



NEWSLETTER OF THE AMERICAN MALACOLOGICAL SOCIETY

OFFICE OF THE SECRETARY
DEPARTMENT OF MALACOLOGY, ACADEMY OF NATURAL SCIENCES
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ANNOUNCEMENTS



**AMS/WCM 2013 – AZORES, PORTUGAL
JULY 21-28, 2013**

Submitted by Peter Marko, president AMS

We are getting closer to the 2013 AMS meeting which will be held in the Azores as part of the next World Congress of Malacology (WCM). Other participating societies include the Malacological Society of London and the Sociedad Española de Malacología. Information about the meeting can be found at the recently launched website:

<http://www.wcm2013.com>.

More information about travel and (especially) SATA discounts for North American travelers will be forthcoming.

The congress is open to all contributions in the field of malacology and will host symposia as well as contributed papers and posters. Tentative symposia titles and organizers include:

- Living in the extreme: molluscan communities of chemosynthetic habitats

Verena Tunnicliffe & Anders Warén
(verenat@uvic.ca)

- Tempo and mode in land snail evolution: the origins and limits of diversity

Robert Cameron & Beata Pokryszko
(radc@blueyonder.co.uk)

- Gains and losses of freshwater bivalves and their consequences for ecosystems (sponsored by Instituto Português de Malacologia – IPM)

Manuel Lopes Lima, Ronaldo Sousa & Joaquim Reis
(lopeslima.ciimar@gmail.com)

- Climate change and molluscan ecophysiology (sponsored by the American Malacological Society – AMS)

Peter Marko and Brad Seibel
(pmarko@clemsun.edu)

- How did they get here?: (Palaeo)Biogeography of marine molluscs

Sérgio Ávila, Carlos Marques da Silva & Ricardo Cordeiro
(avila@uac.pt)

- Who are the “Aculifera”?

Julia Sigwart, Christiane Todt & Amélie Scheltema
(j.sigwart@qub.ac.uk)

- There’s something about Opisthobranchia

Heike Wägele, Terry Gosliner & Jesus Troncoso
(troncoso@uvigo.es)

- Molecular phylogenetics and paleontology

Steffen Kiel & Suzanne William (skiel@uni-goettingen.de)

- Biodiversity and evolution of pulmonate taxa

Benoît Dayrat (bdayrat@ucmerced.edu)

- Mudflat molluscs

Peter Beninger (Peter.Beninger@univ-nantes.fr)

- The evolution of colour polymorphism in Molluscs

Malgorzata Ozgo (mozgo.biol@interia.pl)

If you are interested in participating in any of these symposia, contact the organizer via the email address provided. Please note that proposals for additional symposia must be received by WCM by 1 December 2012. Abstracts for all poster and oral presentations may be submitted via the Congress website starting in November with a final deadline of 30 April 2013.



OTHER UPCOMING MEETINGS

Malacology 2014: The Meeting of the Americas **23-27 June 2014**

Submitted by Paul Valentich-Scott

Who?

Joint meeting of the American Malacological Society, the Asociación Latinoamericana de Malacología, the Sociedad Mexicana de Malacología y Conquiliología, and the Western Society of Malacologists. Coordinated by Roberto Cipriani (ALM), Edna Naranjo Garcia (SMMAC), and Paul Valentich-Scott (AMS & WSM).

What?

80th Annual Meeting of the AMS, IX CLAMA, XII Reunion Nacional de Malacología y Conquiliología, and the 47th Annual Meeting of the WSM.

When?

23-27 June 2014

Where?

Universidad Nacional Autónoma de México, Mexico City (<http://www.unam.mx/index/en>). Hosted by the Facultad de Ciencias.

Rising from the ruins of the Aztec capital, Tenochtitlan, Mexico City offers a unique collision of contemporary city life and historic preservation. World-class museums, restaurants and parks rub shoulders with the remains of several cultures. The nightlife, the shopping and the history make it a must-see regardless of your travel style. Without a doubt Mexico City is one of the most important financial and cultural centers in North America.

Special rates are being negotiated for accommodations at hotels adjacent to campus.

Why?

We share oceans and our continents adjoin, we frequently collaborate, but we have never met in a single all Americas conference. This is an opportunity to meet colleagues from adjacent continents, exchange ideas and forge new research directions.

How much?

Roundtrip airfare to Mexico City – MEX, Benito Juarez Airport (Prices as of November 2012)

From New York – JFK: \$600

From Miami – MIA: \$560

From Chicago – ORD: \$600

From Seattle – SEA: \$560

From Los Angeles – LAX: \$435



OTHER NEWS & ANNOUNCEMENTS

Alcohol collection at DMNH

Submitted by Liz Shea

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The Delaware Museum of Natural History, like all natural history museums, preserves specimens in multiple ways so that they are available to scientists engaged in many different types of work. Although the bulk of our Mollusk collection is dry shells, we have a substantial alcohol-preserved collection, and the cephalopod holdings in particular have increased substantially over the past six years.

For many years and more recently with the Museum's Collections & Research Advisory Committee (since 2011), Museum staff have been investigating ways to improve our alcohol room facilities while managing the growing concerns of our insurance company over fire safety in the building without sprinklers. Our preferred long-term plan was to renovate the alcohol room space to improve both collections care and building safety. In 2009, we solicited proposals and engaged an architectural firm to help develop the planning documents, but the funding necessary to begin the process was never secured.

In June 2012, the Museum was notified that our insurance policy would not be renewed without substantial measures taken to decrease the risk associated with the alcohol-preserved specimens. In the worst case scenario considered, a fire in the

Museum would be exacerbated if it reached the alcohol collection, possibly resulting in a catastrophic loss of life, collection, and building.

The Museum's Board of Trustees directed staff to investigate steps necessary to move the collection out of the building. We explored costs associated with multiple scenarios: on-site storage in a hazardous materials storage container, off-site storage in a hazardous materials warehouse, and specimen deaccessioning and transfer to another institution.

During this time, the Museum began the search for a new insurance carrier. Three of the four insurance agencies solicited declined to make an offer due to the perceived hazard of the alcohol collection. However, we were able to secure a new insurance company to insure the whole museum, including the alcohol collection.

In spite of this success, the Board was influenced by the fact that four companies saw too much risk in our collection. On September 14, the Board voted to deaccession the bulk of the alcohol collection, deciding that the risk of maintaining an alcohol collection at the Museum was too great and the cost to mitigate the situation was too high. The Executive Committee subsequently decided that the vertebrate and invertebrate specimens, excluding the cephalopods, should be given to the Academy of Natural Sciences of Drexel University.

This decision was made over the strong objections of the Curators and the advice of the 13 letters solicited and received from individuals who have been involved in our collection in many different roles. These individuals included past Curators, a past Board member, past and current collections users, regular specimen donors, the Society for the Preservation of Natural History Collections, the American Ornithologists' Union's Collections Committee and others.

In their written explanation of the action, the Board summarized their decision as follows:

"The Trustees were faced with the difficult task of choosing between two undesirable options: keeping the alcohol collections while potentially risking their long-term viability or divesting the collections to secure their future and their access by the scientific community. Ultimately, the Board acted on its primary role of stewardship for all of the collections and the Museum as a whole".

Although collections staff strongly disagree with the direction our Board has chosen, we know that the Mollusk specimens will be well-cared for in the highly capable hands of the Academy's Malacology

Department. We are working with the Academy to make the transition of this important collection as seamless as possible, and expect that the transfer will happen in early 2013.



From Ivory Tower to Ivory Dungeon: Carnegie Museum Mollusk Collection Has Relocated

Contributed by Timothy A. Pearce & Megan E. Paustian

Carnegie Museum of Natural History, 4400 Forbes Avenue, Pittsburgh, Pennsylvania 15213, U.S.A.

Museums hold specimens in perpetuity to benefit current and future generations. In doing so, museums must preserve specimens to maximize long-term storage, while at the same time making specimens accessible.



Old Mollusks and New Mollusks.

A National Science Foundation grant to Carnegie Museum of Natural History (CMNH) has been making significant enhancements to present and future access in the Section of Mollusks by improving storage in this major research collection of international significance (any thorough study of North American mollusks would have to refer to this collection). To improve storage, this project has moved specimens out of wooden cabinets into more accessible archival metal storage cabinets.

Storage of calcium carbonate shells in wooden cabinets can lead to Bynesian decay in which normal acidic off-gassing from wood and wood products reacts with and causes deterioration of shells. Fortunately, we have detected only very minimal instances of Bynesian decay in our collection. The new archival storage will dramatically improve the long term storage of the specimens.



Mollusk shells say good-bye to the lovely wooden drawers and cabinets.

The new metal cabinets arrived July 2nd, and we with a host of volunteers and work-study students have completed transferring the dry specimens from the wooden cabinets where they had been stored for more than 100 years (since about 1906). The main task now is swapping specimens into archival specimen boxes to further enhance storage.



Megan Paustian transferring specimens to archival drawers.

Throughout the move, our worldwide collection of more than 140,000 lots of land, freshwater, and marine mollusks has remained open for scientific business, making loans, and hosting scientific visitors. We are more than 95% moved, currently operate out of the new space, and expect to have everything moved ahead of schedule. Most aspects of the new space are improvements, although with a smaller footprint, we are a bit more crowded.

We are grateful to all those who have helped along the way, securing the grant, planning, remodeling the new space, and moving. These efforts address museum and section goals of holding specimens in perpetuity.

The Texas Conchologist

Contributed by Lucy Clampit

The Houston Conchology Society is pleased to announce that its scientific publication, the Texas Conchologist, is in the process of being posted online at the Biodiversity Heritage Library website. The direct link to the TC is: <http://www.biodiversitylibrary.org/bibliography/50836>. At this time, volumes 1-3 are in the process of being scanned and posted. The posted volumes are not in numerical order, but will be in order when the posting is finished.

Texas CONCHOLOGIST

VOLUME 1, No. 7 March, 1965

COMING ACTIVITIES

MARCH 17, WEDNESDAY, 7:30 P.M., REGULAR MEETING in the Lecture Room of the Planetarium. Mrs. W. Berkeley Glass will relate some of her shelling experiences. Our sincere apologies to Mrs. Glass, who came prepared to give this program at the January meeting, but was prevented from doing so by an unusually long business session.

MARCH 21, FIELD TRIP. A shell count will be the order for the day, and the expedition will be led by Tom and Dorothy Kister. Meet at Bolivar Ferry Landing on the Bolivar side at 9:00 A.M. The group will shell for a while at the point, moving next to the beach at the "garbage dump", and then onward to McFaddin Beach, which is past High Island. BE SURE TO CIRCLE THIS DATE ON YOUR CALENDAR!!

NOTES & NEWS

Conchology Group officers for the 1965-66 year:

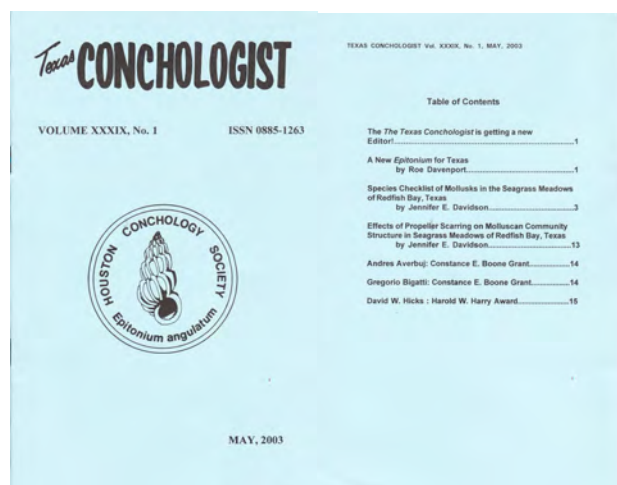
Chairman: Mr. Tom L. Kister Correspondent: Miss Catherine Curson;
Vice-Chairman: Dr. W. W. Sutor Program Chm.: Mr. Harold L. Geis
Secty.: Treasurer: Miss Flower Follett Editor: Mrs. E. W. Eubanks

CORRECTION: In the report of the December 20, field trip, in Vol. 1, No. 5, Solen viridula was reported as collected. This should have been Ensis minor.

A happy group of approximately 30 shellers met on January 17, for "Operation Gastropod" at San Luis Pass. Those who were familiar with Texas northern shore long johns, face masks, and other protective warm clothing. Many underestimated the 25 degree temperature and strong winds; among them was Mr. Cardesa, who alternated 10 minutes shelling with 15 minutes thawing in his car. Fortunately, the sun warmed the area later in the day. Ernie Libby and Fern Heinke each found an *Amiaa mitchelli*, both of which were dead specimens, but prices nevertheless. Dorothy Kister's find of the day was a lovely 4" *Bucycyon contrarium*. The following species were reported as taken alive: *Crepidula plana*, *Ocenebra sayana*, *Terebra dilucata*, *Nassarius (Nassarius) duplicatus*, *Bucycyon spiratum*, *B. contrarium*, *Thais haemastoma floridana*, *Epitonium angulatum*, *Anachis avaza*, *Aequipecten irradians amplicostatus*, *Dinocardium robustum* (Not D. r. vanishing!), *Mercenaria campechiensis*, *Cyrtolobos costata*, *Spisula solidissima similis*, *Mulinia lateralis*, *Donax discus*, *Ensis ensifer*, *Rangia cuneata*, *Tellinella cristata*, *Marteosia striata*, *Lacuna cardium mortoni*, *Trachycardium muricatum*, and *Tellina radiata* (one pair of valves), were reported collected dead. The collectors were well rewarded for their efforts with good shells and pleasant company. As a closing note, we quote from Mr. Cardesa's report: "Evidently the most plentiful species was *Bucycyon Americanus* . . . all very dead. I searched for a "live" specimen, but decided I would have to buy my own! Up near Jamaica, the Gulf washed at my feet a gorgeous specimen bearing the engraved portrait of George Washington . . . a one dollar bill, in fine condition. I have named it *Bucycyon Oceanicum*, and it will be in my collection to remind me that you're bound to find something if you look hard enough. The bird-catchers might like to know that driving out the island in the morning, a Great Blue Heron rose majestically and flapped away within a few feet of my car."

For any collector interested in the living Mollusks as well as their shells, we recommend Mollusca, An Introduction to their Form and Functions, by J. E. Morton, Paperback, \$1.40.

This article is written to acquaint readers with the history and the scientific importance of the publication. In Vol. 25, No. 1, Editor Constance "Connie" Boone celebrated the 25th anniversary of the TC with an article about its history which this writer used as a guide. Through the years, the TC had many editors, but Connie held the position the longest. For her, the publication was a labor of love.



When the TC began publication in September of 1964, it had no name, and the HCS was known as the Conchology Group of the Houston Outdoor Nature Club. The society's goal was to publish 10 issues a year on a monthly basis (August-May). In the December 1964 issue, the name became the Texas Conchologist. The number of issues per year was changed to 9. Money was scarce, so some issues were combined. Beginning with volume 9, the TC became a quarterly publication. It eventually became 1, 2, or 3 issues a year until its demise after volume 39 in 2003.

The TC contains articles by numerous professional and amateur malacologists and conchologists from Texas and around the world. All contributors were held to the same high standards, and if one did not use Latin names for the mollusks, the article was not printed. A few of the many contributors were: T.E. Pulley, Dr. W.W. Sutow, Raymond W. Neck, Harold W. Harry, Roger T. Hanlon, Emilio Garcia, Paula M. Mikkelsen, Dr. Harry G. Lee, Helmer Odé, Henk K. Mienis, Connie Boone, and Joseph P.E. Morrison. The articles cover a wide variety of topics, including reports on collecting trips around the world, biographical information about Texas malacologists, shells on stamps, etc., but most are about Texas shells – marine, land, freshwater, and fossils.

In 1969 the Houston Museum of Natural Science teamed up with the US government to use divers and destroyers to collect mollusks for a population study of the Northwestern Gulf of Mexico. Helmer Odé helped to direct the operation. He spent many years studying and writing about the material collected. His monograph "Distribution and Records of the Marine Mollusca in the Northwest Gulf of Mexico" began in Vol. 11, No. 1, and became the core of the TC.

Helmer was invaluable to the TC. He served as editor for several years and compiled an Index for

volumes 1-10 that was published in Vol. 10, No. 9, beginning on page 92. An index to Helmer's "Bivalvia" was published in Vol. 18, No. 4. Helmer also studied worldwide Turbonillae. TC Vol. 32, No. 1, contains some of his work on northwest Gulf of Mexico material. Numbers 2 and 3 of volume 32 are "A List of Turbonillid Taxa for the Western Atlantic." Volumes 33-35 have lists of Turbonillid from the west coast of the Americas, the Indo-Pacific, the Mediterranean, and the west coasts of Europe and Africa.

Since the TC is a valuable resource about Gulf of Mexico and Texas shells, members of the Houston Conchology Society are happy to make it available for everyone to use. We thank Pat LaFollette for helping and encouraging us in this endeavor.



MEMBERS CONTRIBUTIONS

Studying local adaptation in *Crepidula* spp.

Contributed by Abigail E. Cahill

Stony Brook University, Stony Brook, NY 11794

I am interested in how organisms can adapt to ongoing climate change and how patterns of adaptive evolution are influenced by dispersal. In marine invertebrates that means comparing species with dispersing, planktotrophic larvae that can live and feed in the water for weeks with direct-developing species whose young crawl away from their mother as juveniles. In my dissertation research, I am hoping to answer questions relating to how different dispersal types in the gastropod genus *Crepidula* can influence extant and potential adaptation to warming temperatures.

During the summer and fall of 2011, I conducted research (funded in part by a Carriker grant from the American Malacological Society) to investigate local adaptation to temperature in larvae and juveniles of *C. fornicata*, *C. plana*, and *C. convexa*, three species that are native to the east coast of North America. *C. fornicata* and *C. plana* have planktotrophic larvae that live in the water for 2-4 weeks and *C. convexa* has direct-developing larvae. In previous dissertation work (also funded in part by a Carriker grant), I found that *C. convexa* has much lower gene exchange among populations than *C. fornicata* (see also Collin 2001), but I wanted to know if that translated to ecologically relevant differences in temperature tolerance. I chose to manipulate temperature in my experiments because

the thermal regime along the east coast varies from generally cool north of Cape Cod to generally warm south of Cape Hatteras, with more seasonal temperatures in between these two biogeographic barriers.

I collected adult females of all three species from different populations along the coast (from Nova Scotia to Virginia), brought them back to my lab in New York, and reared their larvae in a common garden experiment at one of three temperatures: 12°C, 20°C, or 28°C. These temperatures were chosen to represent maximum summer temperatures north of Cape Cod, from Cape Cod to Cape Hatteras, and south of Cape Hatteras, respectively. I measured larval growth, survival, and metamorphosis rates for four weeks. *C. fornicata* was represented at seven populations, while the other two species were only represented at three populations each.

As I expected, *C. fornicata* did not show a pattern of local adaptation. All populations grew, survived, and metamorphosed equally well at any given temperature. Metamorphosis was strongly temperature-dependent, regardless of population (no metamorphosis was observed at 12°C). However, *C. convexa* and *C. plana* show signs of local adaptation in survivorship, where northern populations survived better at 12°C and more southern populations survived better at warmer temperatures. As I only had three populations each for these species, I am planning to investigate this problem further to see if the pattern of local adaptation holds with a larger sample size. I am particularly interested in why *C. plana*, a species with planktotrophic larvae, shows more similarities with *C. convexa* than with *C. fornicata*, another planktotroph. We know very little about the ecology of *C. plana*, so it is unclear why local adaptation might be occurring in this species.

Because *C. fornicata* has high gene flow and appears to perform equally well across its distribution, it may be easier for this species to shift its range in response to warming climate. *C. plana* and *C. convexa*, in contrast, may be hampered by lower dispersal and an inability to cope with temperatures outside the ones they currently experience. More work is needed to fill in the details of how these species can adapt to warming temperatures, and how their changing (or static) distributions can impact the ecological communities in which they live.

Acknowledgements

Funding for this project was provided in part by a Melbourne R. Carriker award from the American Malacological Society, a Conchologists of America

Grant to Malacology, and a Grant in Aid of Research from the Society for Integrative and Comparative Biology. Thanks to J. Levinton, D. Padilla, and D. Futuyma for help with project development. K. Alam, P. Jeyasri, A. Viazzo, and A. Woytash provided lab help. T. Essock-Burns, R. Etter, M. Luckenbach, P. Petraitis, T. Rawlings, and D. Ritschoff helped with sample collection.

Literature Cited

Collin, R. 2001. The effects of mode of development on phylogeography and population structure of North Atlantic *Crepidula* (Gastropoda: Calyptraeidae). *Molecular Ecology* 10:2249-2262.



Effects of Various *Echinostoma caproni* (Trematoda) Miracidia Doses on the Survival and Fecundity of *Biomphalaria glabrata* Snails.

Contributed by Alexandra Hunsberger, Daniel Beideman, and Bernard Fried

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Easton, PA 18042

Biomphalaria glabrata is an important vector snail serving as an intermediate host for numerous economically important trematodes, including *Schistosoma mansoni*, *Echinostoma caproni*, and *Echinostoma paraensei*. A considerable body of literature exists on the *S. mansoni*-*B. glabrata* relationship, but less information is available on *echinostomatid*-*B. glabrata* relationships. Recent attention has focused on the effects of various doses of *E. paraensei* miracidia infection on the biology and chemistry of exposed *B. glabrata* snails (Tunholi et al., 2011). Less information is available on the effects of different miracidia doses on the biology and chemistry of *E. caproni* in *B. glabrata*. The *E. caproni*-*B. glabrata* model is a widely used in biological research as discussed by Fried and Huffman (1996).

Our laboratory has begun to examine the effects of various miracidia doses of *E. caproni* on the biology and chemistry of *B. glabrata*. In this note, we report our initial studies on the effects of miracidia doses of 5, 25, and 50 on the biology of *B. glabrata*. Specifically, we examined the effects of these doses on snail survival and fecundity. In our work, we equate fecundity with egg-laying.

Ninety unexposed *B. glabrata* snails, 10-15 mm in shell diameter, were obtained from Dr. Fred A. Lewis, Head, Schistosomiasis Laboratory, Biomedical Research Institute, Rockville, MD,

USA, and used upon receipt. The aquarium water used to maintain these cultures was artificial spring water (ASW) as described by Ulmer (1970). Each culture contained 10 snails in 800 mL of ASW in 1000-mL glass mason jars. Three trials were conducted, and each trial used a total of 30 snails: 10 were unexposed controls; 10 were each exposed to 5 miracidia; and 10 were each exposed to 25 miracidia. Snails were exposed individually in 1-2mL of ASW in multi-well chambers for 6-8 hours before being returned to the mason jars. Cultures were maintained at $25\pm 1^\circ\text{C}$ under artificial fluorescent light. Snails were fed boiled romaine lettuce *ad libitum*, and the ASW in each culture was changed every 2-3 days. Observations on snail survival were made once a week for 4 weeks. Egg masses were counted once a week for 4 weeks. After the egg masses were counted they were removed from the cultures and discarded. To observe the effects of heavy miracidia doses on snail survival, 20 additional unexposed snails obtained from Dr. Lewis were each exposed to 50 miracidia. These snails were maintained as described for those in the other trials. At 3 weeks post exposure we observed 80% mortality in these snails each exposed to 50 miracidia. Presumably, the heavy miracidia exposure caused undetermined damage to these snails leading to such high mortality. Based on this preliminary experiment, we discontinued our 50 miracidia exposure study with *B. glabrata*.

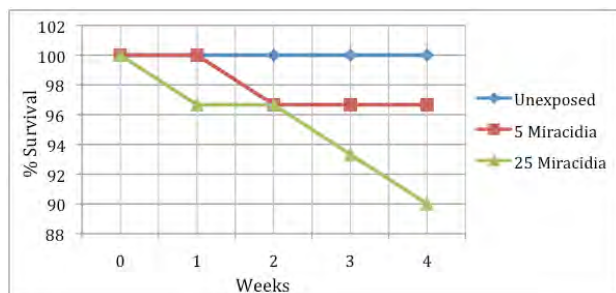


Figure 1. Percent snail survival from 0 to 4 weeks post exposure.

Our study indicated that snail mortality increased as a function of a heavy miracidia dose. We observed some minimal snail losses in the 25 miracidia group, in which there was 90% survival at 4 weeks post exposure, as seen in Figure 1. The fact that snail survival was 90% at 4 weeks allows us to use the 25 miracidia per snail dose in biochemical analysis of snails exposed with various doses of miracidia. Those studies are currently in progress and will be reported elsewhere. The 5 miracidia dose appeared to cause a decline in egg-laying when compared to the controls and the 25 miracidia

exposed groups (Figure 2). Because the fecundity data showed considerable variation as a function of miracidia dose, no conclusions can be made at this time as to the effects of high versus low miracidia dose on egg-laying.

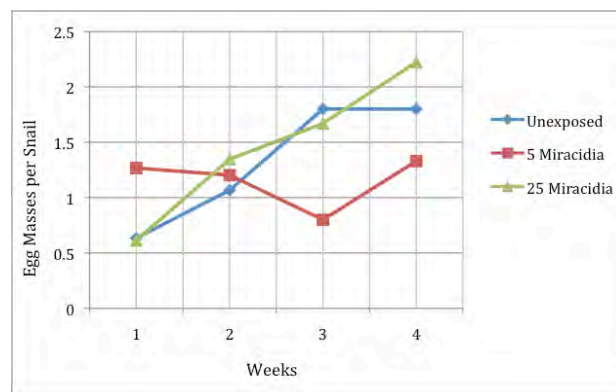


Figure 2. Egg masses per snail, from 0 to 4 weeks post exposure.

Acknowledgements

We are grateful to Dr. Fred A. Lewis, Head of the Schistosomiasis Laboratory, Biomedical Research Institute, Rockville, Maryland, for supplying the *Biomphalaria glabrata* snails used in this work through NIH - NIAID contract HHSN2711010000051.

Literature Cited

- Fried, B., Huffman, J. (1996) The biology of the intestinal trematode *Echinostoma caproni*. *Advances in Parasitology* 38:311-368.
- Tunholi, V. M., Lustrino, D., Tunholi-Alves, V. M., de Mellos-Silva, C. C. C., Maldonado Jr., A., de Azevedo Rodrigues, M. L., Pinheiro, J. (2011) Changes in the reproductive biology of *Biomphalaria glabrata* infected with different doses of *Echinostoma paraensei* miracidia. 106:192-195.
- Ulmer, M. J., (1970) Notes on rearing snails in the laboratory. In *Experiments and Techniques in Parasitology*, MacInnis, A.J. & Voge, M. (eds). W. H. Freeman and Co., San Francisco, pp. 143-144.

✱

Is there a previously unknown cryptic species of giant Pacific octopus in Prince William Sound, Alaska?

Contributed by N. Hollenbeck & D. Scheel

Alaska Pacific University

Coleiod cephalopods are masters of using body patterning for cryptic (Zylinski et al. 2009), protean (shape-change, Norman et al. 2001), deimatic (threat, e.g. Langridge 2009) and mating displays (Mather 2001). Species therefore often may be

distinguished by differences in body patterning (Hanlon 1988; Roper and Hochberg 1988). In the Octopodidae family, the last 25 years have been very productive in the discovery of new species (Norman and Hochberg 2005). Studies of cephalopods have focused on morphological, genetic, behavioral, and body patterning characteristics, and each have been important in taxonomic work describing new species.

Recent molecular evidence indicated genetically distinct clades of octopuses in Prince William Sound, Alaska: Clade I, identified with the giant Pacific octopus, *Enteroctopus dofleini*, and a numerically rarer lineage, termed Clade II (Toussaint et al. 2012). The rarer, previously undescribed Clade II was 3-4% divergent from *E. dofleini* in mtDNA cytochrome oxidase I sequences, within the lower range of sequence divergence characterizing species level differences (Kaneko et al. 2011). Clade II was similarly distinctive in nuclear and microsatellite sequences, and thus appeared reproductively isolated from *E. dofleini* (Toussaint et al. 2012). However, Toussaint et al. (2012) collected no whole specimens and were unable to provide any morphological description of these genetically distinct octopuses.

In October 2012, we collected live octopuses in Prince William Sound from the same locations where Clade II tissue samples were obtained previously. Octopuses were collected as by-catch in shrimp pots during a test shrimp fishery by Alaska Department of Fish and Game. We collected four octopuses captured from three different locations between 55 and 143 m depth. Octopuses were sexed, weighed, and held alive for transportation to Alaska Pacific University for genetic typing and further study. Octopuses were classified using two loci that appear to be diagnostic between the two lineages (Clade I, *Enteroctopus dofleini*, and the less common Clade II). This preliminary classification will be confirmed with additional sequencing of COX1 and nuclear genes. Preliminary classification indicated that of the four octopuses captured, two were female *E. dofleini* and two were small (510 and 820 g mass) male Clade II octopuses.

Body patterning characteristics have been used for taxonomic identification of cephalopods (e.g. Hanlon 1988; Huffard 2007; Jorgensen 2009; Leite and Mather 2008). To our knowledge the body patterning characteristics of *Enteroctopus dofleini* has yet to be fully inventoried, but Anderson et al. (2010) described a preliminary classification of behaviors with some body patterning, including a conspicuous eye bar. We hypothesize that

Enteroctopus dofleini and Clade II individuals may differ in aspects of body patterning. *E. dofleini* body patterns potentially useful in species identification include 1. Skin texture (folds, rather than tubercules), 2. Absence of a lateral mantle ridge, 3. Absence of three papillae under eye (“eyelashes”) and the presence of one large papillae over the eye, 4. Single frontal white spot below and between the eyes (rather than two or none), 5. A white streak from eye to base of 2nd arms, 6. Body papillae flat and paddle-like, 7. Longitudinal mantle skin folds (Anderson 2006; Jorgensen 2009). We used these expected characteristics as null hypotheses, with the expectation that Clade II individuals would not differ from *Enteroctopus dofleini* in any of these traits.

Female *Enteroctopus dofleini* and the two male Clade II individuals did not differ in the presence of folds rather than tubercules, body papillae flat and paddle-like, longitudinal skin folds, and both clades displayed a white streak from eye to base of 2nd arms. However, the two clades differed during live observation in other ways (Fig. 1). Both Clade II males display intense frontal and mantle white spots. Additionally white lines from the frontal white spots to base of first arms R1 and L1 are frequently displayed. Both Clade II males have a longitudinal frill along the edge of the mantle. The frill is formed by merged papillae along a longitudinal line dividing the dorsal and ventral sides of the mantle. The eye papillae were elongated and more slender in our Clade II individuals than in *E. dofleini*. Finally the eye bar described by Anderson et al. (2010) has not been recorded in our Clade II specimens.



Figure 1. Clade II males (top) and *Enteroctopus dofleini* females (bottom). We hypothesize that Clade II may be distinguished from *E. dofleini* by the presence of a lateral skin flap (left), absent eye bar, and paired (not shown) rather than a single frontal white spot (bottom right). Further observation will be required on especially female Clade II and male *E. dofleini* octopuses. Photography by D. Scheel.

From molecular data, Clade II octopuses appear likely to fall into the genus *Enteroctopus* (Toussaint et al. 2012). Characters defining *Enteroctopus* include distinct longitudinal skin folds or wrinkles dorsally and laterally, patch and groove system present, dorsal mantle and frontal white spot complexes present, four elongated papillae in diamond pattern on mid-dorsal mantle, large flap-like papillae over each eye, head distinctly narrower than mantle, outer limbs ½ length inner limbs, arm R3 hectocotylized, ligula long and narrow (Hochberg 1998). On preliminary observation, both Clade II males in this sample displayed these characters, with the exception of relative limb lengths and ligula descriptions, which have yet to be measured.

Following behavior and body patterning observations of live individuals, octopuses will be preserved in formalin, and will be deposited with the California Academy of Science for taxonomic study. However, some defining characters of *Enteroctopus dofleini* include its large size and aspects of ligula morphology as well as skin characteristics (Hochberg 1998). Large size can only be assessed in near-mature individuals; and ligula morphology only in males, making taxonomic work challenging given the sub-mature specimens collected to date. For a short time, a Clade II individual will be retained alive and on display in the aquarium facility at Alaska Pacific University, and additional collecting is planned for Spring 2012. The progress report described here, based on only two small males tentatively classified via genetics as Clade II octopuses, cannot be considered decisive. However, we have now identified several body pattern hypotheses to be tested against octopuses collected from Prince William Sound in the near future.

Acknowledgments

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Literature Cited

Anderson RC (2006) On west coast octopuses including a field key to west coast species. *The Festivus* XXXVIII (1):5-6

- Anderson RC, Mather JA, Monette MQ, Zimsen SRM (2010) Octopuses (*Enteroctopus dofleini*) Recognize Individual Humans. *J Appl Anim Welfare Sci* 13(3): 261-272
- Hanlon RT (1988) Behavioral and body patterning characters useful in taxonomy and field identification of cephalopods. *Malacologia* 29(1):247-264
- Hochberg FG (1998) Class Cephalopoda. In: Scott PV, Blake JA (eds) Taxonomic atlas of the benthic fauna of the Santa Barbara basin and the western Santa Barbara channel, vol 8, The Mollusca Part I: The Aplousobranchia, Polyplacophora, Scaphopoda, Bivalvia, and Cephalopoda. Santa Barbara Museum of Natural History, Santa Barbara, California, pp 175-236
- Huffard CL (2007) Ethogram of *Abdopus aculeatus* (d'Orbigny, 1834) (Cephalopoda: Octopodidae): Can behavioural characters inform octopodid taxonomy and systematics? *J Mollus Stud* 73(2):185-193. doi: 10.1093/mollus/eym015
- Jorgensen EM (2009) Field guide to squids and octopods of the eastern North Pacific and Bering Sea. Alaska Sea Grant College Program, Fairbanks, Alaska
- Kaneko N, Kubodera T, Iguchi A (2011) Taxonomic Study of Shallow-water Octopuses (Cephalopoda: Octopodidae) in Japan and Adjacent Waters Using Mitochondrial Genes with Perspectives on Octopus Dna Barcoding. *Malacologia* 54 (1-2):97-108
- Langridge KV (2009) Cuttlefish use startle displays, but not against large predators. *Anim Behav* 77 (4): 847-856. doi:10.1016/j.anbehav.2008.11.023
- Leite TS, Mather JA (2008) A new approach to octopuses' body pattern analysis: a framework for taxonomy and behavioral studies. *Am Malacol Bull* 24:31-41
- Mather J (2001) Do squid make a language on their skin? Norman MD, Finn J, Tregenza T (2001) Dynamic mimicry in an Indo-Malayan octopus. *Proceedings Royal Society of London B* 268:1755-1758
- Packard A (1995) Organization of cephalopod chromatophore systems: a neuromuscular image-generator. In: Abbott NJ, Williamson R, Maddock L (eds) Cephalopod neurobiology: Neuroscience studies in squid, octopus, and cuttlefish. Oxford University Press, New York, pp. 331-367
- Packard A, Hochberg FG (1977) Skin Patterning in Octopus and Other Genera. *Symp Zool Soc Lond* 38:191-231
- Roper CFE, Hochberg FG (1988) Behavior and systematics of cephalopods from Lizard Island, Australia, based on color and body patterns. *Malacologia* 29(1):153-193
- Toussaint RK, Scheel D, Sage GK, Talbot SL (2012) Nuclear and mitochondrial markers reveal evidence for genetically segregated cryptic speciation in giant Pacific octopuses from Prince William Sound, Alaska. *Conservation Genetics* 13(6):1483-1497. doi:10.1007/s10592-012-0392-4
- Zylinski S, Osorio D, Shohet AJ (2009) Perception of edges and visual texture in the camouflage of the common cuttlefish, *Sepia officinalis*. *Phil Trans R Soc B* 364(1516):439-448. doi:10.1098/rstb.2008.0264

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**Taxonomic and distributional study of
freshwater bivalve populations
"Naiads" (Mollusca: Bivalvia: Hyriidae) in
Patagonia, Argentina.**

Contributed by S. Torres and Darrigran, G.

Research Group on Bivalve Mollusks-Division of
Zoology of the Museo de La Plata (FCNyM-UNLP).
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Populations of Naiads, very abundant in the past (31 species listed) (Rumi et al., 2008), have been displaced / extinct by habitat modification (Darrigran, 1999) and the invasion of bivalves (e.g. *Limnoperna fortunei* and *Corbicula fluminea*) (Darrigran and Damborenea, 2005). Globally the rate of extinction of freshwater bivalves is very high, and superior to other groups such as vertebrates. The IUCN report shows that of the 306 bivalve species assessed, 41% are seriously threatened (Baillie et al., 2004). These species are an important component of the infauna of lotic and lentic water bodies, living in silty and sandy bottoms, filter feeding, taking a role as recyclers of organic material (Bogan, 2008).

Being considered one of the most endangered groups at risk of extinction, distributional and systematic studies play an important role in conservation, allowing recognition of potential priority areas for protection (Bogan & Roe 2008). During 2013, Santiago Torres, led by Gustavo Darrigran and Pablo Vigliano, will initiate a research project that includes a taxonomic and geographic distribution study of naiads present in the Patagonia Argentina. The numbers of studies on freshwater bivalve populations in the patagonic region are scarce, and most date back to the 60s and 70s (Torres et al. in press). The objectives outlined in the Project "Taxonomic and distributional study of freshwater bivalve populations "Naiads" (Mollusca: Bivalvia: Hyriidae) in Patagonia, Argentina" are:

- To know the current geographical distribution of naiads in Patagonia Argentina.
- To check the systematic of the populations to verify the number of species in the area.
- To estimate the population characteristics of naiads and assess their conservation status.

Literature Cited

Baillie J., Hilton-Taylor C. & Stuart, S. (Eds.) 2004 IUCN Red List Of Threatened Species. A Global Species Assessment. IUCN, Gland, Switzerland And Cambridge, UK. XXIV + 191 pp

Bogan, A. E. 2008. Global diversity of freshwater mussels (Mollusca, Bivalvia) in freshwater. *Hydrobiologia* 595: 139–147

Bogan, A. E. & K. J. Roe. 2008. Freshwater bivalve (Unioniformes) diversity, systematics, and evolution: status and future directions. *Journal of the North American Benthological Society* 27:349–369.

Darrigran, G., 1999. Longitudinal distribution of molluscan communities in the Río de la Plata estuary as indicators of environmental conditions. *Malacological Review suppl. Freshwater Mollusca* 8:1-12.

Darrigran, G.; M.C. Damborenea. 2005. A bioinvasion history in South America. *Limnoperna fortunei* (Dunker, 1857), the golden mussel. *American Malacological Bulletin* 20:105-112.

Rumi, A.; D. E. Gutiérrez G., Núñez V. & G. Darrigran. 2008. Malacología Latinoamericana. Moluscos de agua dulce de Argentina. *Biología Tropical* 56: 77-111.

Torres, S.; Darrigran, G. & Damborenea, C. (in press) Distribución del genero Diplodon (Mollusca: Bivalvia: Hyriidae) en territorio Argentino mediante el uso de Colecciones Biológicas. *AUGMDOMUS* <http://revistas.unlp.edu.ar/index.php/domus>



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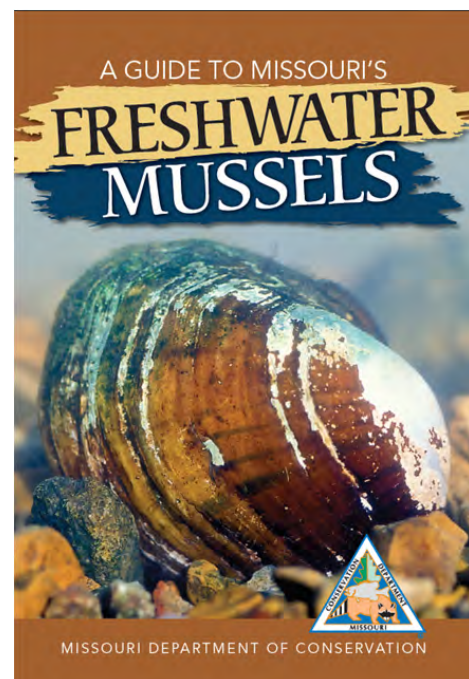
A Guide to Missouri's Freshwater Mussels

By McMurray, S.¹, Faiman, J.S.¹, Roberts, A.², Simmons, B.², and Barnhart, M.C.³

¹Missouri Department of Conservation

²U.S. Fish and Wildlife Service

³Missouri State University



This new free publication is now available from the Missouri Department of Conservation Distribution Center. The 94 page guide provides clear pictures, key characteristics, and up-to-date distribution maps for all of Missouri's native freshwater mussel species and the invasive zebra mussel and Asian clam. To order a copy, send an e-mail to Pubstaff@mdc.mo.gov with the name of the publication, and your name and mailing address.



MINUTES OF THE ANNUAL BUSINESS MEETING

Presented by Amanda S. Lawless, Secretary

June 20, 2012

Crowne Plaza Hotel, Cherry Hill, NJ

The meeting was called to order by President Gary Rosenberg at 5:20 pm.

A motion was made and passed to approve the minutes of the 2011 business meeting.

Executive and Committee Reports were presented:

President's Report: Presented by Gary Rosenberg. 265 people registered for AMS/COA combined, 158 registered for AMS, 156 registered for COA, and 49 registered for both. Thanks to the auctioneers Paul Callomon and Charlie Sturm the auction made \$4,447.

President Elect: Presented by Peter Marko. The 2013 AMS Meeting will be held jointly with Unitas for the World Congress of Malacology (WCM) at the University of the Azores from July 21-28, 2013 in Sao Miguel, Azores, Portugal. Tony Martins of the University of the Azores is the Unitas president. Travel to the Azores is a 5.5 hour flight from the east coast with flights starting at ~\$500. Accommodations will include university housing, hostels, and hotels. Abstracts should be submitted to the WCM. Organizers are working on getting collecting permits. Peter also discussed various symposia topics.

A motion was made and passed to accept the 2013 meeting venue.

Vice President: Presented by Paul Valentich-Scott. It was proposed that the 2014 meeting be held jointly with the Western Society of Malacologists and the Asociación Latinoamericana de Malacología to have the first "Mollusk Meeting of the Americas". This joint meeting would be held in late June/early July 2014 in Merida, Yucatan, Mexico.

Treasurer's Report: Presented by Charlie Sturm. Total assets increased in 2011 by \$11,002.76. Operating funds were \$27,220.87 and endowment funds were \$165,476.85, for a total of \$192,697.72. AMS asset allocation was 49.3% bonds and 50.7% stocks.

Audit & Budget Committee Report: Presented by Charlie Sturm. The 2012-2013 budget was presented with total

income/expenses increased to \$47,000 (possible revenue from the meeting may not be reflected in the budget). The Vanguard Fund may represent both Symposium Endowment and Student Research Grant funds (this is being researched). No funds were withdrawn from the Life Member Endowment Fund. Due to next year's meeting being held in conjunction with Unitas, the symposium, student travel, and office travel expense lines were increased from the previous budget. The student award allocation was increased from \$2,500 to a possible maximum of \$3,000.

Motion to pass budget. Motion passed.

Endowment Committee Report: Presented by Rüdiger Bieler. The Endowment committee consists of Rüdiger Bieler (chair), Alan Kohn and José Leal. Vanguard stock and bond accounts reported a gain of \$12,289 for the two endowments (Life Membership and Symposium Fund). In view of the expensive nature of the 2013 meeting, the committee authorizes the use of \$7,000 for one or more symposia at the meeting. The Committee instructs the treasurer to rebalance the Vanguard stock and bond ratio to 50/50 and requests regular fund updates from the treasurer.

Membership Committee Report: Presented by Beth Davis-Berg. AMS has a total of 209 members, 42 of which are students. AMS has had the same average number of students for the past 10 years, but regular membership has not gone up. It appears students are not becoming members after graduation. Why? Beth recommended sending a survey to members to try and understand the issues facing AMS. Please 'like' AMS on Facebook. Please send ideas about membership to Beth or contact her if you would like to help.

Editor and Publications Committee Report: Presented by Colleen Winters. Managing Editor is Fabio Moretzsohn. Returned to publishing the AMB twice a year (January and July) starting with Vol. 30 (1) & 30 (2). Time from submission of a paper to publication has dropped. The AMB impact factor is at .948. Author directions for publishing research notes will be added to the AMB. An obituary page and list of reviewers will be published in the AMB on alternate years.

Nominating Committee Report: Presented by Gary Rosenberg. The Nominating Committee consisted of Paula Mikkelsen, Charlie Sturm, Doug Eernisse and Gary Rosenberg. Positions were open and the following people nominated: President – Peter Marko, President-Elect – Paul Valentich-Scott, Vice President – Thomas Duda, Jr., Secretary – Amanda Lawless, Past President (4-10 Years) – José Leal, Councilors-at-Large – Elizabeth Shea and Rory McDonnell.

No nominations were received from the floor, and the slate was approved by motion.

Secretary's Report: Presented by Amanda Lawless. Continued maintenance and updating of the membership database and working with the AMS webmaster Marla Coppolino on the maintenance of the AMS website. Please contact Marla if you would like to post an

announcement on the AMS website. Compilation and distribution of the 2011 AMS Membership Directory. Assisting newsletter editor Christine Parent with preparation and distribution of the 2011 fall and 2012 spring newsletters.

Conservation Committee Report: Presented by Jay Cordeiro. IUCN has converted from a print format (Red Data Book) to an online database. AFS Endangered Species Committees have completed final drafts of the Conservation Status of North American Freshwater Mussels (U.S., Canada, Mexico) and North American Freshwater Snails (U.S., Canada). Natural Heritage Network will not have updates for any aquatic invertebrate in the future because of finances. AMS should have a statement for each federal listed species that is given endangered species status, but this is hard because AMS meets annually. Therefore, AMS members will receive e-mails about those species that will be listed and can make a statement on their own if they wish. The listed species will also be posted on the AMS website. Jay proposed forming a formal land snail committee or working group that would meet annually at the meeting to discuss creating a land snail guide to update Pilsbry's "Land Mollusca of North America". Contact Jay about any ideas or funding for the group. Gary recommended the land snail group be a sub-committee of the conservation committee.

Student Awards Committee Report: Submitted by Janet Voight. The 2012 Melbourne R. Carriker student research awards were given to the following students: Jer Pin Chong (Iowa State University), Nicholas Carey (Queen's University Belfast), Carolyn Keogh (University of Georgia, Athens), Anita Krause (Iowa State University), and Catharine Pritchard (University of Oregon). A one-time \$500 award for student travel to the AMS meeting was publicized; however, no student applied for the grant. This year's meeting awards committee consisted of Janet Voight, Tim Pearce and Roland Anderson with the following award being presented: Constance Boone Award – John M. Pfeiffer III (University of Alabama). No poster award was given.

Systematics Committee Report: No chair of the systematics committee, but a meeting was held with Charles Lydeard of NSF to talk about NSF grants.

Resolutions Committee: No new business.

Constitution & Bylaws Committee: Presented by Rob Dillon.

Rob discussed the extensive rewrite of Article 7, Sections 2-4 of the AMS Bylaws. Article 7 discusses the "Use of AMS Funds". Please go to the following link to review the updated Bylaws. <http://www.malacological.org/constitution/constitution.php>

A motion was made to accept the updated Bylaws. Motion passed.

A motion to adjourn was made and passed.

MESSAGES FROM THE NEWSLETTER EDITOR

I would like to draw your attention to the AMS members online "corkboard" where other news and announcements are posted throughout the year:

<http://www.malacological.org/corkboard>

You can find job, postdoc, and graduate student positions advertisements, announcements for research grants, scholarships, and fellowships, and other malacological related announcements.

To post your own advertisement, please contact Amanda Lawless at lawless@ansp.org.



Contributions to the biannual AMS newsletter are always welcomed. Send articles, short notes or news items to **Christine Parent**, the newsletter editor, at the following address:

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