pacific form four clades which represent several independent diversification events. This result will have a profound impact on nassariid taxonomy, especially with regard to the validity of genus-level names.



The origin of the Irish *Geomalacus maculosus* - is the 'Kerry Slug' really a 'Kerryman'?

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The distribution of the Kerry Slug *Geomalacus maculosus*, a species protected under EU and Irish law, was believed to be limited to northern Iberia and to south-west Ireland. In July 2010, the species was found in a commercial conifer plantation in Connemara, about 200 km north of its previously known Irish range. A subsequent survey found no populations between the two Irish distribution areas, suggesting that the slug was most likely introduced to Connemara by forestry. In an attempt to trace the source location of the Connemara population and to generally assess the extent of genetic variation within Irish populations, partial sequences of the mitochondrial 16SrDNA and COI genes were compared from 36 *G. maculosus* specimens sampled from 12 locations throughout Ireland. Results show, that for both markers only a single haplotype is present in Ireland. The same markers were used for 42 specimens sampled from seven locations in northern Spain and three locations in northern Portugal. In this region, 23 haplotypes were found for COI and 22 for 16SrDNA and these clustered into several regional clades. The reduced genetic diversity of Irish populations compared to Spain and Portugal suggest the presence of a genetic bottleneck probably due to founder effects. Given the results, we propose that *G. maculosus* was introduced to Ireland from Iberia and we will discuss possible explanations of the distribution and ways of introduction of this Lusitanian species.



- 3 clusters for both markers
- Ireland groups closest to the populations at the North Atlantic coast
- Spanish specimens from the Serra dos Ancares group closest to Portuguese specimens > 200km south

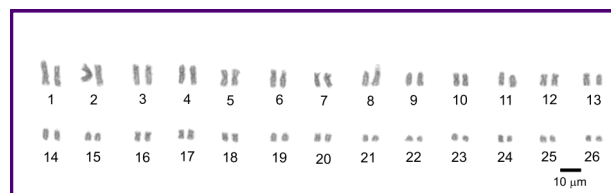


Cytogenetics of selected *Deroceras* (Gastropoda: Agriolimacidae) and *Arion* (Gastropoda: Arionidae) species

Tereza Kořínková

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This study investigated the detailed karyotype characteristics of two slug groups, in part to assess whether these might provide useful taxonomic characters. One group is a sample of the genus *Deroceras*, a few species of which are major pests and have spread worldwide. The other group consists of large species of *Arion*. One species, *Arion vulgaris* Moquin-Tandon, 1855 (known also as *A. lusitanicus* auct. non J. Mabille, 1868), is a serious pest, rapidly expanding across Europe, where it probably hybridises with the native species *A. rufus* (Linnaeus, 1758) and *A. ater* (Linnaeus, 1758). Other large *Arion* species were also studied, including several from the centre of diversity of this group in northern Spain. Chromosome preparations were obtained from the testes or intestine of sub-adult individuals. Besides examining chromosome number and morphology, I used fluorescence in-situ hybridisation (FISH) with probes against rDNA (gene clusters coding for ribosomal RNAs). FISH-mapping of 28SrDNA or 18SrDNA is a method of choice to visualise nucleolar organiser regions (NOR) even when silver-staining (Ag-NOR) fails to do so. All *Deroceras* species studied exhibited 60 chromosomes with a more or less identical pattern of morphology. These chromosome counts were the same as previously reported for other species of the genus; chromosome morphology is reported for the first time. All studied *Arion*, including *A. rufus* and *A. vulgaris*, showed essentially the same karyotype with a diploid number of 52, except for one more distantly related species that possesses only 50 chromosomes. *Deroceras* exhibited NORs on three chromosome pairs, whereas *Arion* on only one pair. The locations of the rDNA genes showed, at least in this group of large *Arion*, no intragenetic variation, which is somewhat unusual in the context of species-specific NOR patterns found in other taxa. Nevertheless, it seems to fit well with the generally low karyotype variability at the generic and family level in pulmonates.



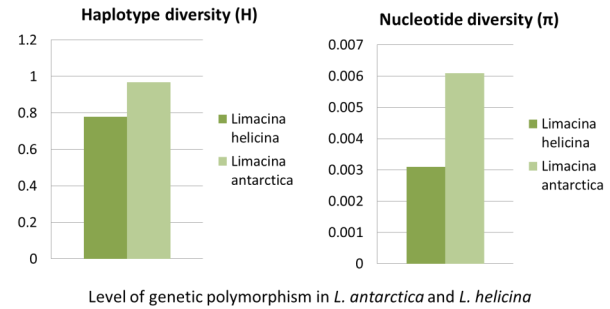
Arion sp.—52 Karyotype



The impact of glaciations on genetic diversity of pelagic molluscs – Antarctic *Limacina antarctica* and Arctic *Limacina helicina*

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Compared with the Northern Hemisphere, glaciations in the Antarctic seem to have increased rather than reduced genetic diversity. In recent years, molecular studies have shown strong genetic diversity and the presence of cryptic species in many marine groups in the Southern Ocean. This is surprising as there are no obvious barriers to gene flow. Recently, the biodiversity pump hypothesis for the Antarctic has been suggested, although the underlying possible mechanisms are poorly understood. We evaluated this hypothesis by examining the genetic diversity and historical demography of the pelagic marine gastropods *Limacina antarctica* and *L. helicina* from Drake Passage (Antarctica) and Spitsbergen fjords (Arctic), respectively. We used nucleotide sequences of the part of mitochondrial gene encoding cytochrome c oxidase I subunit (COI). Barcodes from 60 individuals of *Limacina antarctica* collected at 7 stations covering the Drake Passage were used and compared with barcodes from 67 individuals of *L. helicina* from two fjords: Hornsund and Isfjorden. We found 47 different haplotypes for *L. antarctica* and 25 for *L. helicina*. In both species, some spatial genetic structure was found, supporting the existence of single genetic units of *Limacina* populations. Demographic analyses on haplotype networks and significant negative Tajima's D and Fu's FS indices revealed some evidence of recent explosive population expansion. However, *Limacina helicina* populations showed lower levels of haplotype and nucleotide diversity when compared with *L. antarctica*, which suggests loss of genetic diversity in the Arctic during the glacial periods. These results support the Antarctic biodiversity pump phenomenon, whereby the genetic diversity in Antarctica is higher than in the Northern Hemisphere.



Shells from seagrass meadows and coral carpets: how isotopic signals can help to distinguish palaeohabitats

Sonja Reich¹, Frank P. Wesselingh¹, Viola Warter² & Willem Renema¹

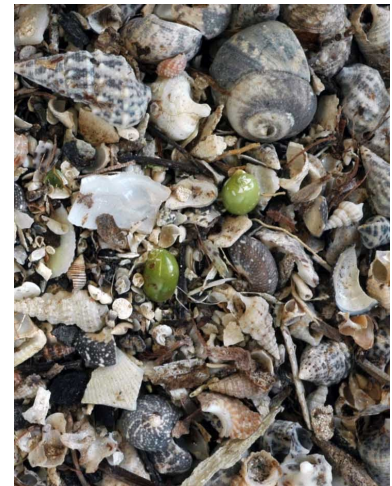
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Today's centre of maximum marine biodiversity is located in the Indo-Malayan region. Amongst numerous other vertebrate and invertebrate taxa, also gastropods and bivalves contribute to the high species numbers recorded in the area. A current research project, the ITN Throughflow, is investigating the development of this so-called biodiversity hotspot in the Cenozoic of Indonesia. One of the challenges when assessing marine biodiversity through time is that comparisons of taxon diversity are only meaningful when comparing faunas from the same habitat, because species numbers may vary considerably between different ecological settings. Therefore, it is indispensable to reliably discriminate between different habitats in the fossil record. A good example of the difficulties that may occur when identifying marine palaeohabitats is the challenge of recognising seagrass vegetation. Due to the low preservation potential of marine angiosperms, indirect indicators, e.g. associated organisms with a higher potential for preservation, are commonly used to infer the presence of seagrass meadows in the geological past. Furthermore, seagrasses may not always occur as dense meadows, but dispersed in other shallow marine habitats, such as coral carpet environments. Molluscs are useful indicators for palaeoenvironments, because of their high fossilisation potential and their abundance in marine habitats. The taxonomic and ecological composition of mollusc faunas as well as the presence of the seagrass-feeder *Smaragdia* can indicate seagrass meadows in the geological past. In this study mollusc faunas from the Miocene of Indonesia are assigned to marine palaeohabitats, including seagrass meadows and others, and are thereafter analysed for their stable oxygen and carbon isotopic signals. Shells attributed to seagrass meadows are characterised by significantly heavier $\delta^{13}\text{C}$ ratios than those from a coral dominated environment. Shells from a mixed coral-seagrass habitat display an intermediate $\delta^{13}\text{C}$ signal. The results suggest that carbon isotopes yield an additional tool to confirm assemblage based palaeoenvironmental interpretations within regions and limited stratigraphic time intervals.



The ecology of *Octopus vulgaris* paralarvae in the zooplankton

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Octopus vulgaris produces numerous small eggs that hatch into planktonic, free-swimming hatchlings with few suckers, simple chromatophores and transparent musculature. These distinctive planktonic stages are termed paralarvae and differ from conspecific adults in their morphology, physiology, ecology and behaviour. *Octopus vulgaris* culture has been trialled for more than 50 years, but is difficult due to limitations in the rearing of *Octopus* paralarvae. Study of this species in the pelagic realm is hampered by its scarcity, small size (<3 mm total length) and their mode of ingestion -they inject an enzymatic cocktail to predigest the prey and then absorb the internal contents leaving an empty exoskeleton. Nonetheless, we attempted to study the ecology of these paralarvae in the pelagic realm in the Canary Current Eastern boundary upwelling ecosystem. Genetic analysis of their diet revealed that early hatchlings of octopus are highly specialised predators, feeding mainly on decapods. Furthermore, *Octopus* paralarvae display a planktonic mode of life markedly different to other neritic cephalopods like loliginids or sepiolids. *Octopus* paralarvae couple their vertical position with the prevailing oceanography and therefore concentrate in the mesozooplankton frontal communities that are transported alongshore. Under strong northerly winds the alongshore jet is advected offshore, constituting a coastal upwelling filament that carries mesozooplankton communities and *Octopus* paralarvae far into the ocean. Our study found *O. vulgaris* paralarvae in the open ocean for the first time. These paralarvae are bigger than those found near the coast, thus revealing that *Octopus* paralarvae do develop in the open ocean, a pelagic strategy so far undescribed for any other neritic cephalopod. Additionally, it is the first time that natural mortality is estimated for *O. vulgaris* in the pelagic realm, revealing a close similarity with that obtained under culture conditions. The next challenges are to determine their diet in the pelagic realm and to unravel which mechanisms they use to return to the coastal area where they grow as adults.



Analysing the differences between seasonal variation patterns of the mollusc assemblages in two muddy sand bottoms

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Temporal variation in soft-bottom benthic communities is influenced by a wide range of factors such as sediment features, climatic and oceanographic phenomena, anthropogenic disturbances, life cycles of the species or the biotic relationships among them. This makes the study of temporal variations a striking issue, where every approach and every scale of study can provide useful information to achieve a better understanding of the topic. In this study, two muddy sand bottoms located in two different embayments in the NW of the Iberian Peninsula (Ensenada de Baiona and Ria de Aldán) were sampled monthly from February 1996 to February 1997 and from May 1998 to May 1999 respectively. Five replicate samples for the study of the molluscan assemblage and an additional one for the characterization of the sediment were taken by means of a Van-Veen grab, the former being then sieved through a 0.5mm mesh. A total of 19427 molluscs were found; they belonged to 134 different taxa, 51 of which were present at both sites. At Ensenada de Baiona, *Kurtiella bidentata* (Montagu, 1803) (48.6%) and *Venerupis corrugata* (Gmelin, 1791) (11.4%) were the only species with a total dominance

higher than 5%. At Ria de Aldán, that value was exceeded only by *Chamelea striatula* (da Costa, 1778) (41.6%), *K. bidentata* (17.6%) and *Tellina fabula* Gmelin, 1791 (14.5%). Maximum values of abundance were reached in August at Baiona and in October at Aldán. Relationships with sediment features were very different at these sites; total abundance showed a positive correlation with mud and organic matter contents at Baiona, while positive correlations between the coarsest size fractions and the diversity of the assemblage defined the changes at Aldán. These differences may be due to the fact that samples were taken in different years, but they can also be explained by the differences between the studied sites in terms of depth and exposure to waves and currents.

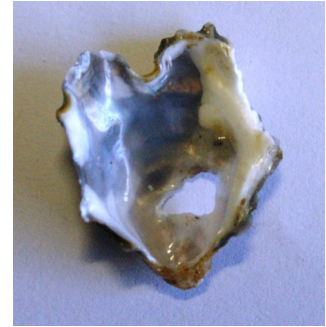


Temperature control of naturalised *Crassostrea gigas* in Poole Harbour, UK

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Pacific oysters, *Crassostrea gigas*, are an aquaculture success story. Nationally 1356t were produced during 2009 with an estimated first sale value of £2.4 million. In the UK however, naturalised, or wild Pacific oysters have begun to establish populations and are classified as an invasive, non-native species. Consequently there is concern that their continued production in UK waters poses a risk to native biodiversity. The degree to which wild populations have established varies from substantial reefs, on the Essex coast, to apparent absence, despite suitable habitat and cultivation proximity. Othniel Oysters Ltd. are a major (300-400 tonnes a year) producer of Pacific oysters from Poole Harbour on the south coast of England. Wild settlement in the harbour appears to be sparse and irregular. The reasons for such a lack of oyster settlement success in Poole Harbour are currently being investigated. A comparison of the naturalised population's size frequency with annual water temperature records show that temperatures have exceeded requirements for spawning for all years since 2006 (excluding 2007), however the limited range of oyster sizes suggests only a single successful year for recruitment.

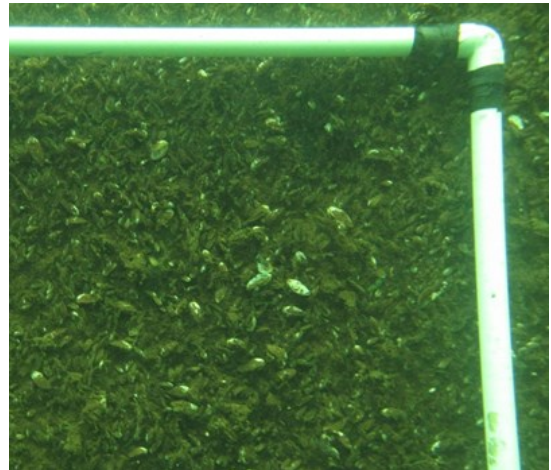
The shallow topography of Poole Harbour makes it sensitive to atmospheric conditions and consequently the harbour is characterised by fluctuating temperatures. Temperatures rarely remain stable for more than a week during the summer months and it is likely that the frequency and magnitude of these fluctuations causes notable mortality to larval stages of Pacific oysters. The Pacific oysters that have aggregated on the shores of Poole Harbour are thought to be the result of spawning in the cultivated stock during summer of 2006. At that time, temperatures were relatively high and stable, remaining above 19°C (the temperature required for larval development) for 43 consecutive days, and the following winter averaged a mild 8.4°C thereby enabling juvenile oyster survival.



Dreissena polymorpha in Salford Quays: Are they useful in water management?

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The Zebra mussel, *Dreissena polymorpha* is a highly successful invader in both brackish and freshwater ecosystems. Its highly fecund nature, planktonic dispersal phase and ability to reach high densities on any hard surface mean that it can rapidly colonise new habitats and filter out large quantities of suspended particles and phytoplankton. Such is their appetite that they are able to cause a large decrease in water column productivity and an associated increase in the sediments. This ability has led to various studies on their detrimental effects on biodiversity but also on their efficacy as a biological control agent. One site where such management has been undertaken is Salford Quays, greater Manchester, a redeveloped docklands originally constructed during the industrial revolution that is now a successful commercial and residential development. *D. polymorpha* were introduced in 1994 in a bid to control the burgeoning *Planktothrix* (then *Oscillatoria*) *agardhii* population present at the time. These potentially toxic cyanobacteria were hindering restoration progress and providing a barrier to the large scale commercial and residential developments in the area. By 2002, algal blooms had ceased but little further work was done to determine how Zebra mussels in Salford Quays contributed to this change and to what extent they were continuing to influence the system. This study sought to clarify the past, present and future filtration capacity in the quays and use these data to inform water managers about the benefits, and dangers of such an intervention. We have found that control of algal populations did not occur until after *P. agardhii* blooms ceased but that subsequent to this, mussel densities have become large enough to exert significant control on local productivity. We have also detected the possibility of a cyclic population recruitment cycle and, most worryingly, evidence of gene flow between Salford Quays and another site 25 km away, indicating active relocation to new areas. The implications of these results are discussed.



Evaluating the effect of Ocean acidification on Antarctic bivalves: a biomechanical approach using finite-element analysis

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Almost one third of anthropogenic CO₂ emissions from the last 150 years have been absorbed by the oceans, leading to a decreasing carbonate saturation state and pH since preindustrial times. A coincident reduction in carbonate ion and bicarbonate ion concentrations required in the production of calcium carbonate may be detrimental to calcifying marine organisms, such as bivalves. This is particularly significant at high latitudes where the carbonate saturation state is naturally low, and a further drop in pH could lead to a decline in the ability of the animal to defend itself against predators. In this study, specimens of the Antarctic bivalve *Limopsis marionensis* from preindustrial and modern times are compared using histological and biomechanical methods. Homogenous finite-element models of shells from the two populations indicate little change in the reaction of these shell shapes to deformation; however strain gauge validation experiments show a reduction in resistance to deformation in modern shells. Comparisons of shell thickness show thinner shells in modern specimens, while micro-indentation indicates an increase in hardness in modern shells. These results imply that although modern *L.marionensis* specimens show thinner shells than preindustrial specimens, the structural integrity of the shell may be compensated for in part by an increase in shell hardness. However, the net result is a decrease in structural integrity in modern shells, as shown by a higher level of deformation under an applied force in modern shells relative to preindustrial shells. This should be taken into account when considering the future dynamics of Antarctic ecosystems, and the survivability of bivalves such as *L.marionensis* with future decreases in ocean pH predicted for the near future.



The Billion Dollar Appetite: the anatomical adaptations and molecular mechanisms which allow the shipworm *Lyrodus pedicellatus* to feed exclusively from wood.

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The wood-eating bivalves of the Teredinidae, commonly referred to as shipworms, are a major economic pest of coastal and maritime structures and cause billions of dollars of damage per annum. This ability to digest wood is aided by symbiotic bacteria which reside in the host gills and are known to produce a range of cellulolytic enzymes. However the mechanism transporting these enzymes from the gill to the digestive tract remains unknown. A single publication identified a duct which appeared to link between the gills and the oesophagus, but this has never been confirmed. This has led to speculation that shipworms may endogenously produce cellulolytic enzymes. X-ray scanning micro-computed tomography was used to create a 3-d model of a shipworm in order to determine whether this duct exists and to identify the digestive structures which allow shipworms to feed on wood. A transcriptomic investigation of these digestive organs was then undertaken to determine whether shipworms could produce cellulolytic enzymes. The 3-d scans failed to elucidate a duct or structure which linked the gills with the digestive system, however a range of anatomical adaptation facilitating wood digestion were found. These included an elongated stomach, a specialised digestive gland, an appendix with a large typhlosole and a long intestine – all of which are modifications towards a more complete utilisation of wood. Transcriptomic analysis of these structures then revealed an endogenous capacity to produce a range of cellulolytic enzymes. This preliminary analysis provides new insights into the mechanisms of wood-digestion in the Teredinidae which may provide new methods for protecting wooden structures against damage, as well as novel enzymes for use in the biofuel industry.



Effect of raised oyster reef structure upon physiological performance of European flat oysters *Ostrea edulis* (Linnaeus, 1758): implication for oyster restoration

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The *Ostrea edulis* UK Biodiversity Action Plan has been hampered by a lack of fundamental research with which to inform management practice. To generate scientific support, an elevated experimental reef stocked with *O. edulis* has been established within Poole Bay (Dorset, UK). Twenty four oyster reef modules were deployed and compared with singleton oysters held on seabed close to each reef module to test the hypothesis that the physiological performance of the oysters on the reefs (80 cm high from seabed) will be improved by reducing competition for space and increasing accessibility to food resources. Respiration and filtration rates, ash content, haemolymph protein, and haemocyte counts were established as indicators of physiological health. For the past 12 months, water samples from the adjacent seabed and at a height of 80 cm were collected at regular intervals to determine chlorophyll a concentration, total suspended solids and bacterial abundance. To date, three samplings have been done; September 2012 (autumn), April 2013 (spring) and August 2013 (summer). At each sampling, triplicate reef modules were also recovered by divers to assess the physiology of the elevated oysters and seabed singletons.



The initial results show that respiration and filtration rates of oysters on constructed reefs were significantly higher than oysters on the seabed when water temperature rose to 18°C in August 2013, one year after reef deployment. Significant differences in the percentage ash content were also found in August 2013. In summer, the number of granulocytes of reef oysters was significantly higher than seabed oysters while haemolymph protein of reef oysters was slightly higher than seabed oysters in every sampling interval. Environmental data indicated that total suspended solids were significantly different between reef and seabed positions in every sampling interval while bacterial abundance in water column adjacent to the sea bed was significantly higher during the summer. Since current stocks of European flat oyster (*O. edulis*) in the UK have declined in both abundance and distribution, the preliminary results of this pilot study suggest that artificial oyster reefs using raised biogenic brood-stock represent a solution to oyster restoration that warrants further detailed study.



Nitric oxide production by haemocytes of two lymnaeid snails, *Lymnaea stagnalis* and *Radix lagotis*: the effect of various treatments, trematode infection and water conditions

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Two lymnaeid species, *Lymnaea stagnalis* and *Radix lagotis* are maintained in our laboratory in similar conditions. Juvenile and adult snails (together with the eggs laid) were reared together in aquaria filled with aerated tap water which is changed irregularly, at least once a month. The snails are intermediate hosts of visceral and nasal bird schistosomes, *Trichobilharzia szidati* and *Trichobilharzia regenti* (Schistosomatidae), respectively. In compatible snails, schistosomes are able to circumvent snail defence responses, and thus ensure their survival. We focused our research on the defence molecule, nitric oxide (NO), released by snail defence cells, haemocytes. Upon treatment of *L. stagnalis* haemocytes with zymosan A and phorbol 12-myristate 13-acetate (an activator of protein kinase C; PMA), only PMA significantly stimulated intracellular NO production. However, the magnitude of stimulation was considerably lower when compared with previously published data on *L. stagnalis* haemocytes (1.7-fold v's 4.0-fold; Wright et al. 2006, Biol Cell, 98:265-278), suggesting that strain differences may occur. NO production was also determined in *R. lagotis*. The results indicate that *T. regenti* infection impaired haemocyte basal NO production when compared with healthy snails. Treatment of haemocytes from uninfected snails with zymosan A, PMA or lipopolysaccharide did not affect NO output. In addition, the effect of water quality on haemocyte NO production was also tested. In haemocytes from *R. lagotis* maintained in aquaria cleaned weekly, PMA increased production of NO; this contrasts with the results from snails kept under "standard" conditions. Water quality is likely to be, therefore, an important factor that should be considered in experiments with aquatic snails.



POSTER PRESENTATIONS

Gastropods indicate seagrass meadows (at San Salvador, Bahamas)

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Seagrass meadows are important marine ecosystems in terms of productivity, nutrient cycling and storage, and sediment stabilisation. Furthermore, they provide habitat for a diverse assemblage of associated organisms. The recognition of seagrass vegetation in the geological record is problematic, because marine angiosperms rarely fossilise. Thus, the presence of paleo-seagrass beds often has to be inferred from the occurrence of associated organisms with a higher potential for fossilization, for instance molluscs. Most mollusc taxa are not restricted to seagrass meadows, but might be particularly abundant in seagrass beds. Therefore, the species composition of whole mollusc faunas needs to be considered when distinguishing paleo-seagrass meadows from other marine habitats. In this study the utility of the species composition of gastropod faunas as an indicator of seagrass vegetation was tested using present-day ecosystems. Gastropod death assemblages from shallow water seagrass meadows and unvegetated sand flats were bulk sampled at San Salvador Island, Bahamas in July 2012. Twenty four standardized (n=200) samples, representing 114 identified species, were compared in terms of species composition. Multivariate analyses (NMDS and ANOSIM) show a significant difference between the species composition of assemblages from seagrass vegetated versus unvegetated areas. Furthermore, samples derived from seagrass meadows differ from those taken close-by the unvegetated zone. The results suggest that gastropod assemblages may be a useful proxy of seagrass meadows in the fossil record.



Identification of *Lymnaea* and *Radix* species and their parasitic fauna from Tundry Pond, Hampshire

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Pulmonate gastropods and their parasitic fauna from Tundry Pond, Hampshire (2011-2012) were identified using molecular techniques as part of an ongoing survey of aquatic snail hosts in freshwater sites in the UK. Although *Lymnaea stagnalis* (Linnaeus, 1758) was readily identified using shell morphology, ITS2 and cox1 genes were essential as genetic markers for the accurate identification of *Radix auricularia*. The two species appeared to form separate colonies in different parts of the pond separated by a bridge. *Lymnaea stagnalis* colonised the larger part of the pond, while *R. auricularia* were abundant in the smaller section rich in the invasive aquatic plant *Ceratophyllum demersum* L. Cercariae shed from the snails were identified by 28s and NAd1 genetic markers. *Diplostomum phoxini* (Faust, 1918), *Echinostoma revolutum* (Fröhlich, 1802) and *Echinoparyphium aconiatum* (dietz, 1909) infected both species of snail. *Plagiorchis elegans* (rudolphi, 1802) infected *L. stagnalis* only. *Trichobilharzia franki* (Muller and kimmig, 1994) were shed only by *R. auricularia*. The latter species is of public health concern as it is an agent of cercarial dermatitis (swimmer's itch).



A new species of *Falcidens* (Mollusca, Caudofoveata) from NW of the Iberian Peninsula.

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Over the past few years, the Marine Biological Station of A Graña (USC) has undertaken several oceanographic expeditions. During Diva Artabria I 2002 and 2003, 7 specimens of *Falcidens* were collected. First records of the study of these specimens are presented, revealing that they might be a new species. The Caudofoveata is a small class of primitively shell-less mollusc which is relatively unknown. They are circular cross section vermiform animals, totally covered by calcareous sclerites and with bilateral symmetry. They have a pedal shield in the anterior region, a bipartite radula and a bell-shaped pallial cavity towards the rear. The 7 animals were collected by EBS, between 600 and 800 m depth. They were fixed and preserved in 70 % ethanol. Specimens were photographed, measured and their external anatomy was described. The radula and the sclerites were studied under optical and electronic microscope. Specimens between 0.720 - 3.265 mm long had a body divided into four regions: foregut, neck, trunk and tassel, a pedal shield laterally flanking the mouth opening and sclerites of different kind in each body region. The sclerite shape and sculpture shows individual variations. In the foregut region, the sclerites are small, smooth, flat and oval. In the neck they are bigger, flat, triangular or lance shaped. The sclerites from the trunk are the biggest ones; they are lance shaped, with a medial keel and a groove in each side and they present three possible types of bases: rounded, truncated or with a median notch. Finally the pallial region has three types of sclerites: lance shape sclerites with a big medial groove, needle shape sclerites with smooth medial groove and needle shaped sclerites with a flat base and a medial groove. The radular apparatus has a pair of sickle-shaped teeth basally united for a symphysis, a pair of lateral supports and a radular ribbon modified in a basal cone



Solenogastres from three abyssal basins of the South-East Atlantic Ocean

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Class Solenogastres is a small group of marine vermiform molluscs characterised by the presence of pleisomorphic features such as a mantle with calcareous sclerites and a ventral pedal groove. Despite the progress made in the last decades, their small size and their organisation based mainly on internal systematic characters, together with the great effort required to collect them, have contributed to a fragmentary knowledge of this group. Considering that the deep sea is the most unexplored part of the planet, there is even less knowledge about abyssal Solenogastres; only 11.2% of the 270 species of described Solenogastres come from these large environments. The DIVA project aims to study the biodiversity along an Atlantic latitudinal transect in comparable abyssal depths. Two expeditions in the R/V Meteor were carried out at the South East Atlantic Ocean basins between 5100-5500 m depth: DIVA 1 (Me 48/1) Angola Basin, 2000 and DIVA 2 (Me 63/2) Cape Basin, Angola Basin and Guinea Basin, 2005. During these expeditions, 111 specimens of Solenogastres were collected. The first completed investigations of 38 specimens from Angola (DIVA 1) described 9 new species and 3 new genera. Twenty two remaining Solenogastres from Angola were identified: 10 as known species from the Angola basin, 5 at family level (1 Pruvotiniidae, 1 Acanthomeniidae and 3 Simrothelliidae), 1 as *Macellomenia* sp. and 6 as *Nematomenia* sp. Both *Nematomenia* Simroth, 1893 and *Macellomenia* Salvini-Plawen 1978 are included in the order Pholidoskepia; this is the first record of this order at more than 3000 m depth. In addition, new sclerite types and some internal anatomy characters indicate that these latter two might be new species of Solenogastres. The results of initial studies of the mantle sclerites and habitats of the Solenogastres from the Cape Basin and the Guinea Basin are presented. The specimens were classified at order level and divided into several morphotype groups. All the evidence suggests that further analysis will reveal a large number of new species of Solenogastres in all of the basins.



First data on the diversity of fissurellids (Mollusca, Gastropoda, Fissurellidae) from the North Atlantic Ocean.

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The Fissurellidae family is composed of prosobranch gastropods of rocky habitats, from the foreshore area to the deep sea. They are characterised by a conical and patelliform shell with a wide aperture and an apical, subapical or marginal foramen. The current classification of the family is based on morphological characters that have been fairly described (radula, shell and mantle characteristics) but highly discrepant according to different authors, with a possible range of two to five subfamilies. Although fissurellid species are often included in molecular phylogenies, there are few specific studies of this group and, therefore, a broader study of Fissurellidae species is necessary to improve our understanding of the family. Through different expeditions carried out by French institutions such as the MNHN Paris and iFreMer (Seamount i 1987 and ii 1993) and Spanish institutions such as the MNcN Madrid (Fauna Ibérica ii 1991) and the investigation group OceaLiM from the University of Santiago de Compostela, a large collection of fissurellids was made. Specimens were found off different marine banks from NE Atlantic Ocean (Galicia, Atlantis, Hyères and Irving banks) and off the continental slope of the Galician coast, between 300 and 1340 m depth. The main objective of this investigation was to study the diversity and spatial and bathymetric distribution of fissurellids from the North Atlantic Ocean. A preliminary study of this material shows a great diversity, with 1359 specimens of at least 14 different species belonging to the genus *Cranopsis* A. Adams, 1860; *Puncturella* Lowe, 1827; *Profundisepta* McLean & Geiger, 1998; *Diodora* J.E. Grey, 1821; *Fissurisepta* Seguenza, 1863 and *Cornisepta* McLean & Geiger, 1998. This investigation provides new information about the description of these species including shell and other characters new to the scientific literature. These results could comprise redescriptions and even description of some new fissurellid species.



Ancient Forests in Malta: Fact or Fiction? A Land Snail Analysis

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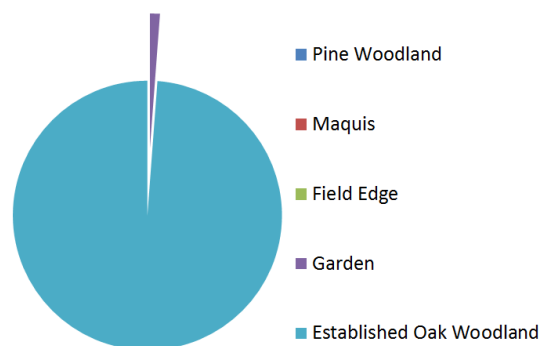
Increasingly an integral aspect of conservation decisions is understanding past landscapes and their responses to various drivers. This information can be used to better inform how contemporary ecosystems may respond to various pressures or as a way of determining what is 'natural' state of the habitat and therefore what to restore to. Within the Mediterranean, the debate about the degree to which the current landscape is degraded is rife causing disagreements about what conservation strategies should be in place. The Maltese Isles provide a laboratory-type environment from which a better understanding of human impact on the natural landscape can be ascertained. The contemporary lack of dense woodland found on the Islands has been assumed to have been caused by intense human activity since the early Neolithic, with aff- and re-forestation being the focus for conservation initiatives. This study aimed to determine the degree to which this is realistic, and therefore to better understand the 'natural' habitat of the archipelago. Land snails were used as an environmental proxy. A modern day survey of the snail composition of various types of wooded habitat was undertaken and the oak woodland indicator species *Lauria cylindracea* was identified. This information was then used to better inform conclusions drawn from land snail samples extracted from various archaeological sites with a focus on the Skorba Temple site. The palaeo-records were considered alongside the findings from the modern aspect of the project, revealing the consistent lack of oak woodland presence. The overall trends suggest a dynamic, mosaic-type landscape. This information is of interest to conservationists as it proposes that the natural habitat of the Islands is not dense woodland, and that conservation measures should be focused on maintaining healthy micro-habitat diversity. Potential issues and further directions for research are explored.



Maquis habitat.



Lauria cylindracea in contemporary samples



The fossil gastropods of Sandelzhausen, Germany (Miocene, MN5): taxonomy, stratigraphy and future projects.

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Sandelzhausen is a Miocene fossil site in southeastern Germany. Despite its small size, it harbours a rich and well-preserved fossil record. Thousands of gastropods, all pulmonates, were collected there from the 1960's until the site was closed in the early 2000's, but never received due attention. Here I present the results of a taxonomical study of this fauna, accompanied by their stratigraphical position along Sandelzhausen's sediment layers. Thirty-three species were recognized: seven basommatophorans, one ellobiid and the rest all stylommatophorans. Among the basommatophorans, the lymnaeid *Galba dupuyiana* (Noulet, 1854) was the most abundant in the lower layers, while in the upper layers the planorbids also became abundant. Among the stylommatophorans, the Pupilloidea were the most diverse and the clausiliid *Pseudidyla moersingensis* (O. Boettger, 1877) the most abundant. Moreover, two new species were found, of the genera *Carychium* (ellobiidae) and *Urticicola* (Hygromiidae). By studying the species' stratigraphical distribution and the faunal changes among layers, it is possible to extract paleoecological and paleoenvironmental data. This study is in its initial stages and will be complemented by carbon, oxygen and strontium isotope analysis for both freshwater and land snail species.



Deep sea Solenogastres from hard substrata of Galicia (NW of the Iberian Peninsula)

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The Class Solenogastres is a small group of marine molluscs with bilateral symmetry and a body without regionalisation. Although these molluscs are present in all substrata and at all depths, the Solenogastres are animals with an uneven distribution. The difficulty with their study is because knowledge of their zoogeography and biology are limited. During expeditions carried out by the investigation group OceALiM from the University of Santiago de Compostela: cangrexo 91, diVA-Artabria i-02, diVA-Artabria i-03, Vertidos-04, Aplacophora-06, sarridal-07, Aselva-08, diVA-Artabria ii-08, Forsagal-09 and diVA-Artabria ii-09, a large collection of Solenogastres was made. These expeditions took place on the deep sea of Galician platform and continental slope, Galicia bank and the Iberian Abyssal Plain, between 150-5400 m depth. Most of the specimens came from soft substrata (sand and mud mainly) but little is known about the specimens living on hard substrata. 200 specimens gathered from hard substrata at 400- 2500 m depth are being studied. They come from: cold water corals, carbonated oceanic crust, polymetallic nodules, coral fragments and other organic sources. First data from the specimens shows a great diversity; more than 30 morphotypes belonging to the 4 orders of this class of molluscs were identified. More than 100 specimens of the 200 hard substrata Solenogastres of Galicia belong to the family Pruvotinidae (order Cavibelonia). Investigation of the mantle sclerites and the serial sections allowed the identification of 2 possibly new species related to *Pruvotina cockerell*, 1903. The type and arrangement of the sclerites and the internal anatomy (foregut, respiratory folds and reproductive system), show many differences from other species of the genus (only *Pruvotina artabra* Zamarro *et al.*, 2012 comes from the coast of Galicia). The evidence suggests that this collection of Solenogastres will increase considerably knowledge of the diversity and the spatial and bathymetric distribution of this group on the hard substrata of the Galician deep sea.



The voyage of *La Bonite*, 1836-1837. The dry material at the Natural History Museum, London

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In 1854, 428 specimens collected during the circumnavigation of the French corvette *La Bonite*, 1836-1837, were donated to the Natural History Museum in London. In January 2012, I began the curation of 85 dry lots of this historically important collection which needed remedial conservation, comprehensive labelling and annotation, as the material was cited in many relevant journals and books. As a result a large number of type specimens have been identified and were incorporated into the type collection.



French corvette *La Bonite* in Montevideo



The Kraken: from myth to science

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The sea was always a great unknown and seafarers' stories of strange animals slowly became legends. The kraken is one of the few to reach our days, for right from the start (first record: end of 12th century) it was incorporated into Nordic mythology. Colossal in size, it haunted the seas between Norway and Greenland, sinking ships and having a taste for human flesh. Of course, nearly all sea monsters have similar traits, for they merely reflect sailors' fears. The Kraken, however, proved to be the strongest figure, dragging all others under its shadow or, borrowing from taxonomy's lexicon, "putting in synonymy" the Hafgufa, the Lyngbakr, the Aspidochelone/Fastitocalon, the sea-serpents, and even the biblical Leviathan. This explains why the kraken is found under many guises in art, from a misshapen mass to a giant humanoid, passing through crustacean, sea-serpent and cephalopod. The most famous account of the kraken was by Bishop Erik Pontoppidan in 1752, but a few later authors (mainly Wallenberg, late 18th, and Hamilton, early 19th century) also helped to build the monster's modern figure. The Kraken was such a strong influence in Nordic folklore that even Linnaeus described it in the first edition of "Systema Naturae" (1735) as *Microcosmus marinus* (later understood as *Sepia microcosmos*). However, he later regretted this and removed the kraken from further editions (although it also appeared in his "Fauna Svecica" of 1746). After this, everyone (naturalists or otherwise) adopted the image of a giant squid for the kraken: which can be understood as a return to the animal that long ago originated the legend. The oldest certified record of a giant squid is from Iceland, 1639 and sailors immediately linked it with the kraken. Finally, based on the beak that remained from a carcass, Steenstrup named the giant squid *Architeuthis monachus* in 1857 (a name later deemed invalid; the valid one being *Architeuthis dux*). Despite the 150 years of studies that followed, almost all our knowledge comes from dead animals and indirect evidence, and thus *Architeuthis* retains a quasi-mythological status.



Molluscs (and a malacologist) on the television



Adelomelon brasiliana

Editor of the *Journal of Molluscan Studies*, Dr David Reid appears on a television programme about alien invasions, talking about *Adelomelon brasiliana*. Mass strandings of the huge eggs of this mollusc (the biggest free-living gastropod eggs known) are not uncommon



The significance of byssi and their morphological diversity within the superfamily Pterioidea

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Many adult bivalve molluscs attach to different kinds of substrata by the byssus. The morphology of the byssus can significantly vary within this class of molluscs and plays an important role in their survival on the seabed. Also, byssi have a historical significance in the everyday life of southern areas of Italy and Portugal, where byssi of *Pinna nobilis* were collected for the production of “marine silk” from ancient times until now. Sardinia and Puglia were the main centres for the processing of extremely fine golden “marine silk” that was used for the production of a very light and warm knitwear, such as gloves, hats, socks, berets, ties, also decorative fabrics, and tapestries. Chiara Vigo from Sardinia is one of the few women, who are still manufacturing byssal cloth today. The Ethnographic Museum of Antioquia in Sardinia, Italy, and approximately ten other museums around the world house less than 100 examples of cloth of the legendary sea silk and other related artworks (Fig. A-C). It is interesting to note that as the Latinised zoological term “byssus” was derived from the Greek word “bussus” that signified fine sea silk (Feen, 1949). As a rule, textiles woven from byssal threads were highly praised in all ancient cultures where sea silk was known. For example, byssal threads were identified in a Roman Centurion's cloak, the raiment of King Tutankhamen, and might have been the material of the Golden Fleece sought by the mythical Jason and the Argonauts.

At present, the morphology of the byssus has been studied most extensively in the family Mytilidae (e.g., Price, 1983; Vekhova, 2007). There is relatively little information on morphology of the byssus and its chemical composition for some Pinnidae (*Pinna nobilis*, *Atrina rigida*) in a number reports (Jackson et al., 1953; Pearce, LaBarbera, 2009). The morphology of the byssus has been previously briefly described for some Pterioidea, pearl oysters and their relatives (Banu et al., 1980; Tëmkin, 2006a, b). To date, there no studies address the connection between the morphological structure of the byssus and an ecological diversification for any bivalve lineage. The aim of this investigation was to elucidate the morphological structure of byssus within the superfamily Pterioidea across all the genera in relation to its significance in ecological diversification.

The byssi were isolated and morphology examined using light and scanning electron microscopy (SEM). For SEM all samples were prepared as described by Vekhova (2007). Dried samples were mounted on aluminium stubs, sputter-coated with gold-palladium using a Cressington Sputter Coater 108 Auto, and then viewed on a Philips XL-30 ESEM scanning electron microscope. Specimens were photographed with Olympus Q-Color 5 camera. The study was conducted in the period of December 12 - January 12 in collaboration with I. Tëmkin at the National Museum of Natural History (Smithsonian Institution, Washington DC, USA).

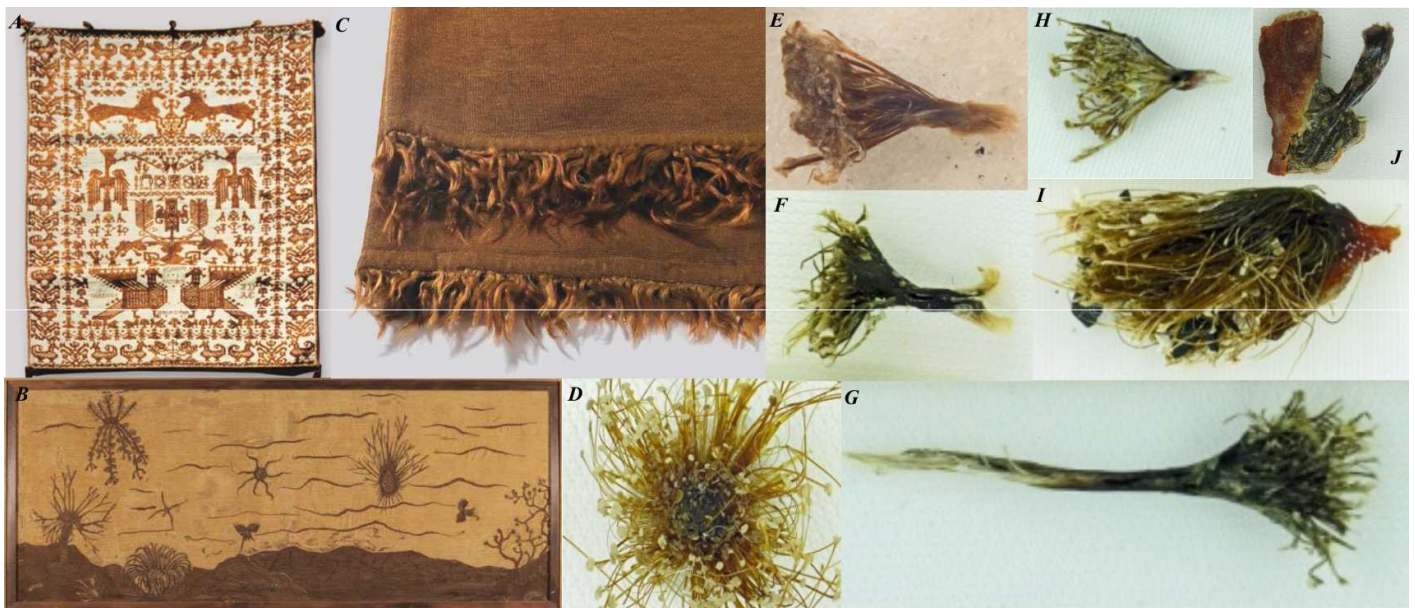


Figure. Some practice application and natural view of byssus in bivalve molluscs among pterioidean genera: A - Tapestry of Benito Mussolini, B - “Marine silk” in visual art, C - shawl made from byssal threads of *Pinna nobilis*, D - byssus of *Pulvinites ex-empla*, E - *Electroma alacorvi*, F - *Malleus albus*, G - *Malleus malleus*, H - *Pteria hirungo*, I - *Pinctada capensis*, J - *Pteria brevi-alata*.

Table Some characteristics of the byssus across the pterioidean genera

Species	Length	Color	Byssal threads	Disk
<i>Pinctada imbricata</i>	18	Brown-	All separated	Brush
<i>Pinctada margaritifera</i>	30	Green stem, yellowish green	All separated	Brush
<i>Pinctada capensis</i>	60	Brown stem, green threads	All separated	Brush
<i>Pteria brevialeta</i>	21	Brow	Fused completely	Brush
<i>Pteria hirundo</i>	22	Dark	Fused partly	Disk
<i>Pteria howensis</i>	12	Light	Fused completely	Disk
<i>Pteria loveni</i>	17	Deep	Fused completely	Disk
<i>Electroma papilionacea</i>	10	Light	All separated	Brush
<i>Electroma alacorvi</i>	8	Brown stem, green threads	All separated, fused by	Brush
<i>Isognomon ephippium</i>	28	Dark	Fused partly	Disk
<i>Malleus malleus</i>	30	Brown stem, green threads	Fused up to 2/3 length	Disk
<i>Malleus albus</i>	14	Dark brown stem, green-brown	Fused up to 2/3 length	Brush
<i>Pulvinites exempla</i>	21	Golden	All separated	Disk

Comparative analysis using the method of light microscopy showed that investigated species have differences in byssus structure, size and colour among of pterioidean genera (Table). The byssus consists of three parts in all species: 1) a stack of thin multitudinous parallel lamina, typically pale yellow in colour, embedded deeply in the tissue of the foot and connected by a root with the pedo-byssal retractor muscles; 2) usually a short or implicit stem; and 3) a bunch of byssal threads, which can be fused partly or completely in different pterioidean genera with adhesive plaques at the distal end, keeping a mollusc attached to a substratum (Fig. D-J). The microphotographs show that in a number of species of the superfamily Pterioidea, the shape of adhesive disks is a brush-like structure differing from that in *Mytilus*. This can be explained by the feature of process of byssus formation in a pedal groove in the molluscs. Also the byssal threads of some Pterioidea species were not covered by a cuticle completely, including disk like in *Mytilus*. The marine bivalves of the superfamily Pterioidea, which include four extant families (Pteriidae, Malleidae, Isognomonidae, and Pulvinitidae), lead epifaunal or semi-infaunal life styles, attaching by a byssus, although there are abyssate endozoic forms living inside sponges (species of *Vulsella* and *Crenatula*). As in many other bivalves, this group retain the byssus in post-juvenile forms for attaching to substrata for development of the adult forms (Yonge, 1962). The greatest variation of byssus morphology was observed in the family of Pteriidae (Fig. E, H-J). In particularly, the byssus structure is well developed in marine pearl oysters of genera *Pinctada* and *Pteria*. Species of *Electroma* have a small byssus with the fine numerous filaments of adhesive disks from attachment to hard corals. In *Pulvinites exempla* (family Pulvinitidae) the byssus was adapted for attachment to hard substrata. For survival in soft sediment and in mangrove ecosystems, *Malleus albus* and *Isognomon ephippium* use a brush-like byssus.

Future work

It would be good to conduct comparative study of the morphology pedal groove and glands located there. Obviously molluscs of the genera *Mytilus*, *Dreissena* and *Pinna* have different byssi, which are not homologues. The obtained data about byssus gland morphology among the pterioidean genera will help us to expand knowledge about the process of byssus formation in bivalve molluscs and can be used for anatomical atlases and textbooks of zoology.

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The mechanical behaviour of the muricid radula

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The radula of the gastropod family Muricidae exhibits a variety of designs and high complexity in the number, shape, and placement of cusps and denticles (Kool, 1993a; Herbert *et al*, 2008) and, as in other gastropods, diverse patterns of tooth integration (Hickman, 1984).

Although structural features of the muricid radula have been investigated in recent studies (Herbert *et al*, 2008; Pio *et al*, in press), knowledge of the mechanical behavior of the radula (i.e., how the teeth move, interact within each other and with the substrate) remains poorly understood. Studies on mechanical behavior of the muricid radula can provide important clues for understanding adaptive functions (Hickman, 1980) and the tendency to convergence within the family.

The muricid radiation resulted in a variety of modes of predation exhibited across the family, e.g. shell drilling, toxins, ectoparasitism, and suffocation, etc. Each kind of feeding requires a different combination of radular characteristics and anatomical parts, generally organs or glands. In the case of shell drilling, two mechanisms based on the functional alternation of the accessory boring organ (ABO) and the mechanical activity of the radula are involved. Both mechanisms combine to produce a characteristic drill hole through the surface of shelled molluscan or crustacean prey (Carrier and Gruber, 1999, and references therein). The study of the tooth mechanics allows inferring how the radula is used as a tool and what aspects of morphology are important for function, as well as helping to redefine taxonomic characters (Hickman 1984; Padilla 2003). Hickman (1984) studied the functional integration of movement in the radula in the Archaeogastropoda and the implication of tooth bases and cusps, suggesting that radular functional integration is valuable in the understanding of how radula works.

This report offers examples of integration of teeth in three representatives of drilling muricids: the muricine *Chicoreus dilectus* (A. Adams, 1855), the trophonine *Trophon geversianus* (Pallas, 1774) and the rapanine *Stramonita biserialis* (Blainville, 1832). The radula was extracted from individuals covering a broad range of sizes. Illustrations herein relate only to adult specimens, where the integration between teeth is substantial. Samples including separate radula and radula over the bending plane of the odontophore were studied to describe the tooth integration mechanism using the Scanning Electron Microscope at the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (MACN), Buenos Aires.

Rachidian teeth of adult muricids bear two primary mechanisms of tooth integration. The first feature is formed by an extension (fe) of the posterior area of each tooth that lies flat on the radular membrane (rm) and fits into a groove (g) in the anterior region of an adjacent tooth (Fig A, B). The second integrating mechanism involves structures at the tooth margins. A rounded shoulder (rs) on each end of the tooth's anterior edge contact, with a corresponding camber (c) formed on either end of an adjacent tooth. When teeth are rotated over the bending plane of the odontophore, these features are conspicuous (Fig C).

While feeding, the activity of the radula is abrasive on the prey shell as well as the radula itself. Thus, alterations in cusp morphology due to wear are expected. Interestingly, the marginal cusps (mc) are not directly involved in mechanical abrasion, while the central (cc) and lateral cusps (lc) do show wear and are inferred to be involved in abrasion (Fig D).

To continue this research, the integration of the radular tooth in muricids will be tested with bio-mechanical engineering techniques to test hypotheses about cusp function.

Acknowledgements

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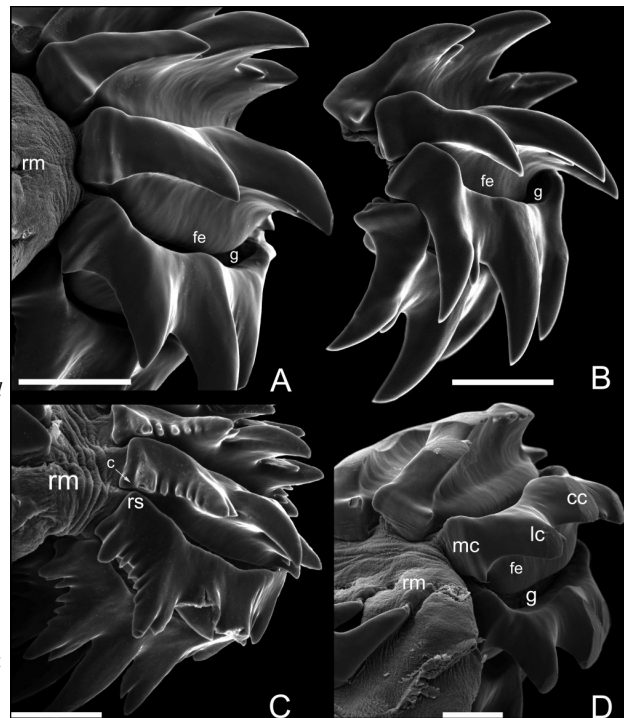


Figure Examples of tooth interaction in some muricids. **A.** *Trophon geversianus*. Scale bar: 100 μ m. **B.** *Chicoreus dilectus*. Scale bar: 50 μ m. **C.** *Stramonita biserialis*. Scale bar: 50 μ m. **D.** *Trophon geversianus* wear pattern. Scale bar: 50 μ m. c= camber; fe= flat extension; g= groove; mci= marginal cusp interaction; rm= radular membrane; rs= rounded shoulder.



Short communication

Two Minoan seal impressions with the hitherto oldest known depictions of a gastropod shell plate (operculum)

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Hardly any other European prehistoric culture shows such close affinity to the sea as the Minoan Bronze-Age civilisation. This is evident from their art, where creatures of the sea motifs are often used. Notably, marine invertebrates like cnidaria, echinoderms crustaceans and molluscs are frequently depicted. Among molluscs we find the cephalopods (argonauts and octopods) and even gastropods as a leitmotif in Late-Minoan art (Karali, 1996; Müller 1997).

In Phaistos (Crete) a burned piece of clay from Middle Minoan IIB (1850-1800 B. C.) was found showing two seal impressions in different degrees of conservation. Despite the small dimension of the *Charonia* shells, some zoological details can be recognised. In the more completely preserved impression, one detects the whole shell with its aperture (Figures 1 and 2). It is noteworthy that contrary to the examples found in nature, here the depicted *Charonia* shell is a left-coiled (sinistral) one. Such aberrant coiled examples are extremely rare and therefore much appreciated by collectors. Several plausible explanations can be given for the portrayal of a left-coiled *Charonia* shell. The artist may have neglected to consider that a seal's impression is necessarily a mirror image of the engraving on the gemstone. It is equally possible that greater importance was attached to the gemstone (signet-ring?) and that its image – rather than the perhaps only infrequently produced impression – was the desired representation. In this case the inversion of sides on the resulting impression would be of little consequence. Finally one cannot exclude the possibility that the representation of a left-coiled shell on the seal impression was indeed intentional.



Fig.1 A seal impression from Phaistos with a *Charonia* shell

Fig. 2 A completed drawing of the motif presented in Fig. 1 (both from Pini 1970).

The other seal impression, which offers a clearer image of the shell aperture (Figure 3) demonstrates from a malacological point of view a very interesting feature: the external border of the aperture is portrayed in a stylised manner in the form of several triangles and the aperture is filled with a spiral, which was hitherto misinterpreted as an indication for a deepening in this area (Levi, 1958). In fact the spiral represents the shell plate (operculum), a part of the snail's morphology (Figure 4). This horny, in some species calcareous operculum, is situated on the upper side of the gastropod's foot (Figure 5) and serves for closing the shell aperture.

The use of opercula is known from non-European cultures as well as from ancient written sources. In South-Asia the shell plates of *Murex*, *Fasciolaria* and *Ampullaria* were used for fumigation purposes (Simroth, 1896/07). In the area of the Himalayan mountain range the opercula of *Murex ramosus* were used as currency (Simroth, 1896/07). A curious utilisation is known from the Ryukyu islands (Japan) where the shell of *Charonia sp.* was used as a tea vessel with the operculum serving as closing plate. Opercula also had great importance in ancient pharmacology. The famous physician Galenus recommended the shell plates of *Purpura* together with vinegar in the case of swollen spleen, and Dioskurides praised opercula for various medical uses (Simroth, 1896/07). The oldest evidence for the use of opercula comes from a Neolithic site near Haifa (Israel). Several opercula of the species *Pomatias olivieri* found on this site show a perfect round hole in the centre, and it is very probable that they served as beads (Mienis, 1990).

The significance of the two Minoan seal impressions discussed in this short communication does not consist in a possible proof for the practical use of opercula in this culture. For such a speculative assertion it would be necessary to find further circumstantial evidences. In fact, they represent the oldest hitherto known pictorial evidence for opercula in Europe, perhaps even in the whole world.

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Fig.3 A seal impression from Phaistos, showing the aperture of a *Charonia* shell with an operculum (from Pini 1970).

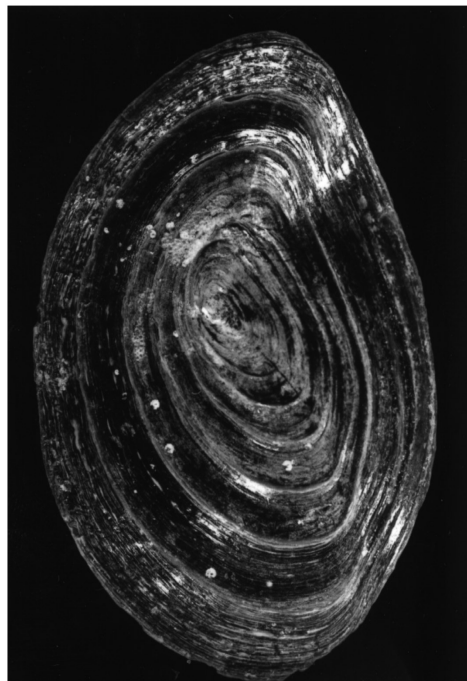


Fig.4 An operculum of *Charonia* sp (own photography).

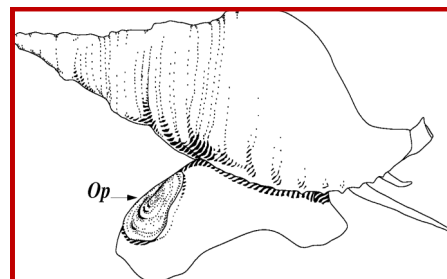


Fig.5: Sketch of *Charonia* demonstrating the position of the operculum (Op) on the snail's foot (drawn by Frank Suppan).



Obituary

S.E.B “Bill” Bailey 1942-2014

It is with great regret that we record the passing of Stuart 'Bill' Bailey. Bill was a long-standing member of the Malacological Society of London serving on the Council of the Society for many years. He was one of the small number of Honorary members. As Editor of the Bulletin of the Malacological Society of London from 1993 to 2007, he transformed the publication from a cyclostyled newsletter into today's colourful and entertaining magazine now called *'The Malacologist'*. Latterly he served as the Society's Archivist and undertook a classification of the extensive archive material of the Society. Bill was a friend to all on Council and was an informed, hospitable and reliable colleague. He preferred to travel by car to malacological meetings both domestic and foreign, even driving to Greece, though he only reluctantly flew to the USA and Australia.

Bill will be remembered by his malacological community as someone who was gentle, kind and helpful, even travelling, driving of course, to Cambridge to install a coat rack for a friend. He supervised and examined many research degree students during his professional life. Ex-President of the Society Mark Davies remembers that as Mark's PhD external examiner, the *viva voce* examination was held in Bill's office and half way through Bill lit up his pipe. He had a variety of non-academic interests including wood-carving, furniture making, painting and drawing, photography and gardening.

Bill's funeral coincided exactly with a MalacSoc Council meeting, which Bill was planning to attend. Thus most of his malacological friends were at the meeting in London. At this meeting, Bill's life and strong contribution to the Society was marked by a short period of reflection.



Bill at the WCM in Perth



Examples of Bill's art work



Helix aspersa fitted with a bespoke radio transmitter used by Bill.



Stuart Edwin Roger ('Bill') Bailey was born on 31st March 1942, the youngest child of Ernest and Alice. He attended St Mary's R.C. Primary School, King's Lynn, King Edward VII Grammar School, King's Lynn and the University of Birmingham, graduating in 1963 with a good Honours degree in Zoology and Comparative Physiology. Bill was awarded his PhD in 1966 for his thesis entitled *Sensory receptors in the skin, tongue, and muscles of the green lizard* and in that year he married Sylvia Ann née Southgate. Bill and Sylvia did not have any children. Bill's last career appointment was as a Senior Lecturer in Zoology at the University of Manchester. He was originally appointed to the Department of Zoology, which merged with Botany and Medical Departments to form the School of Biological Sciences, now the Faculty of Life Sciences. He had several periods of leave to work abroad, for example at the Aristotle University of Thessaloniki with Maria Lazaridou-Dimitriadou and in Australia.

As an experienced field biologist and teacher, Bill organised field courses on terrestrial biodiversity in France and marine zoology in Brittany, Bangor, Kingsbridge, and the Isle of Man. He was an accomplished teacher, covering an impressive range of undergraduate course in his career, including, *Chronobiology, Biology of Mollusca, Environmental Impact Assessment, Genetic and Behavioural Aspects of Pest Management, Behavioural Ecology, Rhythmic and Adaptive Animal Biology, Conservation Biology, Entomology, Invertebrate systematics, Comparative Neuromuscular and Sensory Physiology, Population Dynamics and Ecosystems, Techniques and Criticism of Data Handling and Comparative Animal Physiology.*

When Bill was at the height of his career, the momentum for environmental sciences was just building up and he was one of the early initiators of such courses of study, setting up a degree course in Environmental Biology as early as 1988. Through a range of projects, including the in-service training of teachers, Bill revealed a strong interest in the development of young people and their teachers, leading to students annually monitoring vegetation at Mam Tor, and assisting in the management of newly acquired woodland for the Urban Woodland Trust. As well as editing *The Malacologist*, He was Editor (Animal Sciences) of Biological Sciences Review from 1987 to 2007, a journal aimed at sixth-formers and 1st year undergraduates. During his teaching career, he supervised twelve Ph.D. students, two Research Assistant and three M.Sc students.

In an international context, Bill was active in EU-funded ERASMUS student-exchanges between Manchester, Thessaloniki in Greece and Rennes in France. His publication list (below) was extensive and included the book *Problem solving in Environmental Biology* "co-authored with A R Ennos.

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From friends and colleagues

Back in the early days of Stuart's career at Manchester University, as the new Assistant Lecturer in Zoophysiology, a manuscript appeared on my desk with a note attached. It came from Prof. Ralph Dennell, the Head of Zoology. Would I please take a look at this manuscript, intended for publication, and have a chat with the author? It was based on a section of Stuart's Birmingham PhD thesis, an account of an electrophysiological study of the nervous system in the neck of a lizard. It was way outside my sphere of knowledge. But I need not have worried. The quality of his illustrations alone revealed the proposed publication as the work of a true zoologist. The clarity of the text had been greatly enhanced by the artistry of his anatomical drawing, a perfect visual aid for a non-specialist like me. And that was how I met Stuart and, in the years that followed, saw many examples of his artistic talent, reflected in the accuracy not only of his publications but of his inspiring lectures. In his laboratory research on the behavioural physiology of molluscs, which became his major speciality, he used original equipment, personally designed and constructed, making ingenious use of the latest electronic components. Finance for his work came partly from industry owing to the commercial significance of the work, in relation to mollusc pest control. His work extended into the field, both in Britain and abroad, especially in the Macedonian region of Greece. He was recognised internationally as a leading expert. His wide knowledge of animal ecology made him an obvious choice to organise field work, both in Britain and abroad. His studies on pests led him to expand his interests in horticulture, and in the conservation of urban green spaces. He inspired able and enthusiastic students.

For many years Stuart and I joined in teaching an undergraduate course, in which we combined our different branches of knowledge in devising ecologically favourable pest management strategies (strategies that minimised the use of pesticides). As we met regularly to bring our course up to date, to keep pace with new developments in the field, I came to appreciate the scholarly breadth of his knowledge, beyond anything I could have imagined from this quiet, unassuming friend. He was for ever spotting articles on the internet that were sure to interest me. He read widely in many aspects of science, particularly in relation to evolutionary theory. He revealed an unexpected reading skill in German.

Further chances to interact with Stuart came in retirement when we decided to meet once a week for lunch, often in company with Laurence Cook. Stuart would normally combine lunch with a visit to *The Firs* (the University's experimental garden in Fallowfield). He was welcomed there as an expert ready to give help with ongoing experiments when needed, or simply to co-operate in the general maintenance of the grounds. This was an example of what I admired most about Stuart, his generosity of spirit revealed in acts of kindness. He was generous in a way impossible to match. Hardly a week would pass in the last couple of years when he failed to arrive at our lunch meetings loaded with a well filled carrier bag of highly saleable books for the Cheadle Hulme Oxfam shop. Surely we all have examples of his generosity. The old saying that it is better to give than to receive must have been made for him. Stuart leaves us all with a gap in our lives. *Anonymous*

Stuart 'Bill' Bailey was our resident expert on all small creatures and we were thinking of building a new bug hotel in the new year.

Stuart came every week, even when he was not well, supporting most of the events of the Friends of the Gardens. He gave a very interesting seminar on "Garden Natural History," to the Friends and Volunteers and arranged only this year, coach trips to Plas Cadnant, Treborth Botanic Gardens, Southport Flower show and The Quinta Arboretum. He was instrumental in creating a herb garden within the walled garden and also helped in building our auricula theatre. Stuart and I looked after the auriculas, Stuart made all the wooden labels, photographed all the sponsored auriculas and helped construct the log book for the visitor's centre. He also provided solar powered lighting to the Ice house Stuart joined our recently formed Archery club - "The Burton Manor Bowmen" and was a good shot. He sadly had to give this up when he became too ill. Stuart was also a guest speaker at Ness Gardens. His last one in November was entitled "Gardening and Wildlife 50yrs after Silent Spring". Finally he was a source of inspiration to us all. We loved having him around, patiently answering all our questions on wildlife and we were always amazed that he came all the way from Manchester to be with us. A great loss. - *Dr Viv Guthrie Sec. Friends of Burton Manor Gardens*

I had known Bill for a long time since my time as an undergraduate student and as my PhD supervisor. Bill was a very supportive PhD supervisor, allowing me to explore my own ideas and providing gentle encouragement and discussion. I adopted one or two of his technical innovations during my work which he loved to develop in his office and at home (I often referred to him at the time as 'Q', after James Bond, because of his love of making gadgets for his research or just for general interest). One of these consisted of food items attached to miniature microphones that could detect and record (via a computer) the number and duration of slug 'bites'. I remember he even built his own cold room at Manchester University, having persuaded a butcher to give him an old cold store that was being thrown out. One incident illustrates what I think was his generally positive outlook that things would somehow work out. Driving to a conference in Europe, he wanted to meet a colleague in Paris on the way, armed with nothing more than a simple map of France (and with me map-reading!). I thought this was impossible and prepared for a few hours driving aimlessly around Paris, but somehow we managed to stumble across the correct suburban street almost immediately - to this day I don't know if it was pure luck or if Bill knew more than he let on. However, he seemed almost as amused and as surprised as I was. More recently, Bill was an external examiner at Kingston University, and a number of colleagues here commented on his unpretentious and down-to-earth style, and his supportive and insightful comments. I have many fond memories of Bill, especially his quiet, relaxed manner and his love of a good story over a pint of beer. *Richard Cook—University of Kingston*



MEETING REPORT

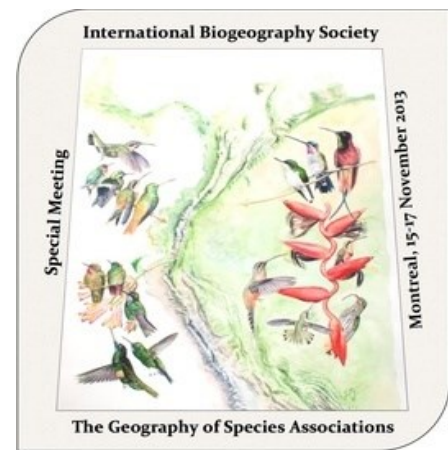
Geography of Species Associations Special Meeting 15-17 November 2013 in Montreal, Canada.

Hanieh Saeedi

The International Biogeography Society (IBS) was founded in 2001 and constituted in 2002 as a non-profit organization. This society runs conferences and special meetings in different countries periodically. I had a chance to present a paper about my PhD research on "*Global Biodiversity and Biogeography of Razor Clams (Solenidae)*" at the Geography of Species Associations Special Meeting from 15-17 November 2013 in Montreal,

In total, there were 48 oral presentations and 42 poster presentations at this meeting. Topics included community assembly, large scale biogeography, climate change, and phylogeography of organisms. Four keynote speakers talked about macroecology, landscape ecology and genetics, ecological and evolutionary theories in the context of past climate changes, and null-model analysis in biogeography. Particular highlights were talks on new indices for measuring beta diversity using genetic data by Legendre and how climate upheaval altered the ecological and evolutionary processes of damselflies by McPeck. The null models in ecology and publication opportunities in biogeography were discussed in two round tables. In most papers, scientists and researchers used a range of techniques such as spatial analysis and modelling (e.g., species distribution and macroecological models), mathematical and statistical analyses, and genetic and molecular techniques (e.g., DNA Barcoding) and restriction fragment length polymorphism (RFLP) to study the biodiversity, biogeography, phylogeography, and community assembly of different organisms on small and large scales. The variety of papers showed that biogeographers and ecologists are using a combination of statistical models and molecular methods to explain the distribution of organisms and their relationships to the environment.

In this conference I met other scientists and researchers and I learned more about new methods and techniques which are using in modern biogeography. Exchanging information and getting positive feedbacks from experts helped me to judge how my research will be best placed in an international context as a young researcher.



NEWS

A note from Daniel Geiger

13,000 SEM images I took for the scissurellid monograph (Geiger, 2012: <http://www.vetigastropoda.com/scissurellidae>) are now accessible on-line; images kindly made available by other persons/institutions are not included. The plates and the text of the monograph are not included. The images are to be used in conjunction with the hard-copy monograph.

Access is granted on a case-by-case basis for research/education purposes only; images cannot be used or consulted for anything remotely commercial. Access is intended for:

- Institutions to obtain the images of their specimens that I took.
- Researchers looking for additional, unpublished images.
- Advanced collectors for identification.

For further information and to request access, please visit <http://www.vetigastropoda.com/scissurellidae/webimages.php> and submit the web form.

Daniel L. Geiger, Ph.D., Curator of Malacology
 Santa Barbara Museum of Natural History
 2559 Puesta del Sol
 Santa Barbara CA 93105

**Bulletin of the Russian Far East Malacological Society - example of content****The Bulletin of the Russian Far East Malacological Society, 2013, vol. 17, contents****Original articles:**

- | | |
|-----------------|---|
| Abstract | <i>V.V. Gulbin, E.M. Chaban</i>
Annotated list of shell-bearing gastropods of Commander Islands. Part II |
| Abstract | <i>P.A. Dulenina</i>
The species composition of bivalve mollusks in the western part of Tatarsky Strait (Sea of Japan) |
| Abstract | <i>K.A. Lutaenko, I.E. Volvenko</i>
On the fauna of bivalve mollusks of Hong Kong (South China Sea) |
| Abstract | <i>M.V. Vinarski, I.O. Nekhaev, D.M. Palatov</i>
Finding of mollusks of the genus <i>Aplexa</i> (Gastropoda: Pulmonata: Physidae) in waterbodies of the northern part of Western Siberia |
| Abstract | <i>B.I. Sirenko, N.I. Abramson, A.I. Vagapov</i>
<i>Schizoplax brandtii</i> (Middendorff, 1847) (Mollusca: Polyplacophora) вЂ“ an example of "explosive speciation"? |
| Abstract | <i>G.A. Evseev, N.K. Kolotukhina</i>
Larval, juvenile and adult <i>Turtonia minuta</i> (Bivalvia: Turtoniidae) and comparative shell morphology of the veneroid and venerid taxa from Peter the Great Bay, |
| Abstract | <i>K.G. Kolbin, V.A. Kulikova</i>
Some aspects of reproductive strategy of Prosobranchia from Peter the Great Bay, Sea of Japan |
| Abstract | <i>E.M. Sayenko, M. Soroka</i>
Morphology of glochidia of <i>Sinanodonta woodiana</i> (Bivalvia: Unionidae) from Poland |
| Abstract | <i>E.V. Kolpakov, N.V. Kolpakov</i>
Local distribution and ecology of the rare bivalve mollusk <i>Trapezium liratum</i> (Trapezidae) in Peter the Great Bay (Sea of Japan) |
| Abstract | <i>L.A. Prozorova</i>
Invasion of the pest slug <i>Deroceras caucasicum</i> (Simroth, 1901) to the islands of Peter the Great Bay (Sea of Japan) |
| Abstract | <i>A.V. Chernyshev, E.M. Chaban, A.P. Tsurpalo</i>
The first finding of <i>Siphonaria thersites</i> Carpenter, 1864 (Gastropoda: Pulmonata) in the intertidal zone of Simushir Island (Kurile Islands) |



Freshwater Gastropods of Mid-Atlantic States

A new web-based resource by R. T. Dillon, M. A. Ashton, and T. P. Smith, is now available from the FWGNA website: www.fwgna.org

This is the sixth region to be added to the FWGNA site since its debut in 2003, extending coverage from Georgia to the New York line, raising the total species reviewed from 79 to 87. The new Mid-Atlantic site covers Delaware, Maryland, New Jersey, eastern Pennsylvania and the West Virginia panhandle. Our database of 2,893 freshwater gastropod records was developed from the collections of the US National Museum, the Academy of Natural Sciences of Drexel University, the Carnegie Museum of Natural History, and the Delaware Museum of Natural History, the macrobenthic surveys of the Maryland DNR (Annapolis), the Pennsylvania DEP (Harrisburg), and the Delaware DNREC (Dover), as well as our own original field-work. The new website features a dichotomous key, a photo gallery and range maps for all 41 species recovered from the five-state area, as well as range maps and notes regarding ecology, life history, taxonomy and systematics.

Also new for 2013 is an overall "Synthesis" combining our fresh Mid-Atlantic observations with data previously obtained from Virginia, North Carolina, South Carolina and Georgia to generate a distribution of commonness and rarity over the entire 67-species Atlantic drainage freshwater gastropod fauna. We suggest a new (nonparametric) system of "incidence ranks" as a supplement to, if not necessarily a replacement for, the subjective system of "conservation status ranks" currently in vogue with natural resource agencies.



The snail in gothic manuscripts

There are fascinating historical images of molluscs on the British Library website. Many seem to focus on people fighting snails. It is at :-

<http://britishlibrary.typepad.co.uk/digitisedmanuscripts/2013/09/knight-v-snail.html>

Further Reading on this subject—Lilian Randall, 'The Snail in Gothic Marginal Warfare' *Speculum* 37, no. 6 (June 1962), pp. 358-367. Michael Camille, *Image on the Edge* (Reaktion Books: London, 1992), pp. 31-36. Carl Prydum, What's So Funny about Knights and Snails?, <http://www.gotmedieval.com/2009/07/whats-so-funny-about-knights-and-snails.html> - See more at: <http://britishlibrary.typepad.co.uk/digitisedmanuscripts/2013/09/knight-v-snail.html#sthash.H8JP8xSs.dpuf>

Thanks to David Reid for spotting this website. It's well worth a look.



A note from Gerhard Haszprunar

I am pleased to announce that my paper "A nomenclator of extant and fossil taxa of the Valvatidae (Gastropoda, Ectobranchia)" was published in Issue 377 of ZooKeys, <http://www.pensoft.net/journals/zookeys/article/6032/abstract/a-nomenclator-of-extant-and-fossil-taxa-of-the-valvatidae-gastropoda-ectobranchia->, doi: 10.3897/zookeys.377.6032 and is freely available for download there.

Beyond Valvatidae the paper provides direct internet links to many old taxonomic papers on extant or fossil freshwater gastropods.



RESEARCH OPPORTUNITIES

PhD opportunity in marine palaeo-ecology at the University of Vienna

The research group of Prof. Martin Zuschin, Department of Paleontology at the University of Vienna, Austria, has an open 4-year PhD position for candidates with a strong focus on palaeoecology of marine invertebrates. The topics investigated in the group include the molluscan palaeodiversity and faunal gradients in the marine fossil record of Europe, temporal and environmental trends in the intensity of drilling predation, taphonomy and actuopalaeontology of benthic invertebrates, conservation palaeobiology, and the effects of marine anoxia. The PhD student would be working in a young, international team consisting of paleontologists and biologists.

The research project involves using the excellent fossil record of Cenozoic marine molluscs of Europe to address large-scale palaeoecological problems. The Cenozoic history of Europe is characterised by a complex pattern of formation and demise of land barriers and seaways between semi-enclosed basins of the Paratethys and Mediterranean Sea, and their connections with the North Atlantic and Indo-Pacific realms. The quantitative collections of marine molluscs accumulated during our previous projects provide an excellent tool for quantitative studies examining the effects of these palaeogeographic shifts and Cenozoic climate changes on temporal and spatial trends in biodiversity and community structure. The candidate will be able to develop their own ideas pertaining to the broad main focus of the project in cooperation with the supervisor and will benefit from the support of leading specialists in molluscan taxonomy and stratigraphic palaeoecology. Vast collections of standardised samples are already available and will make it possible for the student to test preliminary hypotheses at an early stage of the project. Additional field work is planned.

The official announcement of the position can be found at the Job Center of the University of Vienna. Applications including a letter of motivation (German or English) should be sent via Job Center to the University of Vienna (<http://jobcenter.univie.ac.at>) no later than 29.04.2014 (extension possible, please contact martin.zuschin@univie.ac.at) and be referenced to the identification number 4834. The contract is expected to start in June but can be postponed if necessary.

For further information please contact Martin Zuschin, Email: martin.zuschin@univie.ac.at, Tel. +43-1-4277-53555



Conservation palaeobiology of oil-polluted tropical marine biota in the Arabian Gulf University of Vienna

Research activities on marine molluscs are available for students of any level at the University of Vienna In the framework of the project "Conservation palaeobiology of oil-polluted tropical marine biota in the Arabian Gulf" (<http://www.univie.ac.at/conservationpalaeobiology/index.html>) the following research lines are available:

- Live-dead agreement study of benthos samples. Activities: sorting, species segregation and identification, dead-live agreement analysis.
- Taxonomy of bivalves from the Arabian Gulf (in cooperation with a major expert in the taxonomy of Indo-Pacific bivalves: Dr. Graham Oliver, Wales UK, starting March 2014). Activities: identification, morphometrics, literature research, description of new species, digital and SEM imaging.
- Faunal and taxonomic study of macro-molluscs (above 5 mm). Activities: sorting, species segregation and identification, digital and SEM imaging.
- Faunal and taxonomic study of micro-molluscs (below 2 mm). Activities: sorting, species segregation and identification, digital and SEM imaging.

In the framework of other on-going research projects:

- Taxonomy and biogeography of the hyper-diverse Indo-Pacific Triphoridae (sinistral gastropods). Activities: morphospecies segregation, identification, taxonomic study, biogeographic patterns analysis, digital and SEM imaging.

Contact Dr. Paolo G. ALBANO, Ph.D.
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FORTHCOMING MEETINGS

SEXUAL SELECTION IN SNAILS

An open meeting following the AGM of the Malacological Society of London

Flett Theatre, Natural History Museum, London

Thursday 6 March 2014

PROGRAMME

13.30 AGM

14.00 **David Reid** (Natural History Museum): **Introduction to sexual selection**

14.15 **Prof. Kerstin Johannesson** (University of Gothenburg): **Sexual selection and speciation in marine snails (*Littorina* spp.)**

<http://www.bioenv.gu.se/english/staff/kejo>

Sexual selection is common among snails and, typically, males prefer somewhat larger females over females smaller than their own size. A reason for this may be that fecundity of females increase with female size, in particular in species with large eggs. In this talk the mechanisms of sexual selection, and also its consequences on mating patterns and gene flow, will be presented for some species of *Littorina*. The results support hypotheses of sympatric speciation in these snails.

15.15 Tea

15.45 **Dr Joris Koene** (VU University Amsterdam): **Sexual selection in hermaphrodites: the role of accessory gland proteins** <http://www.falw.vu.nl/nl/onderzoek/ecological-sciences/animal-ecology/staff/joris-koene.asp>

Ejaculates often contain compounds that nurture sperm, eliminate rival sperm, and alter female physiology. These substances are produced in male accessory glands and increase the male's chances of fertilising eggs. In species with separate sexes, many studies have focussed on the evolutionary impact of such proteins on female reproductive behaviour, while simultaneous hermaphrodites have remained underexplored in this respect. The evidence for sexual selection in hermaphrodites will be reviewed, showing some of its bizarre consequences, and new findings will be presented on accessory-gland proteins in snails. In contrast to species with separate sexes, a simultaneous hermaphrodite has the unique possibility to alter its mating partner's male as well as female functions to its own benefit.

16.45 Discussion

17.00 Wine reception

18.00 Close

All are welcome. Registration is free but, to help estimate numbers for catering, please email David Reid <d.reid@nhm.ac.uk> if you plan to attend.





The Malacological Society of London is honoured to announce that it will host the 7th Congress of European Malacological Societies. The Congress will be held in the heart of the City of Cambridge at St Catharine's College. Founded in 1473, the College provides a wonderful mix of the old and the new, including a newly built conference centre and bar. Cambridge is a vibrant city with a wealth of museums, restaurants, pubs and other tourist attractions. London is just a 1hr train journey away. Please note: for unfortunate logistical reasons, EuroMal 2014 will be strictly limited to 150 participants. For further information, please visit the website at <http://euromal2014.malacsoc.org.uk/>

Guest speakers



Tom Wilke is an evolutionary biologist at Justus Liebig University in Giessen, Germany. He is Vice President of the German Malacological Society (DMG), Past President of the Society for Speciation in Ancient lakes (SIAL) and Director of the German-Colombian Center of Excellence in Marine Sciences (CEMarin). He published over 80 peer-reviewed papers, books and book chapters. Tom's major scientific interests are patterns and processes of speciation and radiation in space and time



Prof. Lloyd Peck (British Antarctic Survey, Cambridge) Lloyd Peck is based at the British Antarctic Survey, where he is a leading Antarctic scientist with over 200 refereed papers, major reviews and book chapters. His career includes the giving of over 30 keynote speeches, the prestigious 2004 Royal Institution Christmas Lectures and 15 televised lectures in Japan, Korea and Brazil. Lloyd's major scientific interests are in identifying how animals are adapted to their environments and how those adaptations affect capacities to respond or resist environmental change.

Registration costs are as follows

Early bird registration (before 30th June 2014)

Normal £250

Student £150

Late registration (1st July onwards)

Normal £300

Student £200

Conference dinner £40 (spaces limited)

Registration fees include a conference pack, book of abstracts, lunches and tea/coffee breaks.



Abstract submission

Authors must indicate whether they intend to give an oral or poster presentation. Please note that we are unlikely to be able to accommodate all offers of oral presentations; applicants who are unsuccessful in applying for an oral presentation will be offered the opportunity to present a poster instead. Abstracts must be accompanied by a completed and paid registration form and will not be included in the conference volume unless they are submitted in the format indicated below by 31 July 2014. All abstracts and presentations must be in English. Speakers must contact the organisers if they require special audio/visual equipment.

Accommodation

We have reserved accommodation at St Catherine's College for the duration of the Congress:

Single ensuite £64 per night

Single shared bathroom £47 per night

There are also 30 subsidised student rooms available on a first-come first-served basis charged at £30 per night.

These can be booked directly via a dedicated page on the College website:

<http://www.caths.cam.ac.uk/accommodation>

Delegates should enter the code EUROMAL14 to access preferential rates.

All rooms include breakfast and also come equipped with bath and hand towels, tea and coffee making facilities, free inter-

[DoubleTree Hotel](#)

Granta Place, Mill Lane
Cambridge
CB2 1RT
01223 259988
01223 259988

[The Varsity Hotel](#)

Thompson's Lane
(off Bridge Street)
Cambridge
CB3 8AQ
01223 306030
01223 306030

[Cambridge City Hotel](#)

20 Downing Street
Cambridge
CB2 3DT
01223 464491
01223 464491

[Hotel du Vin](#)

15-19 Trumpington Street
Cambridge
CB2 1QA
08447 364253
08447 364253

[YHA Cambridge](#)

97 Tenison Road
Cambridge
CB1 2DN



**Mollusks of the Eastern Asia and Adjacent Seas on October 6–8, 2014
First Announcement and Call for Abstracts**

The Russian Far East Malacological Society (RFEMS), jointly with the A.V. Zhirmunsky Institute of Marine Biology, Far East Branch of the Russian Academy of Sciences (IMB), the Institute of Biology and Soil Science, FEB RAS (IBSS) and the Primorye Branch of the Hydrobiological Society of the Russian Academy of Sciences (PB GBS), will hold a regional conference with international participation

The conference covers such aspects of regional malacology as faunal studies, distribution and biogeography, ecology, taxonomy and morphology of mollusks. The conference languages are both Russian and English. Russian-speaking participants are requested to provide a brief English summary and English captions in presentations. Registration fee for participants is 1000 rubles (about 31 USD), which includes a participant's file, abstract book, coffee breaks and reception dinner. The fee is paid at registration on the first day of the conference. A webpage of the conference will be available soon and regularly updated on the website of the RFEMS (<http://rfems.dvo.ru/>) in two languages. Vladivostok, the largest city and cultural, economic, and scientific capital of the Russian Far East, has about 600 000 inhabitants. The city is located at the Muravyev-Amursky Peninsula, surrounded by two large bays with a rich molluscan fauna. Direct flights to Tokyo, Beijing and Seoul make the city easy accessible for foreign participants.

If you wish to participate in the conference, please, send an abstract and contact data to the Secretary of the Organizing Committee, Dr. Elena M. Sayenko by e-mail (sayenko@ibss.dvo.ru). Abstracts must not exceed 3 pages and be written in English. Other logistics (hotels, transportation, visas, etc.) will be provided in the second information letter in spring of 2014.

Organizing Committee

Konstantin A. Lutaenko (Chair, A.V. Zhirmunsky Institute of Marine Biology, Far East Branch of the Russian Acad. Sciences)
Viktor V. Bogatov (Co-Chair, Institute of Biology and Soil Science, Far East Branch of the Russian Academy of Sciences)
Larisa A. Prozorova (Co-Chair, Institute of Biology and Soil Science, Far East Branch of the Russian Academy of Sciences)
Elena M. Sayenko (Secretary, Institute of Biology and Soil Science, Far East Branch of the Russian Academy of Sciences)
Alexey V. Chernyshev (A.V. Zhirmunsky Institute of Marine Biology, Far East Branch of the Russian Academy of Sciences)
Tatyana Ya. Sitnikova (Limnological Institute, Siberian Branch of the Russian Academy of Sciences)



GRANTS & AWARDS

DEADLINE May 15th 2013

**MALACOLOGICAL SOCIETY OF LONDON
TRAVEL AWARDS**

Contact—Dr Suzanne Williams,
 Natural History Museum, Cromwell Rd., London. SW7 5BD
s.williams@nhm.ac.uk



PLEASE NOTE—NO TRAVEL AWARDS WILL BE AWARDED THIS YEAR EXCEPT FOR ATTENDANCE AT EUROMAL IN SEPT. 2014



Society Awards and Grants

The Malacological Society of London makes a number of Awards and Grants. These are in addition to financial support for meetings, including travel bursaries to the Molluscan Forum.

Research Grants

The Research Grants Scheme was established to commemorate the Society's Centenary in 1993. Under this scheme, the Society anticipates making **at least five awards each year**, each with a value of **up to £1500** to support research on molluscs that is likely to lead to publication. The closing date for applications each year is **15th December**. Grants are preferentially conferred on students and researchers without professional positions, without regard to nationality or membership of the Society. Preference is also given to discrete research projects that fall within the subject areas covered by the Society's *Journal of Molluscan Studies*. Applications will be assessed by scientific merit, value of the project, and the extent to which the research will benefit the applicant's scientific aspirations. The successful applicants will be notified by 31st March and announced at the Annual General Meeting. The conditions of the award, notes of guidance and an application form are on the Society's website at www.Malacsoc.org.uk

Travel Grants

Travel Grants are available as bursaries to support attendance at a conference or workshop relevant to malacology. Grants are preferentially conferred on students and researchers without professional positions. The value of each of these awards is **up to £500**, and the Society anticipates that **at least five awards** will be made annually. The application should have the support of the project supervisor. In years when a UNITAS Congress is held, a number of these awards are likely to be used to support participation at this meeting. There are two closing dates each year, **30th June** for travel starting between 1st September of the current year and 28th February of the following year, and **15th December** for travel starting between 1st March and 31st August of the following year. The conditions of the grant, notes of guidance and an application form are on the Society's website at www.Malacsoc.org.uk. Preference will be given to members of the Society. PLEASE SEE THE PREVIOUS PAGE REGARDING TRAVEL AWARDS FOR SPRING/SUMMER 2014.

Sir Charles Maurice Yonge Awards

Successful applications for Research Grants or Travel Awards that are concerned with the study of *Bivalvia* may be awarded as Sir Charles Maurice Yonge Awards.

Annual Award

This Award is made each year for an exceptionally promising **initial contribution** to the study of molluscs. This is often a thesis or collection of publications. The value of the Award is **£500**. Candidates need not be a member of the Society but must be nominated by a member. There is no application form: the nominating member should send the material for evaluation with a covering letter or letter of support to the Honorary Awards Secretary. The closing date each year is **1st November**. The winner(s) will be notified by 31st March, and announced at the Annual General Meeting.

Applications

Applications for Research Awards and Travel Grants should be sent by post, not email, to the **Honorary Awards Secretary**, Dr Suzanne Williams, Natural History Museum, Cromwell Rd., London. SW7 5BD

Enquiries may be made by post, or by email to s.williams@nhm.ac.uk



SOCIETY NOTICES

SOCIETY NOTICES

Objects

The objects of the Society are to advance education and research for the public benefit by the study of molluscs from both pure and applied aspects. We welcome as members all who are interested in the scientific study of molluscs. There are Ordinary Members, Student Members and Honorary Members. Members are entitled to receive a copy of the Journal and such circulars as may be issued during their membership. The society's Web Site is at:

http://www.Malacsoc.org.uk

Publications

The Society has a continuous record of publishing important scientific papers on molluscs in the Proceedings, which evolved with Volume 42 (1976) into the Journal of Molluscan Studies. The Journal is published in annual volumes consisting of four parts which are received by fully paid-up members and student members. Members also receive The Malacologist, the Bulletin of the Society, twice a year.

Meetings

In addition to the traditional researches on taxonomy and systematics, new experimental, chemical and molecular techniques are amongst the topics considered for discussion meetings and papers for publication in future volumes of the Journal.

Subscriptions

The Annual Subscription is due on 1st January each year.

- Ordinary Members £45 (or US\$ equivalent)
• Student Members £25 (or US\$ equivalent)

Methods of Payment

- (1) Sterling cheque to "The Malacological Society of London".
(2) Banker's standing order to: The Northern Bank (Sort code 95-01-49), 49-51 University Road, Belfast BT7 1ND, for the credit of "The Malacological Society of London" (a/c 70030422).
(3) Credit card: Overseas members ONLY may pay by credit card: the Society can accept VISA and MasterCard payments only. Please provide the Membership Secretary with your card number and expiry date, card type (VISA or MasterCard.), the name on the card, and the cardholder's address (if this differs from your institutional address). Receipts will only be sent if specifically requested.
(4) Overseas members wishing to pay electronically should contact the Membership Secretary (R.COOK@KINGSTON.AC.UK) for SWIFT/BIC and IBAN numbers of our bank.

Institutional Subscriptions to the Journal

Enquiries should be addressed directly to Oxford University Press, Walton Street, Oxford OX2 6DP, U.K.

Change of Member's Address

Please inform the Membership Secretary of a change of postal or email address

Alternatively, use the address slip on the Journal wrapper

APPLICATION FOR MEMBERSHIP OF THE MALACOLOGICAL SOCIETY OF LONDON
I wish to apply for Ordinary*/Student* Membership (*delete one)
I enclose a cheque payable to "The Malacological Society of London" for my first annual subscription.
Title . . . Name
Department Institution
Street City
Post /Zip Code Country Email
Malacological Interests
Signature Date
Please send the completed form and cheque to the Membership Secretary:
Dr Richard Cook, School of Life Sciences, Kingston University, Penrhyn Road, Kingston-upon-Thames, Surrey KT1 2EE, U.K.

