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ANNOUNCEMENTS



**AMS 2011 – PITTSBURGH, PENNSYLVANIA
JULY 23-28, 2011**

Submitted by Charlie Sturm, AMS President

I would like to announce that the 2011 annual meeting of the American Malacological Society will be held in Pittsburgh, PA. Pittsburgh is home to the Carnegie Museum of Natural History (and its world class collection of freshwater and terrestrial mollusks) as well as Duquesne University, sitting on a bluff overlooking the Monongahela River and the downtown area. The meeting will be held at Duquesne University. There will be housing available in the student dorms and there is a nearby hotel for those desiring more plush accommodations. A meal plan will be available through the University.

The meeting will be held during 23-28 July. Even though we will be hundreds of miles from any marine shore, the timing was selected with marine malacologists in mind. This time period will avoid any of the significant low tides, so it will have

minimal impact on marine coastal field work!

At this point in time, several activities are in the planning stage. There will be a special session on gastropod behavior, life history strategies, and ecology. You are invited to present recent experimental discoveries on gastropod behavior, life history strategies, and ecology. If you have an interest in participating please contact either: Amy Wethington (wethia@chowan.edu), Beth Davis-Berg (edavisberg@colum.edu), or Cindy Norton (cgnorton@stkate.edu). We welcome students to participate as well. We hope to have a whole day of interesting talks and a discussion afterwards.

Jay Cordeiro (jay_cordeiro@natureserve.org) will be organizing a session on issues in molluscan conservation. We will be including topics in molluscan diversity, distribution, threats, conservation issues, and management. This session will deal with marine, freshwater, and terrestrial environments. We also expect to host a late afternoon roundtable discussion on conservation issues.

Frank 'Andy' Anderson is hoping to get those folks interested in cephalopods to come to Pittsburgh and participate in a session dealing with these critters. We expect that folks interested in Recent and fossil cephalopods will get together and have a good time discussing the biology, ecology, and evolution of this group. You can contact Andy at (feander@siu.edu) if you are interested in this session.

In addition to planned sessions, there will be opportunities for presentations at open session and there will be a poster session. The Carnegie Museum, which is a short bus trip from Duquesne University, will be available for attendees who wish to visit and use the collection.

There are two field trips in the planning stages. One trip will be studying the land snails of the region. This trip will be run by Tim Pearce. Tim is the curator of mollusks at the Carnegie and a diehard land snail researcher. The second field trip will be led by Art Bogan, a noted unionid specialist. Art has studied the rivers and lakes of western Pennsylvania for many years and is well qualified to lead this trip.

In addition we will have an opening reception, the always popular auction (which helps support student activities), and the annual banquet. Further details will be forthcoming, check the AMS website for details early in 2011. If anyone has any questions regarding the meeting please e-mail me at (csturmjr@pitt.edu). There are still opportunities to hold other special sessions. If you have one in mind, or a workshop, please let me know.

Hope to see many of you in Pittsburgh.

Charlie Sturm
President
American Malacological Society



OTHER UPCOMING MEETINGS

**AMS 2012 – Philadelphia, PA
June 16-21, 2012**

Contributed by Gary Rosenberg

The 2012 AMS meeting will be held June 16 to 21 at the Crowne Plaza Hotel Philadelphia-Cherry Hill. The meeting coincides with the 200th anniversary festivities at the Academy of Natural Sciences of Philadelphia, which is the birthplace of American malacology and conchology. The Conchologists of America will meet at the same venue, June 19 to 24, and some joint sessions are planned.



**BIOLIEF 2011 - 2nd World Conference on
Biological Invasions and Ecosystem Functioning.
Mar del Plata, Argentina**

November 21-24, 2011.

Contributed by Jorge L. Gutiérrez

BIOLIEF 2011 will be a forum for the presentation, discussion, and synthesis of research on biological invasions in its broadest sense. The conference will place a particular emphasis on studies concerning the impact of invasive species on ecosystem functioning and/or services, irrespective of

taxonomic groups or ecosystem types. However, studies on any other ecological aspect of biological invasions will also be welcome. Topics such as the spread of invasive species into ecosystems, the biogeography and history of species introductions, and the community- or species-level impact of biological invasions will also have an important coverage in the final conference program.

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For more information about this meeting, visit our website (<http://www.grieta.org.ar/biolief/>). You can also follow us in Facebook for news and updates (<http://www.facebook.com/?ref=home#!/pages/BIOLIEF-2011/126444150720221?ref=sgm>).



MEMBERS CONTRIBUTIONS

**Preliminary results of life history strategies of
the freshwater snail genus *Leptoxis*
(Cerithioidea: Pleuroceridae) from the
southeastern United States**

Nathan Whelan, winner of the Melbourne Carriker
student Research Grant

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Many systematic and ecological studies have overlooked the critically imperiled freshwater snails in the genus *Leptoxis*, and the genus has a long history of taxonomic uncertainty (Goodrich 1922; Graf 2001). There are twelve extant *Leptoxis* species; 13 are considered recently extinct. The round rocksnail (*L. ampla*), the painted rocksnail (*L. taeniata*), and the plicate rocksnail (*L. plicata*) are currently listed as threatened or endangered under the U.S. Endangered Species Act. The interrupted rocksnail (*L. foreman*), is known only to exist in captivity and in one population in Georgia's Oostantula River which may already be extirpated (Johnson and Evans 2001). In light of this, little is known about the evolution and life history of *Leptoxis*. I am working on a complete systematic revision of *Leptoxis* to document the real biodiversity within the genus and to revise the taxonomy to reflect true evolutionary lineages. This will aid in conservation efforts of *Leptoxis* as it is impossible to conserve the biodiversity of this genus if the true extent of *Leptoxis* biodiversity is unknown. One primary focus of this study is an analysis of life history strategies of the genus. Intraspecific differences in life history traits such as

egg clutch size, egg laying strategies, and the period of oviposition will likely provide novel insights into the evolution of *Leptoxis* and may aid in species delineation (Brown 1983).

A



B



Fig. 1: Two different specimens of *Leptoxis ampla*. Specimen A was collected from the main stem of the Cahaba River near Centerville, AL and represents the typical *L. ampla* form. Specimen B (the “mimica” form) was collected from the Little Cahaba River in Alabama and has distinct horizontal ridges along the first body whorl. This form is only found in the Little Cahaba River and Goodrich (1922) synonymized this form, *L. mimica*, with *L. ampla* based on shell morphology and the shape of the operculum.

The first step of this research was to analyze the large collection of *Leptoxis* and other pleurocerid genera at the Florida Museum of Natural History (FLMNH). Systematic documentation of the intraspecific morphological variation among *Leptoxis* species led to hypotheses concerning whether or not previous taxonomic revisions reflect

biological reality. I documented the considerable conchological variation within *Leptoxis* and other pleurocerid genera (i.e. *Io*, *Lithasia*, *Pleurocera*, *Elimia*) by taking 1,350 high quality pictures of museum material (see Fig. 1 for an example). I also employed the analysis of type specimens through an ongoing project to create a full type catalog of every described North American pleurocerid. The variation within nominal species documented at FLMNH allowed me to make informed decisions concerning how to best study live animals in culture in regards to life history and the collection of tissues for molecular systematic analyses.

Due to the inherent difficulties of studying life history strategies in the wild, I developed a unique culturing set-up at the Alabama Aquatic Biodiversity Center (AABC) in Marion, AL. Currently, nine of the twelve extant *Leptoxis* species are in culture at AABC. Each species has already laid eggs this breeding season, and additional *Leptoxis* species will be in culture before the end of the year for analysis during spring 2011. Two populations of both *L. ampla* (see Fig. 1) and *L. taeniata* that show drastic morphological differences are being cultured in a uniform environment. Once juveniles of these populations are fully grown, their shell morphology will be analyzed to determine if conchological variation is due to differences in habitat or more likely due to genetic influences.

Distinct interspecific differences in egg laying strategies are being documented within *Leptoxis*, and each nominal species demonstrates qualitative differences in the shape and formation of their respective egg clutches. Of the nine species analyzed thus far only *L. plicata* and *L. arkansensis* lay single eggs rather than clutches. Many species demonstrate quantitative differences in egg clutch size. There are also significant differences in fecundity between different age classes of *L. foremani*, and females lay eggs in multiple years. As such—and contrary to the literature—*Leptoxis* is iteroparous and there is evidence that other pleurocerid genera are also iteroparous (Garner and Haggerty 2010; P. Johnson unpublished data).

Future directions for this project include mapping the life history strategies for each species (e.g. presence or absence of an egg clutch) onto a molecular phylogeny that I am currently constructing and population genetic structure analyses of *Leptoxis* species with microsatellite DNA loci primers that I am developing. Funding provided by the American Malacological Society’s Melbourne R. Carriker Student Research Grant primarily funded a trip to the Florida Museum of

Natural History and also offset costs associated with field work. Permits to collect and keep live individuals of threatened or endangered species have been secured through Paul Johnson at the Alabama Aquatic Biodiversity Center and the states where each species is found.

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Studying genetic diversity in *Crepidula convexa*

Abigail E. Cahill, winner of the Melbourne Carriker student Research Grant

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I am interested in invasive species, gastropods, and France, which has led me to a trans-Atlantic study of the ecological and genetic effects of snails from the east coast of North America that are introduced elsewhere in the world. I work on *Crepidula*, a genus of gastropods in the family Calyptraeidae. There are three species that are native to the east coast of the US: *C. fornicata*, *C. convexa*, and *C. plana*.

C. fornicata is the most conspicuous of these species. It was introduced to Europe in the early 20th century, to France around 1950, and is now at very high densities within this introduced range (Blanchard 1997). Previous studies have shown that genetic diversity in the European populations is quite high, a result that conflicts with the often-cited idea that introduced populations, which come from a low number of founding individuals, should have lower genetic diversity than native ones. However, like many marine species, *C. fornicata* has been introduced many times, and has larvae that live in the plankton for roughly 3 weeks, allowing genetic exchange between introduced populations. These

factors work together to prevent loss of genetic variation, which in turn may make the introduced populations more adaptable to their new range (Dupont et al. 2007).

C. convexa is smaller than *C. fornicata*, does not form stacks, and has direct developing larvae, greatly reducing their dispersal abilities relative to *C. fornicata*. These traits seem to make it less likely to establish populations outside of its native range, but *C. convexa* has become established in some places on the west coast of the U.S., including Washington (Collin et al. 2006). I investigated whether the genetic diversity of a population in Padilla Bay, WA has become reduced relative to those in the native range. I also used microsatellite genetic markers to try to identify the source population of this introduction.

To do this, I genotyped individuals from one introduced population in Washington and seven native ones on the east coast of the U.S., from Massachusetts to North Carolina, at six microsatellite loci (Daguin-Thiebaut et al. 2009). Results of my population genetic analyses showed that, as expected, there is much more structure in native *C. convexa* populations than in *C. fornicata*, indicating that the dispersal differences between the species structure their east coast populations very differently. Genetic diversity seems to be similar between introduced and native populations of *C. convexa*. Assignment tests showed that the Washington population most likely originated from populations from somewhere between Long Island Sound and Delaware Bay. This is also to be expected, because the proposed pathway of introduction for *C. convexa* is with oysters that were deliberately transplanted from the east coast to Washington, especially during the late 19th and early 20th centuries. Further research will pinpoint the source of introduction more precisely, as well as increase the number of west coast populations analyzed to draw general conclusions about the importance of multiple introductions in establishing populations of *C. convexa*.

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Mollusk diversity and estimated predation rates by gastropod shell borehole drillers on *Turritella* spp. at Playa Grande, Las Baulas National Park, Costa Rica

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There is a rich and diverse marine mollusk assemblage near-shore of Playa Grande, Costa Rica; as evidence by thousands of empty shells littering the beach. The vast majority of empty shells are soft, sandy-bottom, dwelling mesogastropods, *Turritella* species. Upon inspection, many of *Turritella* spp. shells had boreholes drilled by predatory gastropods. From geological records, it appears that *Turritella* spp. have coevolved with borehole drilling predatory gastropods, at least since the early to mid Cretaceous (Dudley and Vermeij 1978, Tull and Bohning-Gaese 1993, Grey et al. 2005, Grey et al. 2005). There have been no reports of estimated predation rates on *Turritella* spp. in Playa Grande, Costa Rica.

I examined *Turritella* spp. empty shells for boreholes and estimated the percent of *Turritella* spp., preyed upon by gastropod shell drillers, at Playa Grande. I developed a histogram of shell size class of *Turritella* spp. and then investigated the relationship between *Turritella* spp. shell length and predation rates.

Methods

Study Site: The collection site was located near beach marker 19.2 on Playa Grande, in Las Baulas

National Park, one of the most endangered of Costa Rica's national parks. The study site was located at about 10°19'36.38"N; 85°50'35.82"W. The site was a few kilometers north of the increasingly popular tourist destination of Tamarindo and the mouth of Las Baulas estuary, in the Guanacaste Region of Costa Rica. Beach markers are set on Playa Grande every 10 meters to geo-reference sea turtle nests. Playa Grande is the last remaining endangered leatherback sea turtle nesting beach in the eastern Pacific Ocean (Tomillo 2008).

I examined *Turritella* spp. shells on January 2, 2010, at low tide. At the time of sampling, there was a wide, about 3-5 m, high-density band of *Turritella* spp. shells located between markers 17 and 24, approximately 10-20 m seaward from the normal high tide levels.

Collection and examination of *Turritella* spp. shells I collected all *Turritella* spp. shells within arms reach (N = 324), regardless of shell sizes, at three locations at the site. Therefore, the sample collection was unbiased towards larger more easily observable shells. I then measured shell lengths to the nearest 1 mm. I carefully examined all shells for evidence of boreholes. The shape of a borehole is often used to identify predator taxon. Truncated parabolic shaped drill holes are indicative of Naticidae (moon snails) borings, while straight sided boreholes are made by Muricidae (murex or rock snails) (Tull and Bohning-Gaese 1993, Grey et al. 2005). Although many visitors collect and remove shells from the beach, Playa Grande is within the national park boundary and shell collection is not encouraged. On some of the more defined boreholes I could clearly distinguish predator type. However, I was unable to differentiate between borehole shapes for many of the shells with holes, while on the beach, therefore I made no further attempt to quantify the differences between predator types. I also was unable to measure shell thickness to determine if predatory drillers preferentially selected thinner shelled prey. I then created a histogram to explore size classes of *Turritella* spp. at Playa Grande and to separate out sizes to determine if there was a size preference by predatory drillers.

Results

Of the 324 *Turritella* spp. shells that I examined, 119 had drill holes; a minimum predation rate by borehole drilling gastropods of about 37 %. Shell lengths ranged from 12 to 77 mm (Fig. 1). I was unable to determine any distinct size classes; however, the majority of shells were between 29 and 44 mm (1st quartile to 3rd quartile) with median of 35 mm (Fig. 1).

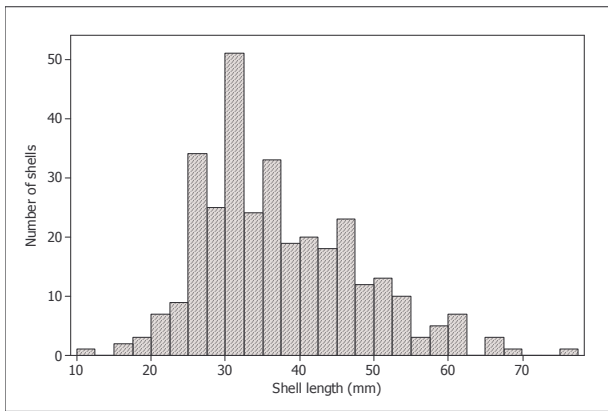


Fig. 1: Histogram of *Turritella* spp. shell lengths (mm) examined at Playa Grande, Costa Rica, January 2, 2010. N = 324 shells examined.

I separated shells into fifteen size classes to have as equal and large enough sample sizes as possible and to have a large enough number of size classes to compare shell size predation rates (Table 1).

Table 1: *Turritella* spp. shell size groupings, number of shells examined and number of drill holes by predatory gastropods in each group at Playa Grande, Costa Rica, January 2, 2010.

| Shell group classes used in Figure 2 | Shell size range (mm) | Number of shells | Number of drill holes | Percent shells drilled |
|--------------------------------------|-----------------------|------------------|-----------------------|------------------------|
| 1 | 12-23 | 16 | 10 | 0.63 |
| 2 | 24-25 | 15 | 11 | 0.73 |
| 3 | 26-27 | 23 | 13 | 0.57 |
| 4 | 28-29 | 25 | 12 | 0.48 |
| 5 | 30-31 | 34 | 12 | 0.35 |
| 6 | 32-33 | 29 | 16 | 0.55 |
| 7 | 34-35 | 23 | 11 | 0.48 |
| 8 | 36 | 12 | 3 | 0.25 |
| 9 | 37-38 | 19 | 6 | 0.32 |
| 10 | 39-41 | 20 | 4 | 0.20 |
| 11 | 42-44 | 28 | 9 | 0.32 |
| 12 | 45 | 9 | 2 | 0.22 |
| 13 | 46-48 | 26 | 5 | 0.19 |
| 14 | 49-54 | 25 | 1 | 0.04 |
| 15 | 55-77 | 20 | 4 | 0.20 |
| | Total | 324 | 119 | 0.37 |

The percentage of *Turritella* spp. shells with boreholes decreased as shell size increased (Fig. 2), suggesting that gastropod hole drilling predators preferentially selected smaller sized *Turritella* spp. at Playa Grande.

Discussion

The number and density of *Turritella* spp. shells on sections of the beach at Playa Grande is impressive. Visitors often collect bagfuls of these shells to take home or to sell. Given this reduction by humans, the number and density of *Turritella* spp. is even more impressive. *Turritella* spp. clearly dominate the molluscan assemblage in the soft sandy bottom substrate of the marine environment at Playa Grande. This makes ecological sense because the soft sandy substrate appears to be very uniform and homogenous for many hectares. Biodiversity is often lower and abundances higher in homogenous landscapes.

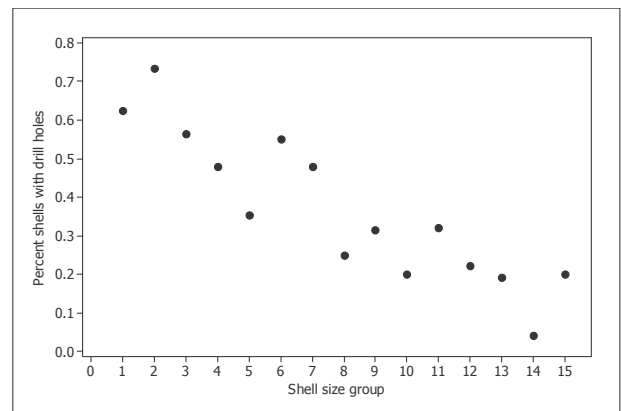


Fig. 2: Relationship between *Turritella* spp. shell size and percent with boreholes drilled by predatory gastropods at Playa Grande, Costa Rica, on January 2, 2010 (see Table 1 for shell size class range, number of shells examined, and number of drill holes in each group).

Field identification of *Turritella* to species level based only on shell morphology is problematic. The only species that I could distinguish with any certainty was *T. nodulosa*, which comprised about 20-30% of the total number of shells examined. *Turritella nodulosa* has been previously reported on the pacific coast of Costa Rica, including Manuel Antonio National Park, south of Las Baulas (Willis and Cortes 2001).

The majority of the shells appeared to be *T. communis*, but I have found no records of its occurrence in the eastern Pacific, only its widespread distribution along the eastern Atlantic coastline (citations). Without soft body parts or genetic material, I was hesitant to make any conclusions as to what these *Turritella* taxa were.

Turritella spp. elongate conical shells allow them to easily burrow into the soft sandy substrate to avoid most predators (personal observation). However, naticids and muricids have coevolved as predators of *Turritella* sp. and can often locate and capture them. On numerous occasions, I have observed a species of naticid widely spreading its grayish white colored foot and rapidly burrowing into the sand. I am unfamiliar with this naticid species and because the study site was in a national park I did not collect any specimens.

A minimum predation rate of 37 % by borehole drilling gastropods on *Turritella* spp. seems to be high. However, all snails that were examined on the beach were dead. The actual predation rate on live snails remains unknown. Also, cause of mortality to the remaining 63 % of *Turritella* spp. was not determined.

The relationship between shell thickness and borehole drilling gastropod predation is well

known; predation rates are inversely related to shell thickness (Dudley and Vermeij 1978, Tull and Bohning-Gaese, 1993, Grey et al. 2005, Grey et al. 2005). It is believed that increased shell thickness of *Turritella* spp. is mostly a result of coevolution with murids and naticids in the dynamic 'evolutionary arms race' between predator and prey (Dudley and Vermeij 1978). However, there are always trade-offs between allocating resources to predator defense or other life history traits, such as food acquisition, intraspecific competition, and fecundity. The relationship between these or other trade-offs remains unknown. I did not measure shell thickness of *Turritella* spp. in this study, but it appeared that shells with boreholes were often much lighter and less dense than those of similar size without boreholes.

I have observed at least twenty three different types of shells of marine mollusk taxa at Las Baulas National Park. The majority of the shoreline and near shore marine habitat is soft sandy bottom interspersed with volcanic rock outcrops. Many bivalve taxa occur in this area (personal observation). At Playa Carbon, the northern most beach in Las Baulas National Park, the marine habitat becomes mostly volcanic bedrock and boulders interspersed with sand. The mollusk community changes from those taxa adapted to soft sandy bottom substrate to those adapted to a more three dimensional, stable hard substrate with some crevices and tide pools (personal observation). Prior to the areas discovery by surfers and tourists, Playa Carbon was known for its very abundant conch population (personal interviews with local residents). Remnants of this once abundant conch population are numerous along the beach and within the near shore marine environment (personal observation).

Live coral is sparse to non existent in all the near shore areas in Las Baulas that I have explored while diving. Las Baulas National Park extends to 12 miles offshore and the mollusk assemblage is even more poorly known.

The entire Pacific coast of the Guanacaste Region in Costa Rica is increasingly threatened by unprecedented, bordering illegal, real estate development including; subdivisions, mega resort hotels, and recreational use. The continued existence of Las Baulas National Park is precarious because of multimillion dollar development plans supported by the Costa Rican Tourism Board (ICT). The ICT has plans to develop this extremely arid area and to reduce the legal status of Las Baulas from that of a national park to a national wildlife refuge, which virtually offers no protection from

development [anonymous long term resident and member of the Costa Rican Tourism Board (ICT), personal communication]. Also, there is almost no law enforcement available in Las Baulas National Park and illegal harvest of its fisheries go unmonitored. Collection of baseline data on molluscan biodiversity, life history, and ecology is sorely needed at Las Baulas National Park and the surrounding area to monitor changes and effects of increased human economic activity.

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A New Species Location Record in Sussex County Delaware

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Abstract: There have been few surveys of *Niades* (Bivalvia: Unionidae) in Sussex County, Delaware. The last major survey which included Sussex County was by Clement L. Counts, III, Thomas S. Handwerker, and Roman V. Jesien. It is published and in *American Malacological Bulletin*, Vol. 9(1) (1991) 27-37. In that report several stations in Sussex County Delaware are sited. I have been monitoring several of these stations recently and have found one new species sighting. I found *Anodonta cataracta* Say, 1817 in addition to *Elliptio fisheriana* (Lea, 1838) at station #39 as listed in their paper.



Williams Pond Dam, Seaford, Delaware, Sussex County

Description of the study area: Williams Pond is located on the Nanticoke River System. In 1954 a branch of the river was dammed off which created the pond. The dam is located in Seaford, Delaware and Williams Pond extends northeast from that point out of the city limits for about a mile and a half. Williams pond is crossed by two bridges. The first is for dual highway, Route 13 (Sussex Highway) and is in the middle of the pond. The second is The Tharp Road Bridge at the northeastern end of the pond. The area from the Route 13 bridge to The Tharp Road Bridge on the pond is surrounded by private waterfront homes. On August 6th, 2010 Del Dot drew down the water in Williams Pond by approximately 1.5 meters to facilitate repair of the dam structure. This draw down of water exposed previously flooded shoreline around the lake.

Methods: A review of the available literature was conducted. Periodic trips to various stations listed for Sussex County, Delaware by Counts, Handwerker, and Jesien were revisited periodically over the past few years. Shells were brought to me that were collected on private property. The property is located about 300 meters west of the Tharp Road Bridge. Shells were collected there on September 25, 2010 and again on September 28th. I visited the property on August 6, 2010, took notes, and collected material. All shells collected were dead. The bottom is sand with some mud mixed in it. All shells were taken from exposed bank. It is assumed that the shells were left on the shore by animals because all shells were removed from the bank on each collecting trip and new dead shells were found on the same bank on subsequent visits.

Shells that were collected were identified by me and were shown to Dr. Arthur E. Bogan who agreed with my identification.



Elliptio fisheriana, *Anodonta cataracta* and *Corbicula* on exposed shoreline, Williams Pond. Seaford, Delaware.

Results: Two species of *Niades* were found at Williams Pond, Seaford, Delaware. One was the previously reported *Elliptio fisheriana* (Lea, 1838). The second and previously unreported at this location was *Anodonta cataracta* Say 1817. The total number of articulated *A. cataracta* collected was 15 and an additional 23 single valves. The total number of articulated *E. fisheriana* collected was 16 and an additional 3 single valves. A number of *Corbicula* were also found.



Anodonta cataracta found on exposed shoreline. Williams Pond, Seaford, Delaware.

Acknowledgements: The author wishes to thank Kenneth Bryson for his help during sampling and his help in collecting specimens. I would like to also thank Mrs. Sharlana Edgell for allowing us to go on her property, to collect shells on her property, and for providing local historic background about the area. Lastly, I would like to thank Dr. Arthur E. Bogan for his encouragement over the years and for his support.

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The interactions of two nudibranchs and their effect on an invasive bryozoan in

the Gulf of Maine

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Corambe obscura is a small, extremely cryptic nudibranch that has made its way up the western Atlantic coast from its native range south of Cape Cod, MA and into the Gulf of Mexico. Up until recently it has been found rarely in the Gulf of Maine, but for two years in a row it has been found in large abundances as far north as Casco Bay. Non-native species are nothing new in the Gulf of Maine, as *Membranipora membranacea*, a kelp-encrusting bryozoan, has been present since 1987 after its discovery at the Isles of Shoals (Berman et al. 1992).

This bryozoan is a nuisance to Lamanarian kelps, often completely covering blades soon after colonization in mid-summer, making the alga more susceptible to breakage and less capable of photosynthesis and reproduction. *C. obscura* has been found almost exclusively on *M. membranacea* in high quantities at some sites and often occurs simultaneously with a native nudibranch, *Onchidoris muricata*. My research focuses on these two nudibranchs and their abundances on *M. membranacea* at floating dock sites in the Gulf of Maine, as well as determining their lifetime feeding rates and habits. The role of increased predation on this invasive bryozoan is of particular interest and has implications for invasive species management.



Fig. 1: *C. obscura* (left) and *O. muricata* (right) on kelp covered in *M. membranacea*. Picture by M. McCuller

This research is funded by a HATCH grant and the Richard Gilder Graduate School's Lerner-Gray Fund for Marine Research.

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American Malacological Society Terrestrial Field Trip Report, 26 June and 1 July 2010: in search of *Anadenulus cockerelli*

Contributed by Timothy A. Pearce and Casey H. Richart

Sightings of the terrestrial slug *Anadenulus cockerelli* (Hemphill, 1890) have not been reported since 1945 (Pilsbry 1948). The southern California counties of Kern, Los Angeles, Orange, and San Diego contain the only localities where it has been found (Gregg 1944, Pilsbry 1948, Roth & Sadeghian 2003). The type description gave the locality as Cuyamaca Mountains (Hemphill 1890), although Gregg (1944) noted that Hemphill's types (at California Academy of Sciences) are indicated as being from Julian. Julian is about an hour's drive northeast of San Diego.

On 26 June and 1 July 2010, during the 2010 American Malacological Society Conference in San Diego, California, six intrepid slug hunters, Elizabeth C. Davis-Berg, Edna Naranjo-García, Timothy A. Pearce, Adrienne F. Richart, Casey H. Richart, and Charles F. Sturm searched for this slug around the town of Julian, San Diego Co. After each

foray, we took advantage of Julian's famous pies at the Julian Pie Company.

Champion slug-hunter Casey found seven tiny slugs that showed similarities with both *A. cockerelli* and *Prophysaon andersoni*. Gregg (1944) noted that *A. cockerelli* bears a superficial resemblance to *Prophysaon andersoni*. The currently known southernmost occurrence of *P. andersoni* (which is the southernmost known species of *Prophysaon*) is central California (Roth & Sadeghian 2003). Either species would be an exciting find: either a 65 year time extension or a 630 km southward range extension.

In all specimens of our mystery slug, the mantle is papillose, and the body below and behind the mantle has a net-like pattern of grooves. Each slug has a pale dorsal band on the body behind the mantle, and it lacks a caudal mucus pore (Fig. 1). The slugs were small, ca 14 mm long. On initial examination, our specimens seemed to have a tripartite sole but later examination indicated the sole was not really tripartite.



Fig. 1: Mystery slug, alive, on carrot.

A similarity with *A. cockerelli* includes the undulating yellow lines on the mantle mentioned by Gregg (1944), more visible in our alcoholic specimens than in life. In contrast to Hemphill's (1890) report that *A. cockerelli* is "uniform brown-black without markings, except some dark marbling on the lighter sides", our specimens show darker markings including mantle bands, dark pigment in netted body grooves, and, at least in preserved individuals, yellow undulating mantle bands. All of these markings more or less match the color description given by Gregg (1944) of his own *A. cockerelli* and redescription of Hemphill's original lot. However, the anterior pneumostome (Fig. 2) contrasts with Hemphill's (1890) report of a pneumostome slightly posterior to the middle of the mantle in *A. cockerelli*, and the back keel in our

specimens seems less distinct than implied by Hemphill for *A. cockerelli*. The soles of our specimens lacked the black dots mentioned by Gregg (1944) for *A. cockerelli*, and the central portion of the sole is wider than that illustrated by Pilsbry (1948).

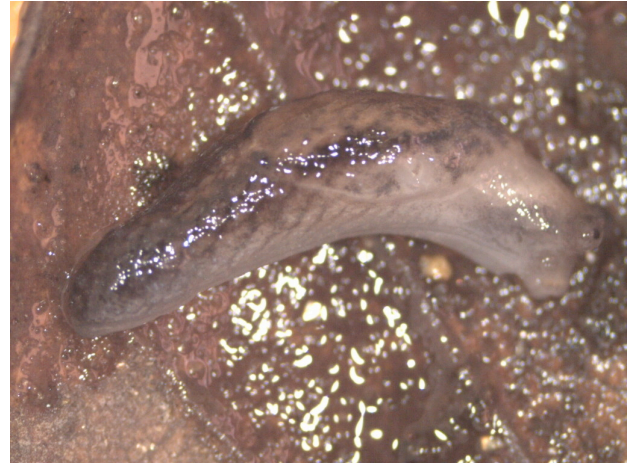


Fig. 2: Mystery slug, side view. Note pneumostome in anterior half of mantle.

Although our specimens showed some resemblance to *A. cockerelli*, they also shared some characters with *P. andersoni* (pneumostome slightly anterior, pattern of netted lines on body). Although the sole of *Prophysaon* is not tripartite, an illustration of *P. andersoni* in Pilsbry (1948) shows different shading with the middle zone widest, giving an illusion of a tripartite sole, somewhat like that in our specimens (Fig. 3). The mantle length of our specimens is nearly half the body length, as in *P. andersoni*, and longer than the rather short mantle of *A. cockerelli*.

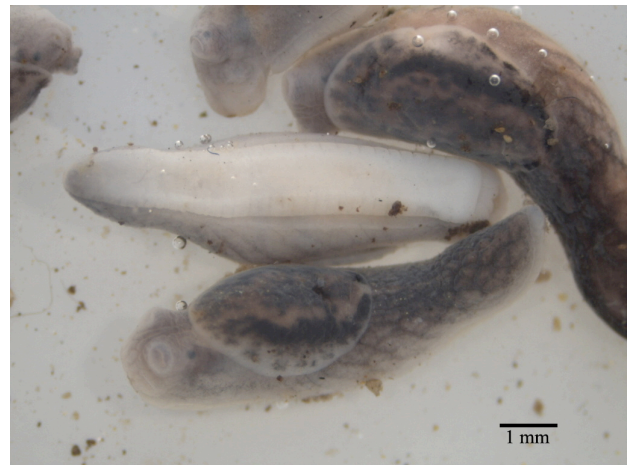


Fig 3: Mystery slug, in alcohol, showing false tripartite sole and yellow undulating mantle bands more visible than in living specimens.

Dissection of two individuals by Lyle Chichester revealed that the specimens are not *A. cockerelli*, but the tentacular and pharyngeal retractor muscles clearly diverge. The only native American slugs

with that character are *A. cockerelli* and *Prophysaon* species (Pilsbry 1948: 704), suggesting that these slugs are a species of *Prophysaon*. However, since our specimens are immature, we cannot assign them to species until additional, mature specimens are found.

Localities and species list:

William Heise County Park, 26 June, 33.03479°N 116.59943°W, elev. 1203m, beside a stream, under moist rocks and debris, vegetation included incense cedar and oak, leg. Pearce, A. Richart, C. Richart. Species found were *Deroceras reticulatum* (with milky disturbance mucus), *Paralaoma servilis*, *Punctum californicum*, and *Striatura pugetensis*.

Cedar Glen Camp, 1 July, 33.11251°N 116.59214°W, elev. 1238m, along a creek and up the hillside, vegetation included oak, poison oak, incense cedar, bedstraw, leg. Davis-Berg, Naranjo-García, Pearce, C. Richart, Sturm (Fig. 4). Species found were *Paralaoma servilis*, *Punctum californicum*, and the mystery slug.



Fig. 4: Slug hunters on AMS terrestrial field trip, 1 July 2010. From left, Tim Pearce, Edna Naranjo-García, Charlie Sturm, Beth Davis-Berg, Casey Richart.

In addition to the snails observed near Julian, we observed the following species on the campus at San Diego State University where the AMS conference was held: *Helix aspersa*, *Lehmannia valentiana*, *Oxychilus draparnaudi*, *Vallonia excentrica*, and *Zonitoides arboreus*.

References

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New PUBLICATIONS

Bulletins of American Paleontology

Contributed by Paula Mikkelsen

Paleontological Research Institution is proud to announce publication of *Bulletins of American Paleontology*, no. 379, "Upper Cambrian chitons (Mollusca, Polyplacophora) from Missouri, U.S.A.," by John Pojeta, Jr., M. J. Vendrasco, and Guy Darrough (81 pp., 23 pls., ISBN 978-0-87710-488-9). See abstract below. The retail price is US \$40.00. Please order online at www.priweb.org or email me directly for a proforma invoice. Members of PRI and booksellers should contact me first to receive discount prices for this and other publications of PRI.

Abstract: Numerous new specimens reveal a greater presence of chitons in Upper Cambrian rocks than previously suspected. Evidence is presented showing that the chiton esthete sensory system is present in all chiton species in this study at the very beginning of the known polyplacophoran fossil record. The stratigraphic occurrences and paleobiogeography of Late Cambrian chitons are documented. The 14 previously-named families of Cambrian and Ordovician chitons are reviewed and analyzed. *Aulochitonidae* n. fam. is defined, based on *Aulochiton* n. gen.; *A. sannerae* n. sp. is also defined. The long misunderstood family *Preacanthochitonidae* and its type genus *Preacanthochiton* Bergenhayn, 1960, are placed in synonymy with *Mattheviidae* and *Chelodes* Davidson & King, 1874, respectively; *Eochelodes* Marek, 1962, also is placed in synonymy with *Chelodes*, and *Elongata* Stinchcomb & Darrough, 1995, is placed in synonymy with *Hemithecella* Ulrich & Bridge, 1941. At the species level, *H. elongata* Stinchcomb & Darrough, 1995, and *Elongata perplexa* Stinchcomb & Darrough, 1995, are placed in synonymy with *H. eminensis* Stinchcomb & Darrough, 1995. The Ordovician species *H. abrupta* Stinchcomb & Darrough, 1995,

is transferred to the genus *Chelodes* as *C. abrupta* (Stinchcomb & Darrough, 1995). The Ordovician species *Preacanthochiton baueri* Hoare & Pojeta, 2006, is transferred to the genus *Helminthochiton* as *H. ? baueri* (Hoare & Pojeta, 2006). The Ordovician species *H. marginatus* Hoare & Pojeta, 2006, is transferred to the genus *Litochiton* as *L. marginatus* (Hoare & Pojeta, 2006). *Matthevia walcotti* Runnegar, Pojeta, Taylor, & Collins, 1979, is treated as a synonym of *Hemithecella expansa* Ulrich & Bridge, 1941. In addition, other multivalved Cambrian mollusks are discussed; within this group, Dycheiidae n. fam. is defined, as well as *Paradycheia dorisae* n. gen. and n. sp. Cladistic analysis indicates a close relationship among the genera here assigned to the Mattheviidae, and between *Echinochiton* Pojeta, Eernisse, Hoare, & Henderson, 2003, and mattheviids. The results suggest treating these taxa as stem-lineage chitons, and do not support the hypothesis that they are aplacophorans.



OTHER ANNOUNCEMENTS

AMS Student Support for Attending Morphology Congress at Harvard University

Submitted by Charlie Sturm

The AMS is offering up to \$500 for travel expenses to send a student to the 2nd International Congress on Invertebrate Morphology, to be held June 20-23, 2011 in Cambridge, MA (see: <http://icim.theoryondesign.com/welcome>). The student would be expected to submit to the AMS newsletter, an article summarizing aspects of the congress that are relevant to AMS members. Alternately, they could present a poster or talk on a similar theme at the next AMS meeting. Any AMS student member is eligible. Note that separate funding for students might be available from the congress organizers. To apply for AMS funding, please submit a statement (no more than 500 words) by email outlining your qualifications and desire to attend this congress and an indication of your need for travel or meeting support, plus arrange to have a letter of support from a faculty advisor sent separately by e-mail, to Charlie Sturm, President, AMS, at (csturmjr@pitt.edu). Your application should be received by midnight on Tuesday, November 30, 2010, but later applicants might also be considered. Any award will be announced by early 2011.



Introducing fwgna.org!

Submitted by Robbert Dillon, Jr.

The Freshwater Gastropods of North America project is pleased to announce one of the biggest steps forward in our twelve-year history, <http://www.fwgna.org>. Come visit us again, for the first time!

Returning users will immediately appreciate the fresh look and feel of our new website, brought to us by talented designer Steve Bleezarde. Like previous versions of our site, [fwgna.org](http://www.fwgna.org) may be entered geographically, by any of the four states currently covered. Users now also have the option of accessing our web resources taxonomically, through either an alphabetical index or a systematic index. The former index includes an extensive list of synonyms, both generic and specific. The latter is sortable by state. Try both of these new portals to see what we mean!

Perhaps a less striking improvement, but certainly as important, is the significant upgrade to our coverage of Virginia. Over 500 new records and six species have been added, bringing the total species indexed on the site to 65. For each of the species confirmed (or reported) for Virginia Atlantic drainages, we have developed one-page species accounts and made them available as pdf downloads. The present renovation of our site was made possible by funding from the Virginia Department of Game and Inland Fisheries, to whom we offer our sincere thanks.

Users entering through the old front door at cofc.edu will be routed directly to the new [fwgna.org](http://www.fwgna.org) index page for the foreseeable future. But direct links to older versions of any of the (several hundred!) internal pages will eventually expire, and we're not sure we'll be able to redirect users very efficiently. So to any of you older users – update your bookmarks.

And to any of you new – welcome!



AMS Webmaster

Submitted by Charlie Sturm

The American Malacological Society is currently looking for a talented individual to take over the position of webmaster. The current website can be found at <http://www.malacological.org/index.php>.

Brian Gollands has been our webmaster for some time and would like to transfer these responsibilities to a new webmaster. Brian has done a great job; however, he is now ready to move on to other challenges.

At this point in time, the web site is in fairly good shape. Before entropy has a chance to work its devilry on the pages, I would like to work with someone to make the minor changes that are needed, such as, posting information regarding the 2011 meeting of the American Malacological Society. I also would be willing to entertain other suggestions for changes to the web site.

The webmaster is a non-voting member of the AMS Council, the governing body which runs the organization. If you think that you would be interested in helping out and becoming more involved in the AMS please e-mail me at csturmjr@pitt.edu.



American Malacological Society Web Publications - An Interactive Tool

Submitted by Gene Coan

AMS members are reminded about the availability of two key information sources on the society's website:

2,400 Years of Malacology, now in its 7th edition, at: http://www.malacological.org/publications/2400_malacology.php

Annotated Catalog of Malacological Meetings, Including Symposia and Workshops in Malacology, also updated, at: http://www.malacological.org/pdfs/catalog_of_symposia.pdf

Both contain a wealth of information. The first covers malacologists, expeditions, and institutions, with an annex of collations of malacological works.

The second covers meetings and workshops in malacology.

Both can use your help. Please help fill in overlooked or missing information. The more complete these on-line resources are, the more useful they become. For example, the list of meetings and symposia lacks information about recent annual meetings of some European societies, and no doubt you are aware of some important malacologists that are not yet listed among the 12,000 or so in the 2,400 Years list. Feel free to contact any of us to make these lists as complete and useful as possible.

Eugene V. Coan, Alan R. Kabat & Richard E. Petit
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Meta-database - NatureServe

Submitted by David Richards

NatureServe is compiling a meta-database for Bureau of Land Management's Ecological Assessment Program. NatureServe has asked me to compile existing databases concerning aquatic invasive species and distributions of native mollusks in the Central Basin and Range and Mojave Ecoregions. We are particularly concerned with the native endemic springsnails. If anyone has or knows of a useful database on invasive or native endemic mollusks in these ecoregions, please contact me as soon as you can. BLM has informed me that funding is available to you if your database needs cleaning up or processing.

Contact:
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MINUTES OF THE ANNUAL BUSINESS MEETING

Presented by Amanda S. Lawless, Secretary

June 30, 2010, San Diego State University, San Diego, CA

The meeting was called to order by President Douglas Eernisse at 3:35 pm.

Executive and Committee Reports were presented:

President's Report: Presented by Douglas Eernisse. 116 people registered for this year's AMS/WSM meeting. Meeting profits were ~\$8,000, auction profits were \$1,300 and reprint sales were \$167.59. The money will be split evenly between the two societies. Dr. Eernisse thanked Hans Bertsch for being this year's auctioneer. An announcement was made that the 2013 UNITAS meeting will be held in the Azores. Also, Brian Gollands will be stepping down as AMS webmaster and a replacement will need to be found. The AMS Council approved to support one student to attend the 2nd International Congress on Invertebrate Morphology taking place from June 20-23, 2011 at Harvard University in Cambridge,

MA. More details will follow on the selection process of the student who will attend as a representative of AMS.

A motion was made and passed to approve the minutes of the 2009 business meeting.

Treasurer's Report: Presented by Dawn Dittman. Total assets by end of 2009 increased \$6,379.52 from 2008. At the direction of the Endowment Committee, invested assets will be kept at a 50:50 balance between stocks and bonds. The AMB budget was increased by \$1,000 due to the increased cost in publishing the AMB and travel for the managing editor. Council decided a minimum of \$6,000 will be dedicated to symposia each year; however, the Endowment Committee allocated only \$4,000, therefore, the additional \$2,000 will be allocated from other funds. Council also decided to support one student to attend the 2nd International Congress on Invertebrate Morphology; therefore, \$500 was added to the budget via extra income from 2010. The treasurer's report will be reviewed by the incoming president and printed in the next issue of the AMB.

Endowment Committee Report: Presented by Jose Leal. Our investments totaled \$147,502. Since we lost over \$30,000 last year due to the market crash, the Endowment Committee did not allocate funds for this year's meeting. However, our endowment is recovering, and the committee decided that \$4,000 should be used for the symposiums at the 2011 meeting.

President-Elect Report: Presented by Charles Sturm, Jr. Dr. Sturm gave a presentation about the 2011 AMS meeting to be held at Duquesne University in Pittsburgh, PA from July 23 – 28, 2011. Dorm housing and a hotel will be available. Dorm rooms will run \$35 for a double and \$40 for a single. A meal plan can be purchased on campus for \$25 per day. There is easy bus access from the airport to downtown. A welcome reception will be held at the Carnegie Museum and the banquet will take place on the Gateway Clipper. Group sessions and symposium will be announced soon.

A motion was made and passed to accept the 2011 meeting venue.

Membership Committee Report: Presented by Colleen Sinclair-Winters. 238 paid members, 39 are students. 67 members are on the AMS Facebook page. Dr. Sinclair-Winters will be contacting journals to advertise for next year's meeting, as well as, contacting other organizations about adding a link to the AMS website on their website. She is also creating posters advertising AMS for members to display at other meetings.

Publications Committee Report: Presented by Ken Brown. The AMB will go back to being published once a year unless a symposium issue is published. AMB 28 came out in March 2010 and AMB 29 will be out in spring 2011. Working on a better way to get members their AMB that renewed after it was sent. The electronic version of the AMB is on BioOne.2. Still working on getting a portal to BioOne on the AMS website, however, when people access the AMB through their library, AMS gets kickbacks. A discussion was had about digitizing

back issues of the AMB and making them available online. After AMB 29, Dr. Brown will be stepping down as editor.

Nominating Committee Report: Four AMS council positions will be vacant (two Counselor-at-Large, Past President 4-10 years and Vice President). Nominees for the positions are: Counselors-at-Large – Jonathan Hendricks and Rebecca Rundell, Past President 4-10 years – Paula Mikkelsen, Vice President – Peter Marko.

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 AMS webmaster Brian Gollands on the creation of the on-line database. Compilation and distribution of the 2009 AMS Membership Directory. Assisting newsletter editor Christine Parent with preparation and distribution of the 2009 fall and 2010 spring newsletters.

Conservation Committee Report: Presented by Doug Eernisse for Jay Cordeiro. The AMS policy on conservation is located on the AMS website. The American Fisheries Society's conservation status of North American freshwater animals committees have finalized the conservation status assessment papers for freshwater mussels and snails; the mollusk assessments are through final review and close to submission. The U.S. Endangered Species Act has 70 bivalves and 35 gastropods listed in the U.S. The Zoological Society of London hosted a workshop for IUCN to assess Red List status of global freshwater mollusks using the Sampled Red List Index approach and results will be posted soon. NatureServe has completed IUCN Red List assessments for all North American freshwater mussels and all southeastern U.S. freshwater snails and results will be posted within a year.

Systematics Committee Report: Dr. Gary Rosenberg gave a brief description of the committee and announced that Benoit Dayrat has volunteered to be the committee chair.

Student Awards Committee Report: Presented by Tom Duda. The 2010 Melbourne R. Carriker Student Research Grant awards were given to the following students: Maria Rosa (University of Connecticut, Avery Point), Patrick Curry (University of Hawaii at Manoa) and Jaynee Kim (University of Hawaii at Manoa). This year's meeting awards committee consisted of Tom Duda, Beth Davis-Berg, Suzanne Williams, Fabio Moretzsohn, Tim Pearce and Rebecca Price and the following awards were presented: Constance Boone Award – Jingchun Li (University of Michigan), Best Oral Presentations – Nathan V. Whelan (University of Alabama) and Ronald Cesar Zepeta Vilchis (co-author Adriana Reyes Gómez) (Universidad del Mar), Best Poster Presentations – Iris García Tello (co-author M. Martha Reguero Reza) (Universidad Nacional Autónoma de México) and Logan D. Froman (co-author Douglas J. Eernisse) (California State University, Fullerton).

No Constitution and Bylaws Committee or Resolutions Committee reports were presented. No new business.

Dr. Gary Rosenberg (AMS Vice President) talked about the 2012 AMS meeting. The meeting will be held jointly with the Conchologists of America (COA) in Philadelphia, PA in June 2012. This year will also commemorate the Academy of Natural Sciences 200th anniversary. The AMS meeting will be held the first half of the week and the COA meeting will be held the second half with one day of overlap between the two meetings. Please submit any ideas for symposia or field trips to Dr. Rosenberg.

Jose Leal thanked Doug Eernisse for all his hard work and congratulated him on a successful conference. Dr. Eernisse's presidency will conclude one month after the end of the conference when Charles Sturm, Jr. will become president.

A motion to adjourn was made and passed.



MESSAGE FROM THE NEWSLETTER EDITOR

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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