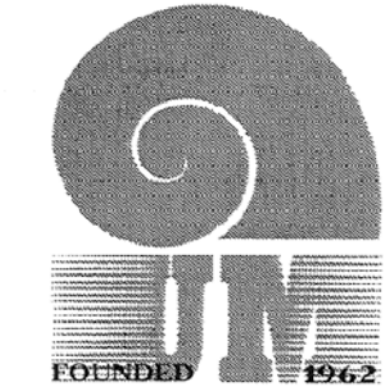
ISSN 1011-2375

UNITAS MALACOLOGICA



Newsletter

Number 28
November 2009

What's Inside

Dear Members,

Everyone is anxious for news of the exciting 2010 Congress in Phuket, Thailand. Somsak Panha is doing a brilliant job organising what promises to be a great meeting. In particular, please note that the dedicated Congress website – **www.wcm2010.com** – is full of detailed information and the full instructions for registration and submission of abstracts.

It has also been a busy period with other UM business. Importantly, the UM website has moved to a permanent 'non-denominational' address, independent of any academic institution for the first time. You may not notice the difference, as it looks exactly the same, but please note the new URL for your reference:

www.unitasmalacologica.org

This issue contains excellent reports on the research from our four student award winners from last year (volute digestion, p. 4; larval dispersal and speciation, p. 6; landsnails and leaf rot, p. 8; microsnails and habitat quality, p. 9). The quality and detail of these reports should be a guideline for this years' winners and future applicants. In 2009 there were only two student research awards made, and we heartily congratulate those two young malacologists (p. 4).

I am happy to see additional short research reports from the 'grown up' membership, and as always your contributions (research, book reviews, puzzles, etc.) are very welcome.

These newsletters usually occur at intervals that may appear erratic to the casual observer, but which are in fact carefully timed at 8-monthly intervals. But occasionally, such as in this issue, the sequence is genuinely without order. The present issue was expected in August 2009, but was delayed when I moved to a new academic position this summer, where I am now in charge of the marine station in beautiful Strangford Lough, a giant marine lagoon in Northern Ireland (note the new address below).

The next issue, UMN29, will be published in **April 2010**, with final information about WCM2010!

JDS

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

Affiliated Organisations

American Malacological Society | Belgische Vereniging voor Conchyliologie | Conchology, Inc. | Deutsche Malakozoologische Gesellschaft | Friedrich Held Gesellschaft | Hungarian Malacological Society | Instituto Português de Malacologia | King Leopold III Foundation | Latvian Malacological Society | Malacological Society of Australasia Ltd | The Malacological Society of Japan | The Malacological Society of London | Malacological Society of the Philippines | Malacozoological Association of Yamaguchi | Nederlandse Malacologische Vereniging | Naturmuseum Senckenberg | Sociedade Brasileira de Malacologia | Sociedad Española de Malacología | Sociedad Malacológica de Chile | Società Italiana di Malacologia | Société belge de Malacologie | Société française de Malacologie | The Western Society of Malacologists

Newsletter Editor: Dr. Julia Sigwart
Queen's University Belfast
Marine Laboratory
Portaferry, Northern Ireland
BT22 1PF
e.mail: j.sigwart@qub.ac.uk

Council of Unitas Malacologica

President

Dr. Somsak Panha
Department of Biology
Faculty of Science
Chulalongkorn University
Phyathai Road, Patumwan
Bangkok 10330
THAILAND

t. +662 218 5273
e. somsakp@sc.chula.ac.th

Secretary

Dr. Dai G. Herbert
Department of Mollusca, Natal Museum
P. Bag 9070, Pietermaritzburg, 3200,
SOUTH AFRICA

t. +33 345 1404
e. dherbert@nmsa.org.za

Treasurer

Dr. Jackie Van Goethem
Royal Belgian Institute of Natural Sciences,
Vautierstraat 29, B-1000 Brussels
BELGIUM

t. +32 2 627 43 43
e. jackie.vangoethem@naturalsciences.be

Past President

Prof. Dr. Thierry Backeljau
Royal Belgian Institute of Natural Sciences
Vautierstraat 29, B-1000 Brussels,
BELGIUM

t. +32 2 627 43 39
e. thierry.backeljau@naturalsciences.be

Members of Council

Dr. Guido Pastorino
Museo Argentino de Ciencias Naturales
Avda. Angel Gallardo 470 3er piso lab. 80
C1405DJR Buenos Aires
ARGENTINA

t. +54-11-4982 6670
e. rvpastor@criba.edu.ar

Dr. Mary Seddon
Bracken Tor
Saxon Gate
Okehampton
Devon
EX20 1QW
U.K.

t. +44 (0)773 888 4804
e. Mary@mollusca.org.uk

Dr. Ellen Strong
Smithsonian Institution
National Museum of Natural History
PO Box 37012
MRC 163
Washington DC 20013-7012
U.S.A

t. +1 202 633 1742
e. StrongE@si.edu

Dr. Aileen Tan Shau Hwai
Universiti Sains Malaysia
Centre for Marine and Coastal Studies
Penang, 11800
MALAYSIA

t. +60 (6)04 657 7888
e. aileen@usm.my

Secretary's Column

Dear Members

For reasons of economy, the UM Council did not have a formal meeting in person during 2009. Instead a 'mini-council meeting' was arranged in Brussels on May 8, to coincide with a visit our President Somsak Panha was undertaking in Europe. Issues for discussion were circulated in advance so that councillors not attending could contribute their perspectives in absentia. Essentially the meeting was an opportunity for Somsak to discuss his plans for WCM 2010 with two key people - Thierry Backeljau [Past President] and Jackie van Goethem [Treasurer].

In terms of other secretarial business, Council was disappointed with the relatively low number of applications for the UM Student Research Awards for 2009, although again, it was not an easy task to assess them since they spanned such a spectrum of topics. In the end, however, there was a clear consensus amongst the panel regarding the two winning applications – so congratulations to them – make good use of UM's money! (Further details of the winners and their projects are given below).

Election of new office bearers

In the last newsletter I put out a call for the nomination of new office bearers (Secretary, Treasurer and one council member), but I am afraid that as usual the response from members has been, let's say 'disappointing'. Council has given this matter a considerable amount of thought - and indeed we are still thinking. Hence we are not yet in a position to present a firm list of nominations, but there is still a while to go and we will do this in plenty of time before next year's WCM.

Dai Herbert
Secretary

TRAVEL GRANTS TO ATTEND THE WORLD CONGRESS OF MALACOLOGY, PHUKET, THAILAND 18-24 JULY, 2010

Unitas Malacologica will provide travel grants to help students of malacology attend the World Congress of Malacology, Thailand 2010. An anticipated sum of €25,000 will be set aside for this purpose. The maximum amount for any award will be €800 for applicants from outside SE Asia, and €400 for those from SE Asia.

Anyone actively involved in the study of molluscs may apply, whether amateur or professional. Preference will, however, be given to registered postgraduate students and malacologists who do not have access to significant alternative funding. A major aim is to encourage wider representation at congresses of malacology students from areas such as Asia, Africa, South America and Eastern Europe. Competition for these awards is high and established malacologists with permanent institutional posts are encouraged to seek funding elsewhere.

Awards will be made on the basis of merit and need, as determined by the Council of UM. To be eligible, applicants must be a member of Unitas Malacologica or of an affiliated organisation, and all applicants must indicate that they will present either an oral paper or a poster. Successful applicants will receive their awards upon registration at the congress venue in Phuket.

In addition to the completed form, applicants must send a half-page summary of the proposed paper or poster, and a supporting letter from a referee or supervisor outlining the qualities of the applicant and their work.

An electronic application form is available from the UM website **www.wcm2010.com/travel_grants.asp** The completed form, together with

the abstract/summary of the presentation and the letter of support should be e-mailed to the UM Secretary (**dherbert@nmsa.org.za**).

The closing date for applications is 1 February, 2010.

UM Student Research Awards
Winners – 2009

Two awards, in alphabetical order, were made as follows:

Erin MEYER (University of California Berkeley)
Phylogeography, habitat modelling, and conservation of Cittarium pica *(Vetigastropoda: Trochoidea) in the Lesser Antilles*.

Gleisse NUNES (Universidade do Estado do Rio de Janeiro)
Environmental factors influencing patterns of land snail diversity and elevational distribution in a protected forest on Ilha Grande, Rio de Janeiro state, southeastern Brazil.

Congratulations and the best of success to them — we look forward to receiving the reports on their activities and progress in a year's time.

2008 Award Reports

Four Student Research Awards were made for 2008. The winners, in alphabetical order, are as follows, with some inevitable small changes to the research project titles:

Florencia ARRIGHETTI (Universidad de Buenos Aires)
Ultrastructure of the digestive gland of the marine gastropod *Adelomelon beckii* (Broderip 1836)

Martine CLAREMONT (Natural History Museum, London and Imperial College, University of London)
What is the scale of phylogenetic differentiation in a muricid with teleplanic larvae?

Marty MEYER (University of Hawaii at Manoa)
Ecosystem services provided by terrestrial Mollusca in Hawaiian rainforests

Norhanis RAZALLI (Universiti Sains Malaysia, Penang)
The diversity and distribution of microsnails in Langkwai Islands, Kedah, Malaysia

Reports from all four students are presented below.

ULTRASTRUCTURE OF THE DIGESTIVE GLAND OF THE MARINE GASTROPOD *ADELOMELON BECKII* (BRODERIP 1836)

The hepatopancreas of molluscs is a large digestive gland formed by a mass of blind ending tubules that are connected to the stomach by a system of branched ducts. This organ is involved in several functions as intracellular and extracellular digestion of food material, absorption of nutrients, storage of minerals, lipids and glycogen and plays an important role in detoxification.

Adelomelon beckii (Volutidae: Zidoninae) is an endemic neogastropod

to the South Atlantic Ocean, which is distributed from Espiritu Santo, Brazil to Tierra del Fuego, Argentina. It is the biggest carnivore specie, often exceeding 40 cm in shell length, that inhabits sandy bottoms between 30 and 70 m water depth. This specie is selected for this study because is a common and conspicuous element of this high polluted area and because of its economical importance for the artisanal fishery of Argentina.

Specimens of *A. beckii* were collected during commercial bottom trawling off Mar del Plata city, Argentina (38°20´S, 57°37´W) between 30-60 m water depth during April 2006 to March 2007. After removal from the shell, pieces of digestive gland were fixed in Bouin´s aqueous solution dehydrated in a graded ethanol series and embedded in plastic historesin. Sections (5µm thick) were stained with a modified Masson's trichrome and hematoxilin-eosin. For electron microscopy studies, small pieces of digestive gland were fixed for 2 hs at 4°c in 2.5% glutaraldehyde, diluted in 0.4 M cacodylate buffer, pH 7.4, with 1% sucrose After washing in buffer, the fragments will be postfixed with 2% OsO_4 in 0.1M sodium phosphate buffer for 1.5 h, again buffer-rinsed (40 min), ethanol-dehydrated and embedded in Spurr's resin. Ultrathin sections were cut using either a Reichert or an LKB IV ultramicrotome and stained with uranyl acetate and lead citrate. All sections were examined and photographed using Zeiss (Oberkochen, Germany) EM 109T, Hitachi 300 and Jeol 1010 transmission electron microscopes operated at 75-80 kV.

The digestive gland of *A. beckii* is formed by a complex of numerous tubules bounded together by connective tissue and muscle fibers. The tubules are made up of two cell types: digestive and basophilic cells. Digestive cells exhibit different phases: immature, absorption, digestion and excretion, each with distinct appearance, being the digestive phase the most frequently encountered. The results present here are the description of digestive cells in the digestion phase. These cells are columnar and their apical surface bears microvilli and cilias. Digestive cells are connected by desmosomes and septate junctions. At the base of the microvilli, numerous pinocytotic vesicles with a size at about 0.23-0.4 µm were observed. The most conspicuous feature of these cells was the presence of numerous membrane-bound vacuoles, which for descriptive purposes were divided in three categories. Vacuoles type Va were small, transparent and in some occasions with granular material inside. Vacuoles type Vb occurred in the subapical region, they were large (1.50-2.83 µm) and contained granulo-fibrillar material and crystallized needles-like. Vacuoles type Vc were situated in the mid-region of the cell and they contained electro-dense material in different degrees of condensation. These types of vacuole predominate in cells that are in digestive phase and in some individuals vacuoles Vc are all along the cytoplasm of the digestive cell. Peroxisomes and lisosomes were also observed in digestive cells. Basophilic cells are pyramidal and occur in small groups. No morphological changes were observed during the different phases. The cytoplasm contains a vesicular appearance due to the presence of a highly developed endoplasmatic reticulum. The cisternae are concentrically orientated and dominate most part of the cytoplasm. Lipid droplets, mitochondria and autophagic vesicles are also observed. The apical region of the cell presents secretion vesicles of about 6 µm that are rounded by and electro-dense ring.

The presence of invaginations in the apical surface of the digestive cells suggests a pinocytosis process of the food particles. This pinocytic vesicles may fuse giving rise to vacuoles Va, suggesting that this vacuoles are a permanent reserve of food previous to digestion. Vacuoles Vb corresponds to heterolysosomes, that would formed from the fusion of lysosomes with vacuoles

Va. Vacuoles Vb, after fused with lysosomes, undergo a dehydratation process as consecuence of lysosome catabolism and formed vacuoles Vc. This vacuoles, also called residual bodies, present different morphologies according to the degree of condensation. Continue intracellular digestion produces the great accumulation of vacuoles Vc. Basophilic cells posses a well developed endoplasmático reticulum indicating a high secretory activity. The autophagic vesicles found would be a regulation mechanism for the excess of protein.

In conclusion the main functions of digestive cells are endocytosis and posterior intracellular digestion while basophilic cells are in charge of protein synthesis for intracellular digestion.

This research could only be realized thanks to Unitas Malacologica for providing funds to carry out this study.

Florencia Arrighetti
Universidad de Buenos Aires
flora@bg.fcen.uba.ar

THE MARINE SPECIATION PARADOX: WHAT IS THE SCALE OF DIFFERENTIATION IN A SPECIES COMPLEX WITH HIGH POTENTIAL DISPERSAL?

A familiar problem in marine evolution is the "marine speciation paradox" (Palumbi, 1992). That is, how can there be so many species in the sea, when there are no obvious barriers to dispersal and many species have long lived larvae? Extensive phylogeographic research has shown a high degree of both phylogenetic structuring and cryptic speciation in species with both long and short lived larvae (e.g. Meyer, 2003). Many different factors have been implicated in this structuring, including separation of populations by ancient tectonic events (possibly followed by secondary contact), modern barriers to dispersal and ecological specialization.

The marine gastropod *Stramonita haemastoma* is thought to have teleplanic larvae which remain in the water column for about 90 days (Scheltema, 1971). Although this species has been described from the Mediterranean and Eastern Atlantic through the Caribbean to the Eastern Pacific, substantial regional variation has led to the recognition of five geographical subspecies*: S. h. haemastoma*, from the Mediterranean and Eastern Atlantic to Brazil, S. h. floridiana, on the east coast of Florida and in the Eastern Caribbean*, S. h. caniculata* on the west coast of Florida and the Gulf of Mexico, S. h. rustica in the Western Caribbean and *S. h. biserialis* in the Eastern Pacific. Within these subspecies, further cryptic variation is suspected (Vermeij, 2001). For example, S. h. biserialis is thought to be differentiated North/South on an even smaller scale: "true" *S. h. biserialis* occurs from Mexico to northern Costa Rica, and its possible sibling species occurs from Costa Rica through Panama to Ecuador (Vermeij, 2001). Yet the protoconch, a structure thought to be correlated with the duration of the planktonic phase, has been shown to be similar across the entire S. haemastoma complex, implying that all subspecies have equally long lived larvae (Scheltema, 1971). In the presence of teleplanic larvae, speciation on such a small scale seems paradoxical.

Various explanations for this paradox are possible. Actual (or realised) dispersal of *Stramonita* species may be more limited than presently believed, leading to allopatric differentiation. Alternatively, morphological differentiation may not be a reliable indicator of genetic differentiation, and *S. haemastoma* (*sensu lato*) might indeed prove to be a single species. It is also possible that ecological speciation could result in geographical speciation on a small scale in the presence of wide dispersal (e.g. Reid et al., 2006).

With the aid of a Unitas Malacologica Student Research award, I have been able to travel to Mexico (Eastern Pacific coast) and Costa Rica (Eastern Pacific and Caribbean coasts) where I collected 33 specimens of *S. h. biserialis* and 26 specimens of *S. h. rustica*, as well as 20 other rapanine and ergalataxine species. Without Unitas support, I would not have had sufficient samples from these sites to include in a population study. I have also obtained additional samples of *S. haemastoma* (*s.l*) from Brazil, Jamaica, Florida, Texas, the Cayman Islands, Cape Verde, the Azores, Croatia, and the Canary Islands. In order to determine ESUs, I have been sequencing the mitochondrial genes COI and 12S and the nuclear gene 28S for a minimum of six individuals from most localities following protocols in Claremont *et al*. (2008).

I will also attempt to obtain a quantitative estimation of morphology for the specimens. Vermeij (2001), for example, has discussed an easily measured shell character (number of crenulations in the outer shell lip) which he uses as a diagnostic character within the *S. haemastoma* complex. I will use these crenulations as a measurable indication of morphological disparity. I will also use photographs of the different forms to show inter- and intraspecific variability

I have produced preliminary results including exemplar specimens from Mexico and Costa Rica that were obtained during my recent Unitas-funded fieldwork (Figure 1). These results suggest the presence of at least two *Stramonita* clades, one in Eastern Atlantic and the other in Western Atlantic/Eastern Pacific. Preliminary population-level analyses (not shown) suggest that Caribbean *S. h. rustica* may form a clade with an amphi-Atlantic *S. h. haemastoma* clade, sister to the Western Atlantic/Eastern Pacific members of the *S. haemastoma* complex (*S. h. biserialis, S. h. caniculata, S. h. floridiana*). *S. h. rustica* and *S. h. haemastoma* appear to overlap in Brazil (not shown).

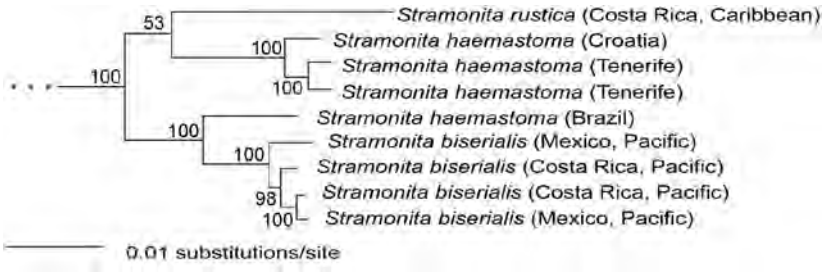


Figure 1. Bayesian phylogeny of the *Stramonita haemastoma* complex based on combined gene sequences (28S, COI, 12S, 16S). Support values are posterier probabilities.

I am currently in the process of completing sequencing of the remaining specimens of the *S. haemastoma* complex collected in Mexico and Costa Rica, as well as many other samples from the Caribbean and Atlantic. Sequencing for this study is almost complete.

I expect to produce from this work on *Stramonita* both a paper and a chapter in my thesis. This work would not have been possible without the support of Unitas Malacologica.

References:

Claremont M., S.T. Williams and D.G. Reid. (2008). *J. Moll. Stud.* **74**: 215-221.

Kool, S.P. (1993).*Malacologia*, **35:** 155-259.

Meyer, C.P. (2003). *Biol. J. Linn. Soc.* **79**: 401-459.

Palumbi, S.R. (1992). *TREE* **7**: 114-118.

Reid, D.G., K. Lai, J. Mackenzie-Dodds, F. Kaligis, D.T.J. Littlewood and S.T. Williams. (2006). *J. Biogeography* **33**: 990-1006.

Scheltema, R.A. (1971). *Biol. Bull.* **140:** 284-322.

Vermeij, G.J. (2001). *J. Paleontology* **75**: 697-705.

Martine Claremont
Natural History Museum, London
and Imperial College, London
m.claremont@nhm.ac.uk

THE IMPORTANCE OF LAND SNAILS AND SLUGS IN LITTER DECOMPOSITION IN A HAWAIIAN RAINFOREST

The highly diverse and endemic Hawaiian biota is disappearing and being replaced by a relatively small number of widely distributed species. This is particularly so for the land snails which were exceptionally diverse (over 750 species) and exhibited extremely high levels of endemism (over 99 % of the species were endemic to the Hawaiian Islands) (Cowie et al. 1995). Sadly, the majority of these unique species are now extinct (Cowie 2002), with estimates of extinction ranging from 65-75 % (Solem 1990) to as much as 90 % (Cowie 2002). Unfortunately, predicting the consequences of this change on key ecosystem processes is difficult because the ecology of both the native and introduced species is largely unknown, especially for invertebrate groups like terrestrial gastropods.

The primary aim of this study was to examine the role of the most abundant terrestrial gastropods (native and introduced) in litter decomposition and nutrient cycling in a Hawaiian rainforest ecosystem. It has been suggested that snails/slugs could contribute directly (by their own metabolism) and/or indirectly (by modification of the habitat to enhance either micro-arthropod or microbial activity) to the decomposition of leaf litter and the cycling of nutrients (Theenhaus & Scheu 1996). The secondary aim was to undertake stable isotope analysis of the invertebrate community to determine the trophic position of each snail/slug species, as well as other soil invertebrate species.

To determine the influence of terrestrial gastropods on litter decomposition rates, 42 field microcosms were established at seven sites in the Waiakea Forest Reserve, an area with dense canopy cover that typically receives annual rainfall of 2,000 - >10,000 mm. Multiple sites were used to limit the probability that disturbance from pigs and humans would ruin the entire experiment. At each site, six microcosms were randomly assigned to one of six treatments (one control, five experimental). The five experimental treatments were: *Succinea* spp. (native snail), *Arion intermedius* (alien slug), *Deroceras leave* (alien slug), *Oxychilus alliarius* (alien snail) and *Limax maximus* (alien slug). Controls had no snails/slugs.

Microcosms (1.0 x 1.0 x 0.5 m) were constructed using PVC poles. Mesh screen (2.0 mm) covered each microcosm. The mesh prevented snails from entering or escaping, but allowed access by soil micro-arthropods. All microcosms were filled to a depth of 0.5 cm with soil collected from the field and covered with a mix of leaves, mostly ohia (*Metrosideros polymorpha*) and hapuu (*Cibotium* spp.). Two small *Peperomia* sp. plants were planted in each microcosm and were allowed to acclimate and grow for one month (December 20, 2007 to January 20, 2008) prior to addition of snails/slugs. After the one month acclimation period, ten litter decomposition bags, filled with leaf litter, were placed in each microcosm with holes (2.5 cm diameter) cut into two sides to allow snails/slugs access.

The results indicate that the snails and slugs increase rates of litter decomposition and influence nutrient release. Litter decomposition was correlated to gastropod biomass. Only the *L. maximus* treatment, the treatment with the highest gastropod biomass, differed significantly from the control. However, only one microcosm containing snails or slugs (microcosm with *A. intermedius*) had less mass loss than the control treatment. Elevated K concentrations were found in the *O. alliarius* treatment. *Succinea* spp. and *A. intermedius* treatments had significantly higher concentrations of Mn compared to *L. maximus* and *D. leave* treatments. Increased nutrient concentrations in the litter probably reflect nutrient immobilization or uptake by microbes. This higher quality litter may later be more attractive to decomposers and have

higher concentrations of microbes, which may then result in increased decomposition and nutrient release. These results indicate that although gastropod species facilitate litter decomposition, the effects on nutrients may be species specific and dependent on timing in the decomposition process.

No increases in micro-arthropod abundances were observed in microcosms with snails/slugs suggesting that snails/slugs do not facilitate micro-arthropod recruitment. There were fewer millipedes in the *Succinea* spp. and the *A. intermedius* treatments than the control or any other snail/slug treatment. Isotopic signatures revealed that *Succinea* spp., *A. intermedius*, and millipedes are primary consumers of litter, while significantly higher ^{15}N concentrations were found for *D. leave*, *L. maximus*, and *O. alliarius* indicating that they feed higher in the food web. Thus, it seems that gastropod species interactions with other soil fauna may be influenced by trophic position, an aspect of soil ecology that is poorly understood. This suggests that snails/slugs when abundant may influence litter decomposition by both facilitation of microbes and to a lesser extent by direct consumption of leaf litter.

These results contribute to a small but growing literature on the influence of terrestrial gastropods on key ecosystem processes. While the study focused on the snails and slugs on only one Hawaiian island, the effects we report may be important throughout the Hawaiian Islands and elsewhere given the widespread distribution of many of the invasive gastropods discussed here (Cowie et al. 2008) and the important influence of snails and slugs in key ecosystem processes, such as litter decomposition. Extinction and biological invasions are generally seen as the main drivers of human induced global environmental change (Vitousek et al. 1997), and improved knowledge of the ecosystem effects of terrestrial gastropods, which are major components of many ecosystems, is necessary to understand fully the impacts of global change on key ecological processes.

This work was funded in part by a grant from UNITAS Malacologica, for which I am extremely grateful.

References:

Cowie, R. H. 2002. Biol. Inv. 3:119-136.
Cowie, R. H., N. L. Evenhuis, and C. C. Christensen. 1995. Catalog of the native land and freshwater molluscs of the Hawaiian Islands.
Cowie, R. H., K. A. Hayes, C. T. Tran, and W. M. Meyer, III. 2008. Int. J. Pest Mgmt. 54: 267-276.
Solem, A. 1990. How many Hawaiian land snail species are left? and what we can do for them. Bishop Museum Occasional Papers 30:27-40.
Theenhaus, A., and S. Scheu. 1996. Biol. Fert. Soils 23:80-85.
Vitousek, P. M., H. A. Mooney, J. Lubchenco, and J. M. Melillo. 1997. Science 277:494-499.

Wallace M. Meyer, III
University of Hawaii at Manoa
meyerwal@hawaii.edu

CORRELATION BETWEEN SPECIES RICHNESS OF MICROSNAILS AND ENVIRONMENTAL CONDITIONS OF THE HABITAT IN LANGKAWI ISLANDS, MALAYSIA

The status of the conservation and taxonomic work on the terrestrial molluscs in Malaysia, or better known as Malaya, is still inadequate especially in the islands. The lack of recent taxonomic work and little subsequent work on ecology or distribution of the animals also adds to the present status of the work here. As in the present study, it is one of the earliest study that has ever been done on the diversity and distribution of microsnails in the islands of Malaysia and also its correlation with environmental conditions. Langkawi islands, being the least studied area

compared to other limestone areas in the region, have the most complete Palaeozoic geological history and island karsts landscape which make them a suitable location for this study. Hence, providing the fundamental knowledge to be used in other areas of the region.

Sixteen karsts in Langkawi and the islands surrounding it were sampled for microsnails during the dry (Jan-Feb) and wet (Oct-Nov) season. Ecological parameters such as ambient air temperature and relative air humidity were recorded at each location. The relationship between the ecological parameters and the species richness of microsnails were analyzed by using multivariate regression in Social Package for Social Scientist (SPSS) version 16.0.

Overall, 20 species from nine genera and five families were found at the sixteen karsts sampled in Langkawi Islands. In this study, the microsnails were found at the ambient air temperature ranging from 25°C to 30°C and relative air humidity ranging from 80 to 90 percent. Both ecological parameters taken during the dry and wet season showed a very strong relationship (adjusted $R^2 > 0.9$; $P < 0.05$) with the species richness of microsnails, which is in the form of Shannon-Wiener Index (Table 1). The use of adjusted R^2 is more reliable than the R^2, since the latter may overestimate the extent to which the sample data explain the variance in the dependent variable, partly because it is affected by the number of variables included in the model (Argyrous, 2005). From the analysis, the use of Standardized Coefficients or beta-weights in multiple regression analysis to assess the relative importance of each independent variable in determining the value of the dependent variable has resulted in which the relative air humidity has a stronger 'pull' on the Shannon-Wiener Index than the ambient air temperature for both seasons. The effect of relative air humidity on the species richness is also more evident during the dry season (Table 1). This finding is supported by Auffenberg *et. al* (2006) where non-marine molluscs can be highly responsive to changes in local environmental conditions, such as seasonality, amount of precipitation, water chemistry and quality, soil type, relative air humidity and temperature, in which three of the environmental parameters mentioned above have been recorded in this study. A study done by Moreno *et. al* (2005) also stated that the most limiting factor for the geographic distribution of terrestrial molluscs is humidity, whereas temperature changes could have a long-term effect due to the buffering effect of the soils, provided plant cover is maintained. Another factor that is not discussed in this account, which is the soil parameters, are still being analyzed.

Table 1. Multivariate regression analysis showing the relationship between ecological parameters and Shannon-Wiener Index (H') of the microsnails.

	Wet season	**Dry season**
Multivariate correlation coefficient, R	0.999	0.990
Adjusted R^2	0.996	0.969
Standard error of the estimate	0.00515	0.04077

Ecological parameters	**Standardized coefficients (β-weights)**	
	Wet season	**Dry season**
Relative air humidity (%)	1.762	1.491
Ambient air temperature (°C)	1.706	0.658

The importance of this study is to fill the gaps on the knowledge of the ecological aspects of microsnails in this region, particularly. Given its geographic location and complex orography, Langkawi Islands offers many possibilities for microsnails research in various aspects. Subsequently, the information obtained from this study can be combined with the geological history of the habitat to study the relationship between the ecological factors and the

distribution of microsnails as a model of the interaction and evolutionary effect of the fauna and its environment.

I am indebted to Unitas Malacologica for providing funds mainly for boat trips to small islands surrounding Langkawi for collecting samples and also to procure a few sampling equipment to carry out this research.

References:

Argyrous, G. (2005). *Statistics for research with a guide to SPSS*.

Auffenberg, K., I. R. Quitmyer, J. D. Williams and D. S. Jones (2006). *In: First Floridians and last Mastodons*.

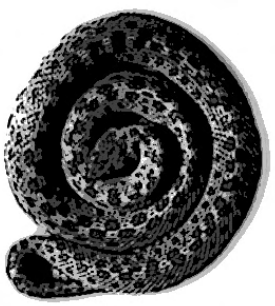
Moreno, J., E. Galante and M. Á. Ramos (2005). In: *Final Report, Project ECCE*, Ministry of the Environment and the University of Castilla La Mancha.

Norhanis Mohammad Razalli
Universiti Sains Malaysia
norhanis86@gmail.com

Member Reports

SNAIL-EATING SNAKES OF SOUTHERN BRAZIL REGION AND THEIR ALIMENTARY PREFERENCES

Molluscs participate in ecosystems as important agents in the re-use of nutrients, forming part of the cycle of the calcium actively in the nature, besides supplying important alimentary supplement the one diversified number of organisms. Around 17 species of snakes exclusively on the feed on slugs and snails, belonging to the family Colubridae, including the genus *Dipsas* (9 species), *Sibon* (1 species) and *Sibynomorphus* (5 species) - the subfamily Dipsadinae (nocturnal arboreal and/or terrestrial forms) - and *Tomodon* (2 species), the subfamily Xenodontinae and Tribe Tachymenini (diurnal habits, terrestrial forms). Many of the aspects concerning the feeding behavior of snail/slug-eating snakes are even today completely unknown, among them the functional evolutionary morphologic adaptations presented as a consequence of possible specific alimentary preferences (type of consumed mollusks).



An ecological study and preliminary revision concerning the snail/slug-eating snakes and potential "prey" (alimentary preferences) present in the Southern Brazil region, integral geographical territory of the "Atlantic Slope of the South Cone" (see UM Newsletter no. 27, December 2008: 9) is presented here based on wide bibliographical revision, the examination of specimens contained in collections of regional natural history museums, consultation with specialists, and the eventual collection of specimens in the environment.

Said species present activity stimulated during more humid periods (under or after rains) for search of mollusks, that they are also stimulated moving in moments of larger environmental humidity, and in moments of drought it is possible that stay in rest, once the caloric content of its food is low, not being advantageous to carry out feeding activities in periods with small probability of encounter of the preys. Snail/slug-eating snakes of the genera *Sibynomorphus* and *Tomodon* (terrestrial forms) would be "specialist" in consumption of native slugs of the family Veronicellidae, meanwhile the genera *Dipsas* (arboreal forms) would be less selective, consuming slugs and/or snails faintly.

Until the present moment, a total of 3 native terrestrial slugs species were identified (Gymnophila: Soleolifera: Veronicellidae) – *Belocaulus angustipes* (Heynemann, 1885) and *Phyllocaulis soleiformis* (d'Orbigny, 1835), were consumed by the snake *Sibynomorphus neuwiedi* (Ihering, 1911), and *Sarasinula linguaeformis* (Semper, 1885), consumed by the serpent *Dipsas indica* Laurenti, 1768. Two snails (Pulmonata: Stylommatophora: Sigmurethra) - one native tree snail Bulimulidae - *Mesembrinus interpunctus* (Martens,

1887), was consumed by the snake *Dipsas indica* Laurenti, 1768, and one exotic invader snail Bradybaenidae - *Bradybaena similaris* (Férussac, 1821), were consumed by the serpent *Dipsas albifrons* (Sauvage, 1884) - these were positively confirmed through this study.

For references to studies completed an in progress, and for taxonomic details of involved species, please contact the author of this report.

A. Ignacio Agudo-Padrón
ignacioagudo@gmail.com

FROM LEIDEN WITH LOVE: MALACOLOGICAL THESES FROM LEIDEN UNIVERSITY 1969-2008

The National Museum of Natural History (Naturalis) in Leiden, The Netherlands, has a strong track record in malacological research (Bruggen, 1977). In conjunction with Leiden University, many students have contributed to malacology by writing and defending their doctoral theses on that subject. The most recent thesis from Leiden has been my own: "Resolving Riddles and Presenting New Puzzles in Chondrinidae Phylogenetics". On december 3rd 2008, I (successfully) defended my thesis before a commitee which included several distinguished malacologists: prof. dr. E. Gittenberger (promotor), prof. dr. M. Schilthuizen, prof. dr. R.A. Bank, dr. A.J. de Winter and dr. J.J. Vermeulen. Building on the work by prof. dr. Edmund Gittenberger, I tested several hypotheses derived from his thesis "Beiträge zur Kenntnis der Pupillacea III, Chondrininae" [Contributions to the knowledge of the Pupillacea III, Chondrininae] (1973) using molecular tools.

The main focus of my project has been on *Chondrina* and *Abida*. Both genera show their greatest (species) diversity in the Iberian peninsula. Both are calciphilous taxa, with *Chondrina* occurring solely on near vertical, exposed rockfaces. Using DNA-barcoding data, we demonstrated that the current distribution of the genus *Chondrina* has been established by at least four waves of dispersal across the palaearctic. A group of taxa that represents one of the earliest waves is currently known as *Chondrina farinesii* s.l. The extreme variation in shell size and shape in this complex has resulted in many taxonomic rearrangements in the past, which culminated in a 'lump' into a single species, i.e. *Chondrina farinesii* (Draparnaud, 1801)(Gittenberger, 1973). Strikingly, the barcoding results showed that we deal with a radiation of (at the very least) 14 species. Many names have therefore been dug out of the graveyard of taxonomy. A 'Riddle (partly) resolved'.

One particular species of *Abida* has attracted most time and research effort. *Abida secale*, which is found from Great-Britain in the northwest to Slovakia in the east. The southernmost edge of its distribution is located in the Spanish province of Valencia. The species is morphologically very constant across its range. However, an amazing exception to this morphological stability is observed in the Spanish province of Catalunya, where currently 14 extant subspecies are recognized! The cause for the extreme morphological variation in *Abida secale* in a relatively small part of its range is not yet clear. Molecular data suggest a hybridization and introgression event of *Abida attenuata* mitochondrial DNA into *A. secale*, which obscures the phylogenetic relationships between the subspecies. Enter a 'New puzzle'.

The results of this project are to be published in the near future (keep an eye on the website!). However, for those who cannot wait, feel free to contact me for a copy of the thesis!

The next generation of PhD students is already there; Liew Thor-Seng and Bastian Reijnen are working on their

respective PhD projects at Naturalis. Liew is working on land snails and slugs from Borneo, while Bastian explores the marine family Ovulidae in the Indo-pacific. Malacology in Leiden is still going strong!

An overview of malacological theses from Leiden 1969-2008:

2008 - Kokshoorn, B. Resolving Riddles and Presenting New Puzzles in Chondrinidae Phylogenetics.
2006 - Gittenberger, A. The evolutionary history of parasitic gastropods and their coral hosts in the Indo-Pacific.
2004 - Uit de Weerd, D.R. Molecular phylogenetic history of eastern mediterranean alopiinae, a group of morphologically indeterminate land snails.
2001 - Moorsel, C.H.M. van.Molecular phylogenetics of a speciose group: *Albinaria* and the search for homology.
1994 - Schilthuizen, M. Differentiation and hybridization in a polytypic snail.
1992 - Kemperman, T.C.M. Systematics and evolutionary history of the *Albinaria* species from the Ionian islands of Kephallinia and Ithaka (Gastropoda, Pulmonata: Clausiliidae).
1979 - Breure, A.S.H. Systematics, phylogeny and zoogeography of Bulimulinae (Mollusca).
1975 - Backhuys, W. Land and fresh water Molluscs of the Azores.
1973 - Gittenberger, E. Beiträge zur kenntnis der Pupillacea III, Chondrininae.
1969 – Bruggen, A.C. van. Studies on the Land Molluscs of Zululand. With notes on the distribution of land molluscs in southern Africa.

References

Bruggen, A.C. van (ed.), 1977. Nederlandse Malacologische Vereniging, 1-53, Leiden.

Bas Kokshoorn
kokshoorn@naturalis.nl

science.naturalis.nl/research/people/cv/kokshoorn

Publications

MARINE MOLLUSKS OF BERMUDA: CHECKLIST & BIBLIOGRAPHY

Russell H. Jensen, Timothy A. Pearce

pub. 2009. 473 pages, 16 full page colour plates, paperback. $29.95 (USD)
Delaware Museum of Natural History.

"a complete list of modern species names that shows their taxonomic placement and points out synonyms, misidentifications, and literature references to the species and illustrations. The book documents more than 900 mollusk species, including over 100 never before reported and 66 found only in Bermuda."

WORLD OCEAN CENSUS: A GLOBAL SURVEY OF MARINE LIFE

Darlene Trew Crist, Gail Scowcroft, James M. Harding, Jr.

pub. 2009. 256 pages, colour photographs throughout, hardcover with jacket. $40.00 (CAD)
Firefly Books, Richmond Hill, Ontario.
ISBN-10 1554074347

A popular science book reviewing the drama and some highlights of the global Census of Marine Life, which is drawing to a close in 2010.

SNAIL

Peter Williams

pub. 2009. 168 pages, 86 illustrations (59 colour), paperback. £9.99 (GBP)
Reaktion Books, London.
ISBN 1861895283

"a philosophical look at life from the point of view of a snail"

Treasurer's Report

Dear members,

In my 'Budget proposal 2008-2010' I had foreseen an amount of 2,000.00 euros to cover the 2009 council meeting costs. It was not that easy for most of our council members to make this year a short trip to Brussels in order to attend the yearly meeting without substantial external funding.

The only way out was to hold a 'mini council meeting' since Somsak was travelling in Europe earlier this year and scheduled to meet Thierry and myself in Brussels for a one day exchange of ideas and information. Thierry made the minutes of the meeting and informed all other council members after which decisions were agreed upon. It turned out that this mini council was quite fruitful and moreover had been organised without any financial charges for Unitas Malacologica.

As a consequence the amount of 2,000.00 euros will be added to the proposed budget for congress travel grants in 2010. If the yearly income for Unitas continues to go smoothly during the next twelve months, the Unitas Malacologica Trust Fund will be able to offer an amount of roughly 25,000.00 euros for Phuket congress travel grants.

Donations to the Trust Fund are very much appreciated since they contribute to the set up of activities to the benefit of PhD students and young researchers being active in the field of malacology.

Also members paying their membership fee for multiple years in advance contribute to the wellness of our financial situation. In the past John B. BURCH, Kepa ALTONAGA SUSTATXA, Thierry BACKELJAU, Gerhard FALKNER, Donald R. MOORE, Liliane FRENKIEL-MOUEZA, Eike NEUBERT, Luitfried SALVINI-PLAWEN, Heike WÄGELE and Vollrath WIESE were very flexible and generous in this respect. The previous records in paying for 10 or 12 years in advance are at present broken by someone having paid mid June 2009 the sum of 320.00 euros which is good for 20 years of UM membership! And be confident I have checked this payment and found that it was not a payment for a two years fee by an absent-minded member… It deliberately was for 20 years.

In the period December 2008 – July 2009, several individual donations to the Trust Fund were received: three generous donations by Takenori SASAKI, Fred WELLS and Gary ROSENBERG, smaller ones by Alasdair D. BERRIE, Alan J. KOHN, Willy SLEURS, Jon-Arne SNELI and Jesus TRONCOSO, and round-ups by Goncalo CALADO, Mark DAVIES, Sadao KOSUGE, Julia SIGWART, Tania SITNIKOVA, and John TAYLOR.

Thank you all very much.

Best wishes,

Jackie VAN GOETHEM
Treasurer

WCM 2010

Comprehensive up-to-date information on the congress is available at:

www.wcm2010.com

The 17th International Congress of UNITAS MALACOLOGICA, the next World Congress of Malacology (WCM), will be held in the island of Phuket, Thailand, from the 18th to the 24th July 2010 (inclusive) at the majestic and luxurious Royal Phuket City Hotel. This is the first time that the WCM has ever been held in Asia and is jointly organized by Unitas, Chulalongkorn University and the Biodiversity Research and Training Program of Thailand. Phuket, often called the "Pearl of Andaman" is one of the most beautiful islands in the Andaman Region, located in the southwest of Thailand within and next to the Sirinath and Phang-Nga Bay National (Marine) Parks, respectively, and a short boat trip away from the equally well known Krabi (Hat Noppharat Thara National Park) and Phi Phi Island. Both the island of Phuket itself, as well as the nearby mainland (including Khao Sok National Park) offer exciting opportunities to study a diverse range of freshwater and terrestrial wildlife and trekking, or just explore the diverse local, and world famous, Thai cultures, cuisine and hospitality.

The congress will adopt the style of the last highly successful Congress in Antwerp, Belgium (2007) and, building upon their expertise, we expect the Phuket meeting to be at least as successful. The congress offers a great opportunity for people who work on or are interested in molluscs to come to Phuket, Thailand. Currently thirteen symposia are already arranged.

IMPORTANT DATES

Travel grants: **1 February 2010**
see p. 3, above

Abstract deadline: **31 May 2010**
see the website for instructions!

www.wcm2010.com

CONFIRMED SYMPOSIA

Ecology, Evolution and Biology of Freshwater Bivalves by Arthur Bogan and Randy Hoeh

The Biology and Evolution of Limpets by Alan Hodgson

Evolution of the Bivalvia by Rüdiger Bieler, Gonzalo Giribet and Paula Mikkelsen

Community Ecology of Tropical Forest Land Snails by Dinarzarde Raheem and Peter Tattersfield

The Last 50 Years of Malacology: Specialization, Methodological Transformation and Globalization by Robert Hershler and David Lindberg

Studies on Opisthobranchs Molluscs by Manuel Malaquias, Juan Lucas Cervera and Terry Gosliner

Emerging Molluscan Models: Biological Questions in the 21st Century by Mónica Medina Sam Loker and Sandie Degnan

Evolutionary Ecology and Genetics of Molluscan Populations by Takahiro Asami

The Systematics of Asian Land Snails by Fred Naggs, Min Wu and Somsak Panha

Mollusc Aquaculture by Zulfigar Yasin, Aileen Tan Shau-Hwai and Somchai Bussarawit

Countdown 2010: Towards a Global Freshwater Assessment of Threatened Species by Mary Seddon (SSC Mollusc Specialist Group) and Will Darwall (IUCN)

Reproduction and Mating Systems in Hermaphroditic Molluscs by Kurt Jordaens and Joris Koene

Speciation: insights from insular isolation to global patterns by Matthias Glaubrecht and Thomas von Rintelen

In Memoriam

Albert R Mead (17 July 1915 – 13 March 2009)

Albert Raymond Mead, 93, passed away peacefully with his loving wife of 67 years by his side. He was born in San Jose, California, on July 17 1915. He was preceded in death by his daughter, Janet; his sister, Jenny, and his brother, Harley. He is survived by his wife, Eleanor; his children, Ruth and Jim; his grandchildren, Jon, Jeanna, Joshua, Jannelle and Aimee and several great-grandchildren. Al received his Ph.D. at Cornell University in 1942, where he was a John Henry Comstock scholar. During World War II, he served as a 2nd Lieutenant in British West Africa, working as a parasiotlogist in the Inter-Allied Malaria Control unit. It was there that his life-long interest in the giant African land snail and related species was sparked. Through his intense dedication for over 60 years of study and research, he is still considered the world expert on these species. After meeting and marrying his wife Eleanor, he accepted a professorship in zoology at the University of Arizona, Tuscon, in 1946/47, where, for over 50 years, he taught and inspired students to follow their dreams.

Al joined Unitas Malacologica at the beginning of 1971 and was one of the most devoted members, being present at almost all congresses and always accompanied by Eleanor. These congresses gave them the opportunity to extend their trip and to visit over the years, nearly all major natural history institutions. Al was one of the founders of the UM Trust Fund capital, making a donation of US$ 1000 in February 1991.

Al Mead (1915-2009)

Jørgen Knudsen (1918-2009)

Jørgen Knudsen (6 March 1918 – 6 October 2009)

Jørgen Knudsen, of the Danish Museum of Natural History, Copenhagen, passed away last month aged 91.

The museum held a special two day symposium to celebrate his 90th birthday and successful malacological career, with publications spanning from 1944 to 2005.

As an active UM member, Jørgen was one of the 'fathers' of the idea to set up a Trust Fund within Unitas Malacologica. To enable it's start, he contributed with a donation of 1000 US Dollars.

A more complete obituary will follow in the next issue of the newsletter.