UNITAS MALACOLOGICA

FOUNDED 1962

Newsletter

Number 36
Spring 2016

What's inside

Dear members,

Happy spring to all our members in the Northern hemisphere and happy autumn to the Southern hemisphere! This would be my second issue as Editor and there are some additional reads this time round (it gets better with experience).

This issue, we proudly present a message about the last leg of WCM 2016 preparations by Aileen Tan Shau-Hwai, Secretary updates from Jesús Troncoso, along with the upcoming NOMINATION preparations and deadlines for ballot submission and more membership updates as well as cautionary tales from our beloved Treasurer, Jackie Van Goethem.

Also in this issue are the reports from our 2014 Student Research Awards awardees: Silvia Lourenço and Lauren Sumner-Rooney.

What most members might not know is that the Unitas Malacologica newsletter not only functions as the society's current state report, but it also functions as a mean of spreading periodical information, hence its motto: ***Keeping the World of Malacology Informed.*** *We invite all our affiliated organization to kindly email us their conference brochures from time to time and maybe even some interesting articles not published elsewhere (we do not have an impact factor, if you do not mind).*

Somewhere in December 2015, I received correspondence from Dr. Keith Walker about an unpublished article on Haasodonta which he felt needed to be circulated. Hence, we agreed that his article made sense to be published here to highlight the issue at hand: "Is Haasodonta extinct?" Unfortunately, Dr. Keith Walker passed away in February 2016, before this newsletter was published. As a tribute, we are including his last article here for all to read and dwell upon.

Lastly, you will find the WCM 2016 pre-preparation updates from the Secretariat before your departure to Penang, Malaysia in July 2016. Next issue – autumn. ***GOC***

Our aim is to further the study of Mollusca by individuals, societies and institutions world-wide

Affiliated Organizations

American Malacological Society | Asociación Argentina de Malacología | Conchology, Inc. | Deutsche Malakozoologische Gesellschaft | Hungarian Malacological Society | Instituto Português de Malacologia | Koninklijke Belgische Vereniging voor Conchyliologie | Latvian Malacological Society | Malacological Society of Australasia Ltd | The Malacological Society of Japan | The Malacological Society of London | Malacological Society of the Philippines | Nederlandse Malacologische Vereniging | Sociedade Brasileira de Malacologia | Sociedad Española de Malacología | Sociedad Malacológica de Chile | Società Italiana di Malacologia | Société belge de Malacologie | Society for the Study of Molluscan Diversity, Japan

Newsletter Editor:

Ms. Geraldine O. Chang
School of Biological Sciences,
Universiti Sains Malaysia,
11800 Penang, Malaysia.
e.mail: goppietu@gmail.com

President's Message

Dear friends,

We are delighted to announce that WCM 2016 is just 2 ½ months away! The congress secretariat has indeed been working very hard to prepare an unforgettable congress for the participants. To sum up the registrations, I am providing the tentative participation by country through the registrations we have received.

This will also be my last opportunity to address the malacological community, as it is nearing the end of my Presidency. It has been a tremendous honour and opportunity for me to serve with the 2013 to 2016 UM Council members, especially to Jesus Troncoso and Jackie Van Goethem, who have been guiding me throughout my Presidency duration. I believe that Unitas Malacologica will constantly strive to move forward with the advancement of technology.

As seen in previous WCM congresses, the congress theme "*UNITY IN DIVERSITY*" adapts to the needs of the malacological field with UM backing up knowledge exchange in the form of travel grants for young researchers. UM has always been promoting the need for sustainable learning throughout generations of scientists to make our field relevant to all ages.

If it is not too late to ask for a favour from all of you, kindly *DO* consider giving back to UM by means of donations to the Endowment fund which will in turn benefit and sustain the need for knowledge exchange.

Here are some ways you can achieve that:
1) Simply donate to the UM Endowment Fund

2) Donate items with Mollusc themed designs for the UM Endowment Fund Auction, held during WCM 2016 in Penang (please ensure that no actual molluscs or mollusc parts are being used in the piece of art)

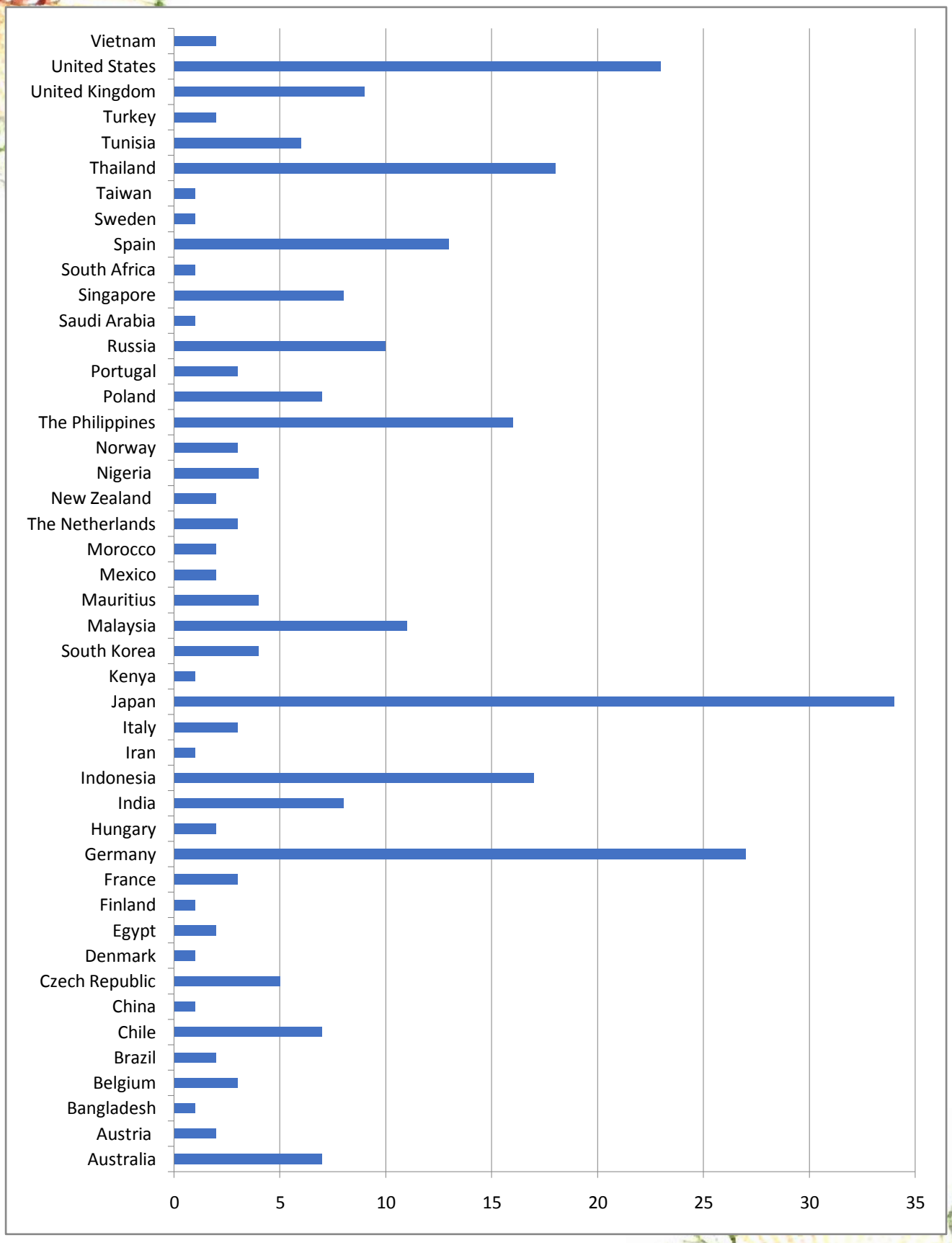
3) Bid for items at the UM Endowment Fund Auction. All proceeds will go to the UM Endowment Fund.

For more information on the items for auction, kindly refer to the Secretariat's booklet link available at the end of this newsletter. One final thing to entice your participation in WCM 2016:

Penang is popularly known as Food Heaven by the locals

Georgetown, being located in Penang Island, has been fêted as a UNESCO World Cultural Heritage Site, filled with tangible and intangible cultural heritage.You can be assured that WCM 2016 will be a memorable event. It is an honour for us to have all of you to be our most valuable guests. I look forward to seeing all of you in Penang soon!

Aileen Tan Shau-Hwai
President
aileen@usm.my


Vietnam
United States
United Kingdom
Turkey
Tunisia
Thailand
Taiwan
Sweden
Spain
South Africa
Singapore
Saudi Arabia
Russia
Portugal
Poland
The Philippines
Norway
Nigeria
New Zealand
The Netherlands
Morocco
Mexico
Mauritius
Malaysia
South Korea
Kenya
Japan
Italy
Iran
Indonesia
India
Hungary
Germany
France
Finland
Egypt
Denmark
Czech Republic
China
Chile
Brazil
Belgium
Bangladesh
Austria
Australia
0
5
10
15
20
25
30
35

Secretary's Column

Dear members,

Travel Grants WCM 2016

This July, we will convene in Georgetown, Penang, Malaysia to participate in WCM 2016. For this reason, in the first quarter of the year, the principal task of the UM Secretary and all Council members was to decide the winners of the travel grants to participate in WCM 2016. We have received atotal of 65 applications from 25 countries.

As you can see in the graphics, the United States of America (10) and Spain (7) show the highest number of applications, followed by the Philippines (6), Germany (6), Indonesia (4), India (3) and Russia (3); the other countries have submitted 1 or 2 applications. So, with such a high number of applicants, it was impossible for us to award all the candidates.

Out of the 65 applicants, we have awarded 48 grants. For this purpose, UNITAS *Malacologica* has dedicated a total sum of 31600 Euros, which represent a great effort for our Society.

Election of Councillors 2016 and venue for WCM 2019

According to Article IV (Section 1) of the UNITAS *Malacologica* Constitution, we need to elect **one (1)** new President, **one (1)** new Secretary and **two (2)** new UM Councilors in the next General Assembly to be held in Georgetown, in order to replace those who have reached the end of their term of service.

This time round, we have to replace Antonio Frias Martins (Past-President), Julia Sigwart (who served as Vocal and now stands for Secretary), Mark Davies (Vocal) and me (The Secretary). The good news is that our Treasurer, Jackie Van Goethem, has agreed to serve for another 3 years. On behalf of the Council, thanks Julia and Jackie for deciding to continue serving UNITAS; Tony, Mark, thank you so much for your interest and excellent work. As for myself, I would like to say that for me, it was a great pleasure and an honour to serve as Secretary of UNITAS for the past 6 years and thank you so much to all the people that have interacted with me.

So, this is the past, and now we must think of the future. For the next election, I have the pleasure to announce that **Terrence Gosliner** (California Academy of Sciences) stands for **President** and, consequently, **the next Congress will be in California!** Many thanks, Terry. As I have said, Julia will be appointed as Secretary and Jackie continues as Treasurer. As for new Vocals, the Council would like to propose the following names: *Suzanne Williams* (Natural History Museum of London) and *Gonzalo Giribet* (Harvard University).

A short biographical data for these candidates is included on the ballot page (*see page7 and 8*)

Please complete the ballot in *page 9* of this newsletter and post, fax or e-mail it back to me by **10th July 2016.**

See you in Penang!

Student research awards

In the following pages, you can read the reports of Silvia Lourenço (Portugal) and Lauren Sumner-Rooney (UK).

Jesus Troncoso
UM Secretary

Nominations

PRESIDENT (2016-2019)

Terrence Gosliner

Dr. Gosliner is leading researcher in the evolutionary history of nudibranchs (the colorful group also known as sea slugs) and has published more than 150 scientific papers and six books in his career. His research focuses on the evolution and adaptive radiation of opisthobranch mollusks, especially nudibranchs or sea slugs. He utilizes phylogenetic techniques, both morphological and molecular to reconstruct the evolutionary relationships of major groups of opisthobranchs. With these phylogenies, he studies adaptive radiation, evolution of colour patterns and implications to conservation biology. Fundamental studies of opisthobranchs also focus on documenting biodiversity, with a focus on the Coral Triangle of the western Pacific. Approximately 40-60% of the species that have been collected from tropical regions are undescribed species and currently, members of his lab are describing many of these species within taxonomic revisions. Additionally, he has conducted extensive field-work in southern Africa, Madagascar, the Seychelles, Papua New Guinea, Mexico, Costa Rica, the Galápagos Islands and California. His work has been supported by NSF to train the next generation of opisthobranch workers, including undergraduates, Masters' students, PhD students and postdoctoral fellows. Other aspects have been supported by several grants from the National Science Foundation, the National Oceanic and Atmospheric Administration and California Sea Grant.

His field studies have uncovered more than one thousand new species and have taken him to southern Africa, the western Indian Ocean, Papua New Guinea, the Philippines, and Hawaii. Since 1992, he has focused his research on the nudibranch fauna of the reefs of the Philippines, documenting the most diverse marine ecosystems of the world. He was instrumental in developing the Philippines coral reef exhibit at the Academy and has worked actively to strengthen ties with Bay Area Filipino communities. He also has extensive experience in building collaborations to support sustainable management and conservation of the rich reefs of the Philippines. Dr. Gosliner is also a champion of educational outreach, particularly in the Philippines, where he has worked with local researchers, educators and community leaders to share knowledge and resources with locals, empowering them to prioritize conservation in Philippines waters rich with biodiversity. He recently lead the 2011 Philippines Biodiversity Expedition that documented remarkable new biodiversity from Philippines forest, coral reefs and deep-sea environments and is currently leading biodiversity studies in the Verde Island Passage of the Philippines, where he conducted a major expedition in 2014 and 2015.

Dr. Gosliner first joined the Academy as an Assistant Curator in 1982 and has previously served as Director of Research, Provost of the Academy and Dean of Science and Research Collections. He received his Bachelor of Arts from the University of California at Berkeley in 1972, his Masters of Science from the University of Hawaii in 1973 and his PhD. from the University of New Hampshire in 1978.

SECRETARY

Julia Sigwart

Julia is a senior lecturer (associate professor) in marine biology in Queen's University Belfast and the associate director of the Queen's University Marine Laboratory in Portaferry, Northern Ireland. From 2015-2018 she is based in University of California, Berkeley, on an extended sabbatical funded by a research award from the European Commission. She began her professional malacological career as a collections manager at the American Museum of Natural History (New York), and later completed her PhD while working as research coordinator in the National Museum of Ireland, Natural History (Dublin). Her research interests focus on the diversity and diversification of molluscs, particularly Polyplacophora. Julia is currently the co-Editor-in-chief of Journal of Natural History, the Secretary of the International Society for Invertebrate Morphology, and for UM she has served as the UM newsletter editor from 2004-2014, and on UM Council since 2010.

COUNCIL MEMBERS

Gonzalo Giribet

Gonzalo Giribet is the Alexander Agassiz Professor of Zoology in the Museum of Comparative Zoology and Professor of Organismic and Evolutionary Biology at Harvard University, Cambridge, Massachusetts, USA. Gonzalo has been interested in molluscs since an early age, first as an amateur malacologist. He did his undergraduate (1993) and PhD (1997) at the Universitat de Barcelona, moved to the American Museum of Natural History to do a postdoc, and started a tenure-track position at Harvard in 2000. As a professional zoologist he has been interested in reconstructing the molluscan tree of life using morphological and molecular data and has worked extensively on phylogenomics of molluscs with emphasis on the position of molluscs in the larger scheme of the tree of life as well as on the phylogeny of bivalves. He has published numerous molluscan phylogenies, including Polyplacophora, Cephalopoda, Gastropoda and Bivalvia. He currently serves as vice-president of the Spanish Malacological Society.

Suzanne Williams

Suzanne Williams is a Researcher at the Natural History Museum in London. Her research has been focused on marine invertebrates and molluscs in particular, with her first molluscan study on giant clams preceding her PhD at James Cook University. She has lived and worked in Australia, Panama and the UK. All her projects come back to a major overarching question, "*Where, when and how did biological diversity in the oceans originate?"* Her research attempts to identify the mechanisms that generate diversity in species-rich biomes (particularly the Indo-West Pacific Ocean) and the factors that drive cladogenesis and phenotypic diversity. She is the current President of the Malacological Society of London.

UNITAS MALACOLOGICA

Election of office bearers - 2016

Ballot Sheet

Office	Candidate	For	Against	Abstention
President	Dr. Terrence Gosliner			
Secretary	Prof. Julia Sigwart			
Council Member	Dr Suzanne Williams			
Council Member	Prof. Gonzalo Giribet			

The terms of office for President will be 2016-2019, and 2016-2022 for the Secretary and Council Members. The results will be announced at the General Assembly in George Town, Penang, July 2016.

Please insert a cross (X), for, against or abstention, for each candidate.

Post, fax or e-mail your complete form to:

Prof. Jesús Souza Troncoso
Secretary of UNITAS Malacologica
Department of Ecology and Animal Biology
Marine Sciences Faculty – UVIGO -
36310, Vigo, SPAIN

Fax: **+ 34 986 812556**
E-mail: **troncoso@uvigo.es**

Treasurer's Column

Dear members,

The World Congress of Malacology 2016, organized by Aileen Tan Shau-Hwai and her staff in Penang, Malaysia, is approaching. Many malacologists and PhD students applied for UM membership since they can benefit from a reduced WCM 2016 registration fee. Other advantages for UM members are the congress travel grants and the research awards.

Regarding the Penang Congress, the UM Council has decided to grant 31,600.00 Euros to be spent for travel grants. From the 65 applicants, no less than 48 PhD students and young researchers were successful. Participants from neighbouring countries received individual grants of around 400.00 Euros, while those from overseas received a maximum of 800.00 Euros.

Such financial effort is only possible by the generosity of former congress organizers who transferred a substantial benefit resulting from their congress to Unitas' Endowment Fund and of course by many members paying their membership dues on time and preferably in advance.

In my previous Column (Newsletter 35, p. 6), I have launched a practical way to pay for a life time UM membership based on an idea proposed by Liew Thor Seng.

In a nutshell: deduct your age from life expectancy in your country. Multiply the remaining years with 16.00 Euros and consider finalizing the amount upward… ☺

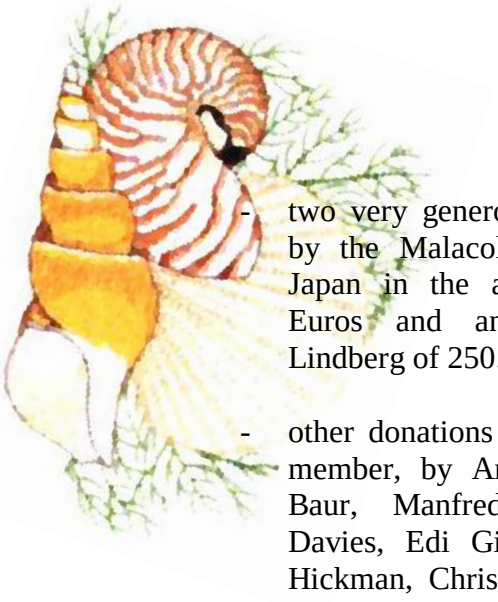
Happily *my dream* came true, although… it was a very short one. Anyway, Fred Wells and Antonio Frias-Martins paid a substantial amount to acquire life time UM memberships. At present, our count is three life time UM members. Other members such as Thierry Backeljau, Kurt Jordaens and Heike Wägele paid their membership dues some time ago, for 10 or even 20 years in advance.

Niko Malchus launched an alternative idea: a budget friendly one for younger members having less financial scope. Niko's idea is that young members may pay in advance an amount corresponding to their career up to the year of retirement. In that case, they can also be considered as life time members.

For me, that is also a valuable option. It saves time for the treasurer. Because it has to be said again that the most unpleasant task of a treasurer is to remind members to pay their dues. Honestly, most do not do so within a reasonable lap of time and that, I consider as a discourtesy. As a consequence, I am removing more than 100 names from our members list right now.

To end with a positive note, donations to the Endowment Fund are also key to set up activities that benefit PhD students and young researchers, in particular for the congress travel grants, the 1,000.00 Euros research awards and the congress prizes.

With great pleasure I can mention quite a lot of donations to the Endowment Fund received in the period September 2015 – April 2016:



- two very generous donations, one by the Malacological Society of Japan in the amount of 780.00 Euros and another by David Lindberg of 250.00 Euros,

- other donations by an anonymous member, by Anette Baur, Bruno Baur, Manfred Colling, Mark Davies, Edi Gittenberger, Carole Hickman, Christian Ibáñez, Mohd Zacaery Khalik, Angel Luque del Villar, Jaruwat Nabhitabhata, Maria Pardo Gandarillas, Willy Sleurs, Fred Wells, Pongrat Dumrongrojwattana,

- and round ups by Kepa Altonaga, Gizelle Batomalaque, Bastian Brenzinger, Irina Ekimova, Ian Gleadall, Seiji Hayashi, Anna Mikhlina, Barna Páll-Gergely, MakiriSei, Christiane Todt and Heike Wägele.

Thank you all very much!!

Best wishes.

Jackie Van Goethem
UM Treasurer

P.S. You may wish to use the form 'payment of membership' which is available at the UM website http://www.unitasmalacologica.org/membership.html.

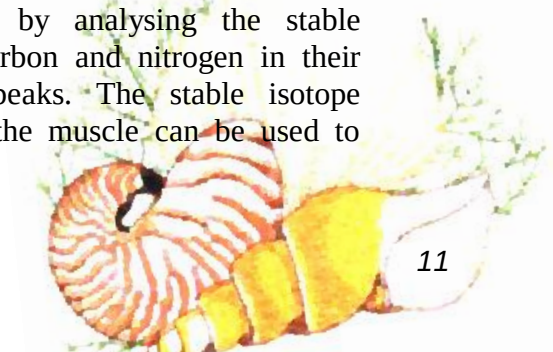
Student Research Awards 2014 Reports

Stable isotope signatures in the beaks and muscle of Cephalopods of different life cycle strategies

Introduction

The cephalopods evolved in the marine environment from an ancestral benthic mollusk to occupy the demersal and pelagic environments due to the acquisition of neutral buoyancy (by the development of an internal shell) and the increasing swimming capacity (by the development of the funnel and lateral fins). Being important prey and generalist predators in the marine ecosystems, the cephalopods have an important linkage role within the marine food web, assigned with one up to three trophic positions depending on the regional food-web analysed (Takai *et al*., 2000; Guerreiro *et al*., 2015). The analysis of the stable isotopes ratios of carbon (12C:13C, δ13C) and nitrogen (14N:15N, δ15N) allow us to identify food sources and energy links within the marine trophic web. While the δ15N content is an indicator of the consumer trophic position (Vander Zanden & Rasmussen, 2001), the δ13C content is used to identify primary production sources and habitat characteristics (Cherel & Hobson, 2007). The combination of these two sources of information allows defining trophic position, prey type and habitat at population or species level, and ultimately their isotopic niche (Newsome *et al*., 2007).

The present study aims to follow the impact of the changes in the diet of the cephalopods through their life cycle within the food-web by analysing the stable isotopes of carbon and nitrogen in their muscle and beaks. The stable isotope signatures of the muscle can be used to



assign present diet and habitat. The stable isotope signatures of the whole beak are indicators of the global habitat of the individual or population, and the stable isotope signatures of specific region of the beak (e.g. rostrum) are indicators of the diet or habitat in a specific life stage (e.g. paralarvae or early juvenile stage). In the present study, I analysed the muscle and whole beak stable isotope signatures as indicators of present and entire life cycle diet and habitat of *Alloteuthis subulata*, a benthopelagic species and *Octopus vulgaris*, a benthic species. Nitrogen and carbon stable isotopes of the two species where integrated in order to define the isotopic niches of the two species in the northwest Portuguese coast.

Methodology

The *A. subulata* samples (n = 15) were collected during a pelagic scientific survey conducted in March 2014, and the *O. vulgaris* (n = 10) from fisheries in June 2014. All individuals sampled were collected in shallow waters (between 20 – 100 m depth) of the Portuguese northwest coast, between 38.5°N and 39.5°N (Figure 1).

Each individual was weighted and its dorsal mantle length measured. Muscle and lower beak were sampled, frieze dried and milled to powder prior stable isotope analysis (SIA). The muscle samples were additionally rinsed successively in a 2:1 chloroform-methanol solution before milling. The stable isotope ratio analyses of carbon and nitrogen were conducted at the Stable Isotopes and Instrumental Analysis Facility (SIIAF) of the Centre for Environmental Biology (CBA), University of Lisbon - Portugal. 13C:12C and 15N:14N ratios in the samples were determined by continuous flow isotope mass spectrometry (CF-IRMS) (Preston & Owens, 1983) with precision of ≤ 0.2‰ of the isotope ratio analysis, calculated using values from 6 to 9 replicates of laboratory standard material interspersed among samples in every batch analysis.

A. subulata and *O. vulgaris* isotopic niches were defined by determining the Bayesian corrected standard ellipse areas (SEAc) of each species (Jackson *et al.*, 2011) and compared with the isotopic niches of *Loligo vulgaris* and *Illex coindetii*. *L. vulgaris* and *I. coindetii* isotopic niches were determined based on the beak samples collected in the same area of *A. subulata* and *O. vulgaris.*

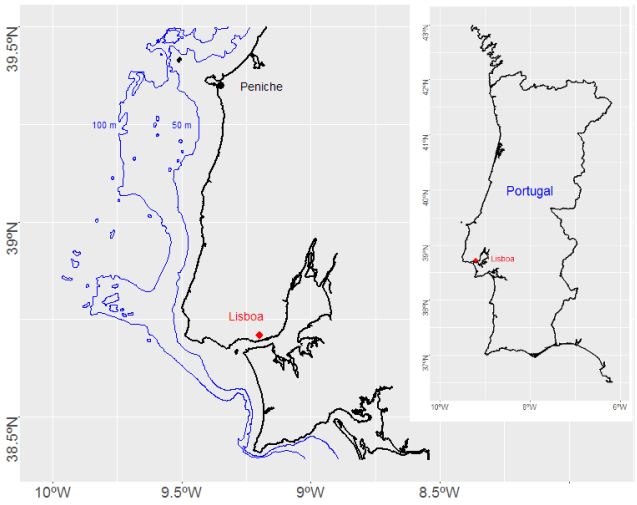


Figure 1 – The map represents the sampling area between 38.5ºN and 39.5°N in the Portuguese Northwest coast. Samples were collected between 20 m and 100 m depth.

Different tissues have different δ15N signatures. Generally, the δ15N content in the cephalopods' muscle increases approximately 3.4 ‰ in relation to their preys, while in the beak, the δ15N content is poorly enriched (Hobson & Cherel, 2006; Cherel *et al.*, 2009). In this study, both *A. subulata* and *O. vulgaris* beaks were 5.1 ‰ poorer in δ15N in relation to muscle (see points observations in Figure 2).

The beak grows by accretion of chitin (a nitrogen rich molecule) in a

protein matrix with no tissue turnover resulting in depletion of the isotope 15N and consequently low δ15N. This δ15N reflects almost directly prey trophic position (Miserez *et al.*, 2008; Cherel *et al.*, 2009). For this reason, Hobson & Cherel (2006) suggested using the beak isotopic signature to determine the trophic level of the cephalopod prey.

Considering that prey size and type varies along the predator life cycle, it should be expected to observe some variations in the δ15N content through predator life span (Bode *et al.*, 2006). Generically, this could be tested by comparing the δ15N with increasing size. In the present study, no relationship was found between *A. subulata* size and the δ15N in the beak and in the muscle. For *O. vulgaris*, δ15N in the beak and muscle decreased with increasing weight although the relationship found was not statistically significant. In cephalopods, size (mantle length or individual weight) is not directly proportional to age due to factors as variable growth rates dependent of maturity and the flexibility of the body structure.

The differences found in the beak stable isotope signatures between *A. subulata* and *O. vulgaris* reflected the different life strategies of the two species (see Figure 2 for comparison between two species). Both δ15N and δ13C beak signatures are significantly different between both species (δ15N and δ13C WKw = 17, $p<0.05$). While *A. subulata* beaks had a lower content in both δ15N (mean ± sd: 4.85 ± 0.73 ‰) and δ13C (-16.69 ± 0.47 ‰) in comparison to the *O. vulgaris* beaks (δ15N: 6.15 ± 0.45; δ13C: -16.1 ± 0.36). The lower δ15N signature in the beak of *A. subulata* is related with its pelagic behavior. Although living near the bottom, the *A. subulata* is a small (6 cm mean mantle length in the Portuguese coast) and pelagic long-finned squid that feeds in the coastal Atlantic waters on gobiids, clupeids, gadiids and *Ammodytes* spp. (Hastie *et al.*, 2013). On the other hand, *O. vulgaris'* higher content in δ15N (6.15 ± 0.45) and δ13C (-16.1 ± 0.36) reflects its benthic life cycle strategy. Although hatching as pelagic paralarvae, after 30 to 60 days the juvenile settle and start to feed on a diversity of benthic fauna, mostly crustaceans and bivalves that they found in the bottom.

But what is the impact of the benthopelagic cephalopods in the marine food-web of the coastal waters of the Portuguese coast? Do they feed on the same prey groups? Beak δ15N and δ13C signatures of *A. subulata* and *O. vulgaris* were compared with *L. vulgaris* (a coastal benthic long finned squid) and *I. coindetii* (an oceanic benthopelagic short finned squid) co-habiting the same geographical area. The beak mean δ15N of the four species ranges between 4.84 ‰ (*A. subulata*) and 7.26 ‰ (*I. coindetii*) with a difference of 2.42 ‰, inferior to 3.4 ‰ of δ15N fractioning between trophic levels determined by Vander Zanden & Rasmussen (2001).

This means that, despite the general idea of diversity of trophic levels among cephalopods (Cherel & Hobson, 2005; Coll *et al.*, 2013), in this region the four species most probably occupy the same trophic level. This is probably a consequence of the local food web low stratification. Generally, food webs under the influence of upwelling systems as in the Portuguese coast are structured in a small number of trophic levels and have low stratification (Sommer *et al.*, 2002). As a consequence, it is reasonable to think that the impact of cephalopods feeding behaviour and abundance variability in the lower level of the food web is very high. In fact, *A. subulata* and *O. vulgaris* are among the most abundant species of the Portuguese northwest coast (Sousa *et al.*,

2005; Pilar-Fonseca *et al.*, 2014) and the impact of their feeding behaviour in the lower trophic levels needs to be properly evaluated. However, it is noteworthy that the isotopic niches, represented in Figure 2 by the Bayesian ellipses, are well separated. This means that, at least for one of the two axes that can define species niche, habitat (δ13C) and trophic position (δ15N) the four species have different feeding preferences or different migratory behaviours avoiding competition between species.

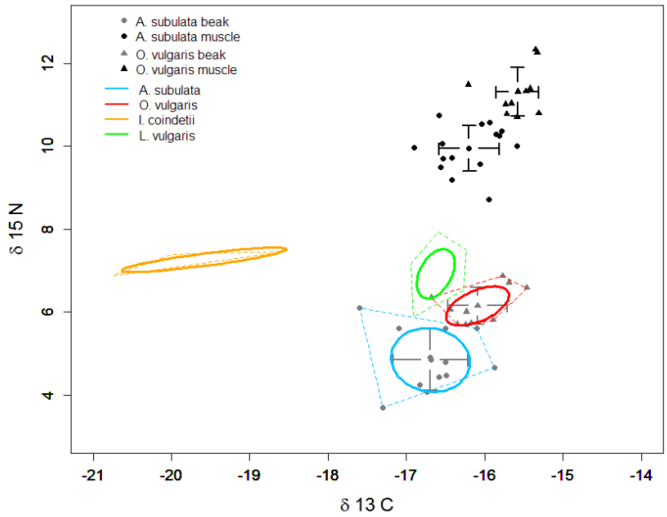


Figure 2 – δ13C and δ15N stable isotope signatures in the beak (grey) and muscle (black) of *Alloteuthis subulata* (bullets) and *Octopus vulgaris* (triangles) and isotopic niches represented by the bayesian standard ellipses determined based on the beak samples isotopic signatures of *A. subulata* (blue) and *O. vulgaris* (red) in comparison with other two squids present in the Portuguese coast, *Loligo vulgaris* (green) and *Illex coindetii* (yellow).

Sílvia Lourenço

Interdisciplinary Centre of Marine and Environmental Research - CIIMAR and Direção de Serviços de Investigação das Pescas, Direção Regional das Pescas da Região Autónoma da Madeira –DSIP; IPMA-PortugueseInstitute of Ocean and Atmosphere.

REFERENCES

Bode, A., Carrera, P and Porteiro, C. 2006. Stable nitrogen isotopes reveal weak dependence of trophic position of planktivorous fish on individual size: a consequence of omnivorism and mobility. *Radioactivity in the Environment*, 8:281–93.

Cherel, Y., Fontaine, C., Richard, P. And Labatc, J. P. 2009. Isotopic niches and trophic levels of myctophid fishes and their predators in the Southern Ocean. *Limnology and Oceanography*, 55: 324–32.

Cherel, Y. and Hobson, K. A. 2007. Geographical variation in carbon stable isotope signatures of marine predators: a tool to investigate their foraging areas in the Southern Ocean. *Marine Ecology Progress Series*, 329: 281–87.

Coll, M., Navarro, J., Olson, R. and Christensen, V. 2013. Assessing the trophic position and ecological role of squids in marine ecosystems by means of food-web models. *Deep Sea Research Part II*, 95: 21–36.

Guerreiro, M., Phillips, R. A., Cherel, Y., Ceia, F. R., Alvito, P., Rosa, R. and Xavier, J. C. 2015. Habitat and Trophic Ecology of Southern Ocean Cephalopods from Stable Isotope Analyses.*Marine Ecology Progress Series*, 530: 119–34.

Hastie, L. C., Allcock, A. L., Jereb, P., Lefkaditou, E., Moreno, A., Oesterwin, D. and Pierce, G. J. 2013.*Alloteuthis subulata*, European common squid. In: Rosa R, O'Dor R, Pierce G (eds) *Advances in squid biology, ecology and fisheries*, 109-122.

Hobson, K. A. and Cherel, Y. 2006. Isotopic Reconstruction of Marine Food Webs Using Cephalopod Beaks: New Insight from Captivity Raised *Sepia Officinalis*. *Canadian Journal of Zoology*, 84: 766–70.

Jackson, A. L., Inger, R., Parnell, A. C. And Bearhop, S. 2011. Comparing isotopic niche widths among and within Communities: SIBER - Stable isotope bayesian ellipses in R. *Journal of Animal Ecology*, 80: 595–602.

Miserez, A., Schnebeck, T., Sun, C., Zok, F. and Waite, J. 2008. The transition from stiff to compliant materials in squid beaks. *Science* 319: 1816–19.

Newsome, S. D., Martinez Del Rio, C., Bearshop, S. and Phillips, D. L. 2007. A niche for isotopic ecology.*Frontiers in Ecology and the Environment*, 5: 429–436.

Pilar-Fonseca, T., Campos, A., Pereira, J., Moreno, A., Lourenço, S. and Afonso-Dias, M. 2014. Integration of Fishery-Dependent Data Sources

in Support of Octopus Spatial Management.*Marine Policy*, 45: 69–75.

Preston, T. and Owens, N. 1983. Interfacing an automatic elemental analyser with an isotope ratio mass spectrometer: the potential for fully automated total nitrogen and nitrogen-15 analysis. *Analyst*, 108: 971-977.

Sommer, U., Stibor, H., Katechakis, A., Sommer, F. and Hansen, T. 2002. Pelagic food web configurations at different levels of nutrient: t richness and their implications for the ratio fish production: Primary - production. *Hydrobiologia*, 484:11-20.

Sousa, P., Azevedo, M. and Gomes, M. C. 2005. Demersal Assemblages off Portugal: Mapping, seasonal, and temporal patterns. *Fisheries Research*, 75: 120–37.

Takai, N., Onaka, S., Ikeda, Y., Yatsu, A., Kidokoro, H. and Sakamoto, W. 2000. Geographical variations in carbon and nitrogen stable isotope ratios in squid. *Journal of the Marine Biological Association of the UK*, 80: 675-684.

Vander Zanden, M. J. and Rasmussen, J. B. 2001. Variation in δ15N and δ13C trophic fractionation: Implications for aquatic food web Studies. *Limnology and Oceanography*, 46: 2061–66.

What does the Schwabe organ do? An electrophysiological study of a novel sensory organ

Introduction

Since the discovery of the Schwabe organ, a new sensory structure in lepidopleuran chitons (Sigwart *et al*., 2014), additional anatomical observations and behavioural experiments have drawn important parallels with the larval eye. The two structures appear to be positionally homologous and both appear to be sensitive to light (Sumner-Rooney & Sigwart, 2015). It is hypothesised that the Schwabe organ may represent a larval eye which is retained in adult chitons. However, a direct approach was needed to establish a causal link between alight stimulus, the Schwabe organ itself and an observed light-avoidance response. Electrophysiology, the direct measurement of electrical potential changes in living tissues, can provide this information.

Molluscs have made substantial contributions to the field of neurobiology and the phylum has provided several invaluable model organisms, notably *Aplysia californica* and several cephalopods. However, recordings have never been made directly from the nerves of a chiton despite their putative position as the most primitive molluscan class. The ability to reliably record nervous activity in chitons would not only significantly advance our knowledge of the Schwabe organ and its role, but would offer greater opportunities to use chitons as a new model system for neurobiologists. The development of robust and dependable novel protocols for electrophysiological studies of chitons is a priority, and here I used the Schwabe organ as a target system within chitons in order to achieve this.

A student research award awarded by *Unitas Malacologica* allowed me to undertake a three-week research trip to Heriot-Watt University in Edinburgh, Scotland, to develop electrophysiological protocols for recording from chiton nerves under the guidance of electrophysiology expert, Dr Euan Brown and then use these to study the responses of *Leptochiton asellus* to a variety of stimuli at Queen's University, Belfast. In Edinburgh, I examined and tested a wide range of techniques throughout the recording process in order to identify the most suitable equipment and methods. Animal preparation, dissection method, electrodes, amplifiers, filters and grounding were all exhaustively tested. I then optimised and applied these to test the sensitivity of both the Schwabe organ and the anterior nervous system to a variety of stimuli,

including light, food odour, conspecific odour and vibrations.

Chitons proved to be robust subjects for electrophysiological preparations and we were successful in taking many *en passant* extracellular recordings of nerve activity. Spiking was recorded immediately following the application of light stimuli in the region of the Schwabe organ on several occasions; however overall levels of activity were low, even in the anterior nerve ring and this combined with the challenge of targeting the correct nerves in an understudied system made it difficult to replicate observed physiological responses.

However, during the course of this project, I did observe a previously unreported response to vibration stimuli which was consistently found across numerous subjects in the same antero-lateral region of the anterior nerve ring. Chitons notably lack statocysts and no alternative vibration-sensitive organ has been discovered in the class. There are numerous tactile elements in the girdle and doubtless in the foot, and there are thousands of thick ciliary tufts throughout the pallial cavity which could be mechanosensory, but these are not concentrated in the anterior part of the body (Leise & Cloney, 1982; Sumner-Rooney *et al*., 2014). Given that there appears to be no obvious discrete vibration sensor in this region, the results suggest that vibration signals are being processed in a particular region of the nerve ring, representing a relatively advanced state of organisation in the central nervous system. This is an exciting possibility in chitons, which are not traditionally considered to possess a brain. Relatively higher levels of spontaneous activity in the anterior and lateral parts of the circumoesophageal nerve ring compared to other areas such as the sizeable lateral nerve cords also suggest an anterior concentration of nervous activity and support an argument for basic levels of cephalisation in *Leptochiton asellus* (Sigwart *et al*., 2014).

The support of *Unitas Malacologica* enabled me to learn, test and refine electrophysiological techniques specifically optimised for use in Polyplacophora. With these methods I have successfully recorded genuine nervous activity from several points within the chiton nervous system for the first time, identified a specific response elicited rapidly and reliably by a mechanical stimulus. Now that these techniques and the viability of chitons as electrophysiological subjects are established, future work on the electrophysiology of chitons has great potential to reveal much about the evolution of molluscan nervous system.

Acknowledgements

Many thanks to Dr Euan Brown (HWU), Dr Chris Johnson (QUB) and Professor Shaun Cain (EOU) for their expertise and assistance with this work. I am very grateful for funding for financial support received from *Unitas Malacologica*.

Lauren Sumner-Rooney

REFERENCES

Leise, E. M. and Cloney, R. A. 1982. Chiton integument: Ultrastructure of the sensory hairs of *Mopalia muscosa* (Mollusca: Polyplacophora). *Cell Tissue Research*, 223:43–59.

Sigwart, J. D., Sumner-Rooney, L. H., Schwabe, E., Hess, M., Brennan, G. P. and Schrödl, M. 2014. A new sensory organ in "primitive" molluscs (Polyplacophora: Lepidopleurida), and its context in the nervous system of chitons. *Frontiers in Zoology*, 11: 7.

Sumner-Rooney, L. H., Cain, S. D., Brennan, G. P. and Sigwart, J. D. 2014. A test for mucus removal in the chiton *Lepidochitona cinerea* (Linnaeus, 1767) (Polyplacophora: Chitonida: Ischnochitonidae). *The Veliger*, 51:269–272.

Sumner-Rooney, L. H. and Sigwart, J. D. 2015. Is the Schwabe organ a retained larval eye? Anatomical and behavioural studies of a novel sense organ in adult *Leptochiton asellus* (Mollusca, Polyplacophora) indicate links to larval photoreceptors. *PLoS One*, 10:e0137119. Public Library of Science.

Appendix

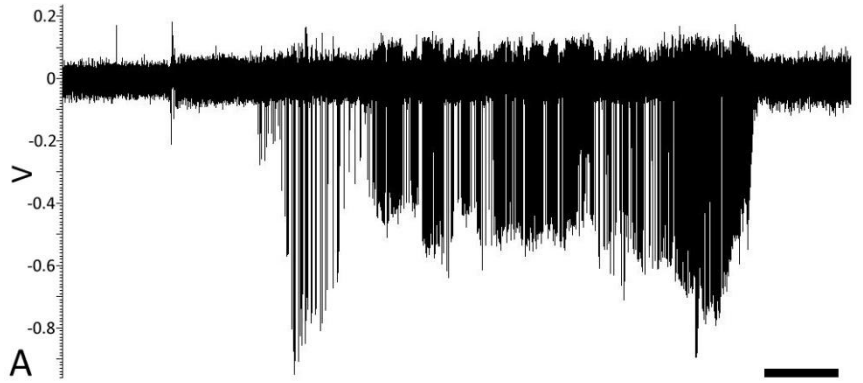


Figure 1 **Spontaneous activity from the anterior nerve ring of *Leptochitonasellus.*** Scale bar, 5 s.

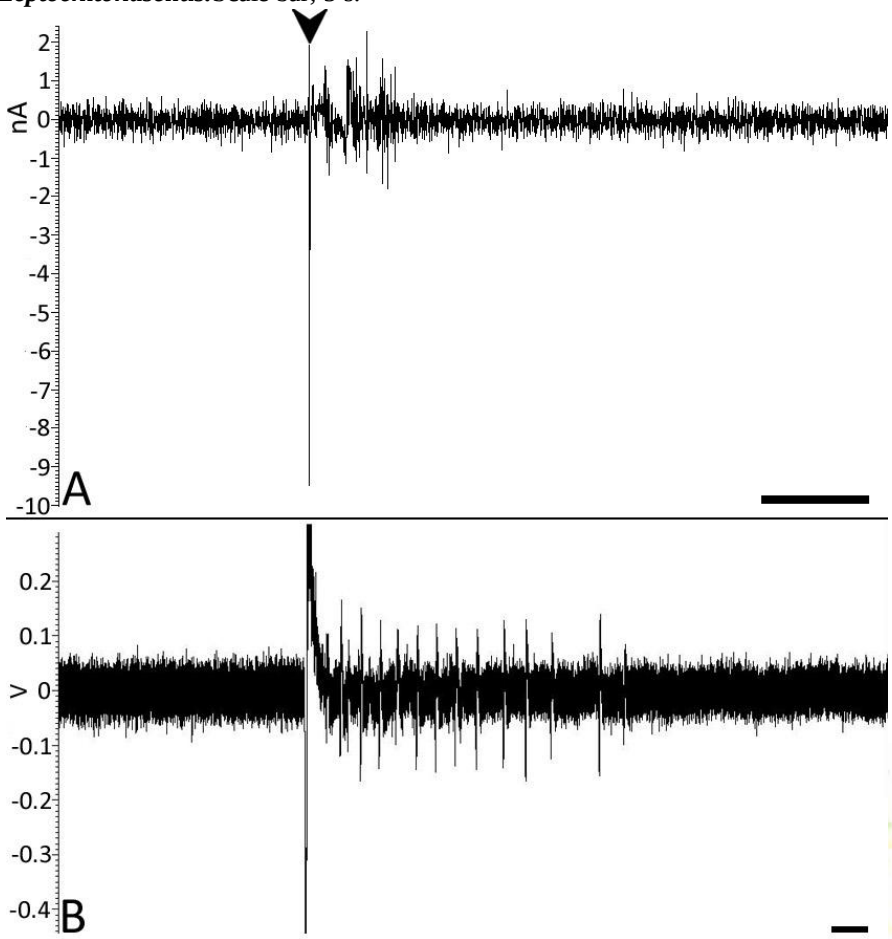


Figure 2 Responses to stimuli in *Leptochiton asellus.* **A,** Spiking in the lateral nerve cord in response to illumination. Scale bar, 0.05 s. **B,** A response to vibrations recorded from the anterior commissure (see Figure 4.2, position 8). Scale bar, 1 s. Arrowhead in **A** and **B** indicates stimulus application and associated artefact.

A tribute to Dr. Keith Walker

Apakah *Haasodonta* Punah?

An interesting genus of freshwater mussels from Indonesian Papua,not seen by biologists for many years

The shells of many freshwater mussels (Unionida) look similar at a glance, but there are eye-catching exceptions like *Haasodonta* from Papua Province, Indonesia. The shells have their posterior ridge inclined downward, and look a little like a stone axe.

Haasodonta fannyae

Even so, few people (other than local folk) have seen them. The specimens in the Australian Museum are 60 years old and they are merely shells. We now know better than to discard the animal within.

There are two species of *Haasodonta*, known from only a small region and as their environment has changed in recent years, there is reason to wonder if they have survived. Extinctions of freshwater mussels have occurred in other parts of the world.

There is more to *Haasodonta* spp. than a curious shape. Partof the mystery is in their distribution.

Wallacea

For most of the last two and a half million years, Australia and New Guinea were joined by a land bridge. The connection waxed and waned with changing sea levels and was severed at the end of the last Pleistocene glaciation, 12,000 years ago. Nevertheless, the two landmasses geologically are parts of one continent, known as *Sahul*. To the west is *Sunda* (South East Asia), including the Malay Peninsula, Sumatra, Borneo, Java and Bali.

Between the continental shelves that support *Sunda* and *Sahul* are 90 m deep seawater straits, in a region known to biogeographers as *Wallacea*. The region includes Sulawesi, Lombok, Flores, Timor, Seram and many more islands. Its name honours the celebrated naturalist Alfred Russel Wallace (1823-1913).

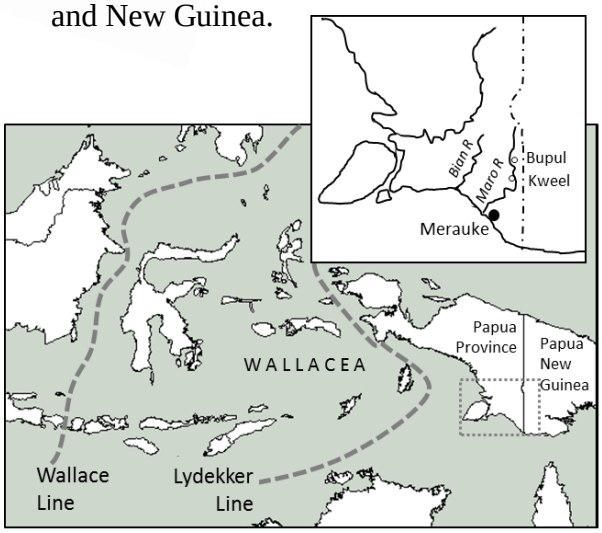
Wallace's Line is at the western boundary and to the east is *Lydekker's Line*, named after another naturalist, Richard Lydekker (1849-1915). Between the boundaries, there is some mingling of flora and fauna from the two continents, but *Wallacea* above all is a barrier.

While the islands of *Wallacea* sometimes have been joined to their parent continents, the deep-water barrier has stayed intact for more than 50 million years. As a consequence, the faunas of Asia and Australia have evolved mainly in isolation. For example, *Sahul* now is home to marsupials whereas *Sunda* has placental mammals. Many groups of animals are divided in this way.

Freshwater mussels are among those groups. In *Sunda*, the Unionidae are dominant, with species across Asia, Europe and North America. In *Sahul*, their counterpart is the Hyriidae.

At one time, the Hyriidae were residents on Gondwana. As the supercontinent broke apart, South

America, Australia and New Zealand progressively split from Antarctica, and one another, between 40 and 110 million years ago. Through all that time, through immense changes in climate and geology, through the rise and fall of the dinosaurs, the Hyriidae have endured. Today, they are found in South America and New Zealand, the Solomon Islands, Australia and New Guinea.



Australia and New Guinea

The freshwater mussels of Australia and New Guinea are close kin. Australia has 18 species of Hyriidae whereas New Guinea has nine species and two (*Alathyria pertexta*, *Velesunio wilsonii*) are shared.

The regional mussel fauna was last revised 60 years ago, in a time that pre-dated ideas about continental drift, cladistics in taxonomy and genetic (molecular) methods. Those newer ideas and methods have changed our under-standing (and will continue to do so), and should solve some long-standing mysteries. Not least among them is *Haasodonta*.


Physunio

Haasodonta probably is not a member of the Hyriidae, but one of the Unionidae. The shells do bear some resemblance to those of *Physunio*, a unionid from South East Asia, but it is not possible to be surebecause all we have are shells. Comparative anatomy would settle the issue, and even a mere sample of tissue could reveal relationships through analyses of allozymes and mitochondrial DNA.

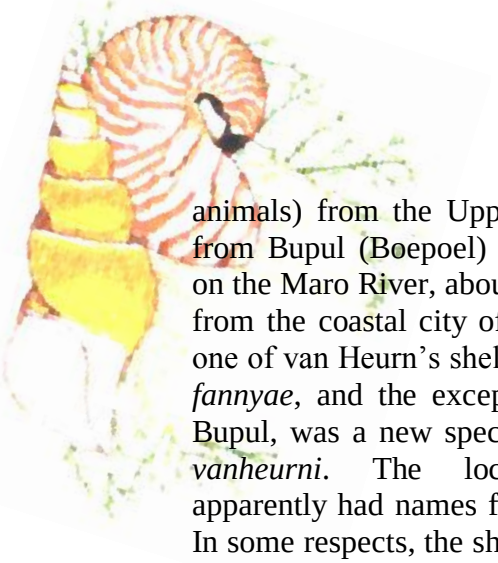
If *Haasodonta* spp. are indeed members of the Unionidae, they are the only freshwater mussels known to have crossed Wallace's Line. That could have occurred through transport as glochidia (mussel larvae, parasitic on fish). Another possibility is that *Haasodonta* or an ancestor was transported by humans.

History of Haasodonta

A *Haasodonta* shell was first collected in 1926 by an anthropologist, Patrick (PTL) Putnam, from the Maro River in Merauke Regency, in what then was Dutch New Guinea. In 1948, Richard Johnson, malacologist at the Museum of Comparative Zoology at Harvard, described it as *Hyridella fannyae*, named for Miss Fanny Day Farwell.

In 1956, Don McMichael of the Australian Museum, Sydney, saw that Johnson's species did not fit *Hyridella*. He erected a new genus, *Haasodonta*, honouring Fritz Haas, who fled Nazi Germany in 1938 and for many years was a curator at the Field Museum of Natural History in Chicago.

Two years later, McMichael teamed with Ian Hiscock of the University of Queensland to produce a seminal revision of the freshwater mussels of Australasia. In 1957, in the course of theirwork, McMichael and Hiscock received from Jonkheer EW van Heurn, an agricultural adviser to the government in Merauke, a number of shells (again, no



animals) from the Upper Bian River and from Bupul (Boepoel) and Kweel (Kwel) on the Maro River, about 200 km upstream from the coastal city of Merauke. All but one of van Heurn's shells was *Haasodonta fannyae*, and the exception, a shell from Bupul, was a new species to benamed *H. vanheurni*. The local people also apparently had names for the two species. In some respects, the shell of *H. vanheurni* is intermediate between that of *H. fannyae* and *Alathyria*, hinting that it could prove to be a hyriid after all.

Other freshwater mussels from these localities include *Microdontiaano dontaeformis*, *Virgus beccarianus*, *Alathyria pertexta* and *Velesunio wilsonii*. The first two are widely distributed in New Guinea, but the latter twoare the only records from New Guinea of species otherwise widespread in Australia. There is some doubt over the records of *A. pertexta*, from the Upper Bian and Maro rivers, but that cannot be resolved from shells alone.

In *H. fannyae*, the hingeline is about equal to the length of the shell and the posterior margin is at an angle of 90°or less relative to the dorsal margin. In *H. vanheurni*, the hingeline is distinctly less than the shell length and the posterior margin is at an oblique angle. The shells of *H. Fannyae* are up to 90 mm long; the sole specimen of *H. Vanheurni* is112 mm.

A changed environment

In 2010, the Indonesian Government established the *Merauke Integrated Food and Energy Estate* (MIFEE), creating plantations forfood and energy. One of the plantation crops is oil palm (*Elaeis guineensis*), yielding oil that is used around the world in products like toothpaste and household detergents. In the regions where *Haasodonta* occurs, forests have been burned and clear-felled, and there are disturbing reports of social upheavals. MIFEE is a contentious project in Indonesia.

A press release in December 2012 **from the Indigenous Peoples Organization of Bian Enim** said, in part:

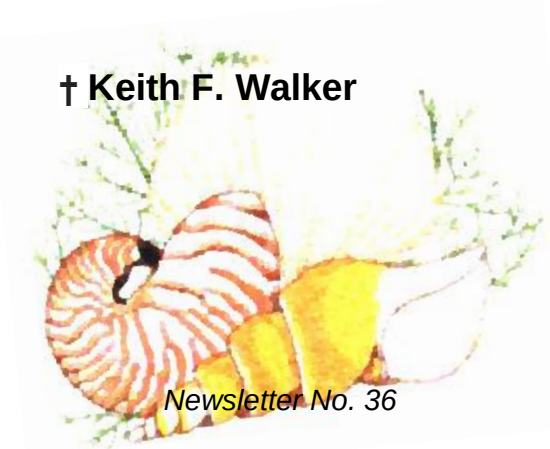
> *The presence of company and investment development on our customary land has caused several impacts, which we face direct and indirectly. One of the impact that clearly occurs is water contamination which is followed with phenomenon of dead fishes,turtles and other water animals, which people believes that these are affected by company's waste where is located on the edge of Bian River. Moreover, the water from river and swamp that we have been using and consuming for our daily needs, e.g. drinking, cooking, bathing, and others, can no longer be used by us anymore. The kids who bathe in the river and swamp has got health problems on the skin, digest problems, coughs and other health problems. In compensation, we have to walk miles and miles to get fresh and clean water...*

Source: http://westpapuamedia.info/2013/01/08/the-impact-of-mifee-presence-at-bian-river-and-maro-river-west-papua/

This is not the place to debate the pros and cons of MIFEE, but statements like the one above are alarming, for the sake of the indigenous people and their environment.

Freshwater mussels have met many environmental challenges over many millions of years, and here is another. Is *Haasodonta* extinct?

† Keith F. Walker



Bogan, A. E. 2006. Conservation and extinction of the freshwater molluscan fauna of North America, In: Sturm, C.F., Pearce, T.A. & Valdés, A. (eds), *The Mollusks: A Guide to Their Study, Collection and Preservation*. American Malacological Society, 373-383.

.

Johnson, R. I. 1948. A new naiad from Dutch New Guinea. *Nautilus*, 62: 47-48.

McMichael, D. F. & Hiscock, I. D. 1958. A monograph of the freshwater mussels (Mollusca: Pelecypoda) of the Australian Region. *Australian Journal of Marine and Freshwater Research*, 9: 372-508.

McMichael, D. F. 1956. Notes on the fresh-water mussels of New Guinea. *Nautilus*, 70: 38-48.

Obidzinski, K., Andriani, R., Komarudin, H. & Andrianto, A. 2012. Environmental and social impacts of oil palm plantations and their implications for biofuel production in Indonesia. *Ecology and Society*, 17: 25-44.

Walker, K. F., Byrne, M., Hickey, C. W. & Roper, D. S. 2001. Freshwater mussels (Hyriidae) of Australasia. In: Bauer, G. & Wächtler, K. (eds) *Ecology and Evolution of the Freshwater Mussels Unionoida*. Springer, Berlin, 5-31.

Walker, K. F., Jones, H. A. & Klunzinger, M. W. 2014. Bivalves in a bottleneck: taxonomy, phylo-geography and conservation of freshwater mussels (Bivalvia: Unionoida) in Australasia. *Hydrobiologia*, 735: 61-79.

Internet

Graf, D. L. & Cummings, K. S. 2015. The freshwater mussels (Unionoida) of the world (and other less consequential bivalves), updated 5 August 2015. Mussel Project Web Site: http://www.mussel-project.net/

Government in Merauke: http://www.merauke.go.id/portal/

Information about MIFEE: https://awasmifee.potager.org/

West Papua Independent Human Rights Media: http://westpapuamedia.info/

Upcoming Conferences

2do. Argentine Congress of Malacology

August 10−12, 2016-Mendoza, Argentina

CCT-CONICET-Mendoza Universidad Nacional de Cuyo

2 CAM

Program of Activities

1. Conferences

Dr. Pablo E. Penchaszadeh (MACN-CONICET) Gastropod reproduction modalities in deep water gastropods from Argentina.

Pablo R. Martin (INBIOSUR-CONICET) Snail without borders: patterns and process in fresh water environments of Argentina.

Sonia Barbosa dos Santos (UERJ-Brasil) IUCN criteria and categories for risk assessment of mollusk extinction: the case of Brazil.

Gustavo A. Darrigran (UNLP-CONICET) Strategies to prevent the spread of bioinvadersmolluscs.

2. Symposia Sessions

What do we mean when we talk about land snails? Contact: Cuezzo, Maria Gabriela (UNT-CONICET).

Mollusks of Argentina and its history through the Phanerozoic.Contact: Ferrari, Mariel (CENPAT-CONICET) & Echevarria, Javier (UNLP-CONICET).

Mollusks of the Argentine Sea and surrounding waters. Contact: Zelaya, Diego (UBA-CONICET).

Fresh water bivalves. Contact: Clavijo, Cristhian (National Museum Natural History, Montevideo; InvBiota Uruguay).

Genetic of Mollusks. Contact: Vogler, Roberto (UNaM-CONICET) & Bertramino, Ariel (UNLP-CONICET).

3. Workshop

South American Mollusk Conservation: Standardizing risk criteria. Coordinator: Rumi Machi Zubiaurre, Alejandra (UNLP-CONICET).

For more information, visit:
http://malacoargentina.com.ar/blog/category/2cam/

The World Congress of Malacology 2016 Secretariat Updates

Dear Malacological Community,

We have closed our registrations for WCM 2016 and are now in the final leg of preparations for the congress. We are happy to announce that we have hit our target of 250 participants and we cannot wait to meet all of you in Penang. We wish that you will have a blast in Penang, Malaysia. To help you with pre-congress preparations, we have prepared a congress preparation book which can be found on our website: http://wcm2016.usm.my/ to get you started with packing, visas, flights and other arrangements.

As a treat from us, we invite all WCM 2016 participants to attend a **complimentary dinner (on us) on 19th July 2016** at the highest restaurant in Penang with 360° view.

There will also be a formal farewell dinner (included in the registration fees) on 24th July 2016, where we will be feasting on an 8-course Chinese dinner and where student awards are given out. The attire for the farewell dinner is **FORMAL**. Please dress your best as this will be the last photo-op with friends you have met in Penang.

Last but not least, we are announcing the **first** ever UM Endowment Fund Auction to be held during WCM 2016. All proceeds will go to the UM Endowment Fund. Refer to the congress preparation booklet for more details.

See you in Penang!

- The WCM 2016 Secretariat