

Florida United Malacologists

The First Meeting



Program and Abstracts

José H. Leal, Editor

January 30, 2010



WELCOME TO THE FIRST MEETING OF FLORIDA UNITED MALACOLOGISTS (FUM)

On behalf of The Bailey-Matthews Shell Museum, I want to welcome you to the First Meeting of Florida United Malacologists (FUM). This one-day gathering is designed to facilitate and enhance communication among professional, amateur, and student malacologists, with topics including but not limited to biology, ecology, paleontology, archaeology, and conservation, and includes presentations on marine, freshwater, terrestrial mollusks.

FUM follows the pattern established by similar informal gatherings such as BAM (Bay Area Malacologists), SCUM (Southern California United Malacologists), MAM (Mid-Atlantic Malacologists), and OVUM (Ohio (River) Valley United Malacologists). The State of Florida is endowed with a large surface area, wealth of drainage systems, a diversity of ecosystems, long coastline (spanning more than one biogeographical region), and relative abundant number of researchers working on different aspects of malacology, including a group of productive non-professional researchers and collectors. Consequently, it is only natural that a gathering similar to those so successfully organized by our colleagues in other states should take place in Florida.

There is no formal membership to FUM and there are no dues, officers, nor publications. However, presenters are required to submit a brief abstract limited to 150 words or less. Abstracts are posted on the Shell Museum web site (<http://shellmuseum.org>). The gathering is free of charge to presenters and Museum members. Non-members will be asked to donate the standard Museum admission fee.

Participants are strongly encouraged to ask questions and discuss data, compare notes on methods and problems, and get acquainted with presenters and members of the audience. Presentations are limited to 15 minutes plus 5 minutes for questions. The Shell Museum will provide projection equipment for PowerPoint programs, brief videos, and slides.

Due to staffing limitations, use of the library and research area and collection visits will be limited to two days prior to the gathering, Thursday, January 28, and Friday, January 29. Museum parking is free. An event reservation form for presenters and participants will be posted soon on the Museum web site (www.shellmuseum.org). Box lunches and dinner at a local restaurant will be available at cost to participants and presenters, provided that the reservation form was received by Museum staff prior to the event.

I want to acknowledge the “principal instigators” of the event, Alan Gettleman (Merritt Island) and Phyllis Diegel (West Palm Beach). They also came up with the name and acronym for our group. Kimberly Nealon designed the logo, Kathleen Hoover and Anne Joffe (Vice-President of the BMSM Board of Trustees) helped with the logistics for lunch and dinner. Staff members Mary Jo Bunnell and Diane O. Thomas provided organizational help.

Welcome to Sanibel and enjoy FUM!



José H. Leal, Ph.D., Director/Curator
The Bailey-Matthews Shell Museum

**FLORIDA UNITED MALACOLOGISTS
FIRST ANNUAL MEETING – JANUARY 30, 2010
PROGRAM**

8:30 José H. Leal
Opening Remarks

SESSION 1 – Chair: Loren Coen

8:45 David J. Karlen, Barbara K. Goetting, Thomas L. Dix, and Sara E. Markham
Sub-tidal, soft-sediment molluscan communities of Tampa Bay

9:05 Carole P. Marshall
Mollusks of the Lake Worth Lagoon between the cities of Lake Worth and Lantana, Florida

9:25 Donald Swenson
The seashells of Coral Cove Park, Jupiter Island, Florida

9:45 José H. Leal
The online guide of Southwest Florida shallow water marine mollusks: A community-based project

10:05 BREAK

SESSION 2 – Chair: Harry G. Lee

10:20 Harry G. Lee and John Slapcinsky
A re-examination of *Daedalochila* Beck, 1837 *sensu stricto* (Eupulmonata: Stylommatophora: Polygyridae)

10:40 Chelsey Campbell and John Slapcinsky
Is *Ampelita lamarei* (Acavidae) a species complex?

11:00 John Slapcinsky
Kalidos, a Madagascan endemic genus of land snails

11:20 Jeffrey C. Nekola
Evolutionary pattern and process within the *Vertigo gouldii* (Gastropoda: Pulmonata: Pupillidae) group of minute North American land snails

11:40 Fred G. Thompson
The West Indian land snail family Cerionidae in Mexico

12:00 LUNCH

SESSION 3 – Chair: Gustav Paulay

- 13:00 Stephen P. Geiger, Sarah P. Stephenson, Janessa C. Cobb, and William S. Arnold**
Calico scallop (*Argopecten gibbus*) abundance and recruitment in Southwest Florida
- 13:20 Aswani Voley, Patricia Goodman, Patricia Gorman, Lesli Haynes, and Lacey Smith**
Role of oysters in setting freshwater inflow targets in the Caloosahatchee Estuary: A case study
- 13:40 Mark A. Thompson, Loren D. Coen, Steven P. Geiger, Jay R. Leverone, and James Culter**
Assessing bay scallop recruitment success and initiating a community-based population enhancement program in Lower Pine Island Sound, Florida
- 14:00 Rick Bartleson, Loren D. Coen, José H. Leal, Ernest D. Estevez, and Victor S. Kennedy**
Die-off of brackish water clams in the Caloosahatchee River, Summer 2009: possible contributing factors
- 14:20 David Campbell**
Lymnaeidae genera update: *Acella* to *Zalophancylus*
- 14:40 BREAK**

SESSION 4 – Chair: José H. Leal

- 15:00 Nathan A. Johnson, James D. Williams, and James D. Austin**
Phylogeography of the round pearlshell, *Glebulina rotundata* (Lamarck, 1819) (Bivalvia: Unionidae): Marine dispersal or paleodrainage connectivity?
- 15:20 James D. Williams, Gary L. Warren, and Robert S. Butler**
Current status of the Freshwater Mussels of Florida Project
- 15:40 Gregory S. Herbert**
Evolution and adaptive significance of shell spines in the florida fighting conch, *Strombus alatus*
- 16:00 Gregory S. Herbert**
Timing and severity of Florida's most recent molluscan extinction event
- 16:20 Gustav Paulay, John Slapcinsky, Sarah McPherson, Mandy Bemis, and Chris Meyer**
DNA sequencing and mollusk species: What are we learning from large-scale efforts?
- 16:40 End**
- 19:00 Dinner at Doc Ford's (See map at end of this brochure)**

Abstracts

DIE-OFF OF BRACKISH WATER CLAMS IN THE CALOOSAHATCHEE RIVER, SUMMER 2009: POSSIBLE CONTRIBUTING FACTORS

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Large numbers of decomposing bivalves, mainly the Carolina marsh clam (*Polymesoda caroliniana*), were noted in the Caloosahatchee River covering the bottom near Beautiful Island and floating downstream west of Fort Myers in June and July 2009. Smaller dead marsh clams were found, also upstream, on the bottom, in an area affected significantly by warm water discharge from the FPL Orange River power plant. The upper lethal temperatures of most subtropical bivalve species tested were 36°C or below. Ambient Caloosahatchee temperatures reached 36°C in shallow water during the die-offs. Temperatures of the plant effluent are allowed to rise 7°C over ambient, and are a likely contributing factor to the die-offs in the river. A salinity drop and hypoxia, which would be exacerbated by decomposing infauna, were also noted during this time period. Projected future increases in water temperature from global warming average 2.2 to 4.9°C by 2090.

^αPresenting author

IS *AMPELITA LAMAREI* (ACAVIDAE) A SPECIES COMPLEX?

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Snails of the family Acavidae are among the largest and showiest of Madagascar's endemic, diverse, and critically endangered terrestrial snails. *Ampelita lamarei* (Pfeiffer, 1848) was among the earliest of Madagascar's snails to be described. However, since its description the species, or species complex, has been divided or synonymized numerous times in part because of limited and poorly localized collections. Extensive recent collecting is allowing us to readdress the problem using morphometric and genetic information. Shell measurements of over 100 individuals combined with CO1 sequence information suggest *Ampelita lamarei* is a species complex of several often sympatric species with variable color patterns. Sorting out the species involved will be critical to efforts to conserve these snails, which are threatened by habitat loss through deforestation.

^aPresenting author

LYMNAEIDAE GENERA UPDATE: *ACELLA* TO *ZALOPHANCYLUS*

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The freshwater basommatophoran family Lymnaeidae has been a target of both lumping and splitting. A survey of the literature located 141 fossil and extant genus names that have been assigned to this family since 1900, but some workers lump this diversity into one or two genera. Of the 141 genera, 27 are invalid in some fashion, one belongs in another phylum, 16 (not all valid) represent other snails, and the remainder can be assigned to two extinct and four extant lymnaeid subfamilies. Apparently valid genera have between 0 and 31 subjective and objective synonyms. Molecular data suggest that biogeography and anatomy are more reliable than shell shape for subfamily placement. American “*Stagnicola*” belong in *Polyrhytis* and *Fossarius* is an objective synonym of *Galba* based on an ICZN ruling; consequently, few American taxa are currently placed in the correct genus.

CALICO SCALLOP (*ARGOPECTEN GIBBUS*) ABUNDANCE AND RECRUITMENT IN SOUTHWEST FLORIDA

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Florida's annual calico scallop (*Argopecten gibbus*) harvest averaged 5.7 million pounds from 1974 until 1999 but has declined to zero since 2002. Surveys conducted from 2004 to 2006 indicate that calico scallops were still abundant on at least two historic fishing grounds: the Cape Canaveral fishing grounds and a previously poorly documented fishing ground in the near-shore waters off Southwest Florida. The preferred settlement substrate, calico scallop shell and shell from other mollusks, was abundant but patchy. Few scallops of a desirable market size were collected; most were less than 40 mm shell height. Every scallop examined was infected with a protozoan parasite assumed to be of the species *Marteilia*. Observations of live calico scallops in beach wrack lines and recruits in bay scallop monitoring traps indicate the continued presence of scallops in near-shore Gulf of Mexico waters, with peak spawning occurring in early spring.

^αPresenting author

EVOLUTION AND ADAPTIVE SIGNIFICANCE OF SHELL SPINES IN THE FLORIDA FIGHTING CONCH, *STROMBUS ALATUS*

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Fighting conch (genus *Strombus sensu stricto*) originated in the Caribbean and invaded Florida by 3.5 million years ago. However, these early fossils lack the formidable shell spines that characterize modern species of *Strombus*, which suggests that the group may be involved in an escalating arms race with shell crushing predators. Here, we examine the evolution of shell spines in the fossil record and test their adaptive function using finite element analysis, experiments with shell crushing predators and modified prey, observations of shell development in a predator-free hatchery environment, and shell repair frequencies. These tests indicate that shell spines evolved in the context of intensifying shell crushing predation, that they are effective deterrants to predators, and that they function by increasing prey handling time rather than shell strength. We also examine the future of this escalating interaction in light of fisheries impacts on stone crabs, one the fighting conch's most important predators.

TIMING AND SEVERITY OF FLORIDA'S MOST RECENT MOLLUSCAN EXTINCTION EVENT

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Florida's molluscan faunas witnessed severe environmental changes 2.5 million years ago, including cooling, loss of habitat, and nutrient decline, and the ecological response was instantaneous. Molluscan communities younger than 2.5 Myr were less even and supported fewer predators. Many species after 2.5 Ma have decreased lifespans – an adaptive response reflecting high mortality rates. Here, I present paleontological data on Florida's shallow water molluscan diversity during this interval of environmental and ecological change. Unlike previous studies, we find that Florida's molluscan diversity was stable after the immediate onset of environmental stresses but dropped precipitously a half million years later. There is no evidence for a two-staged extinction event, nor is Florida's molluscan fauna showing any signs of biotic recovery even two million years later. The extremely long lag between initial ecological collapse and subsequent extinction has been documented elsewhere and may have general implications for managing anthropogenic threats to ecosystems.

**PHYLOGEOGRAPHY OF THE ROUND PEARLSHELL, *GLEBULA ROTUNDATA* (LAMARCK, 1819)
(BIVALVIA: UNIONIDAE): MARINE DISPERSAL OR PALEODRAINAGE CONNECTIVITY?**

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The genus *Glebula* (Conrad, 1853) is monotypic, restricted to Gulf Coast drainages, and known to occur from the Ocklockonee River in Florida west to the Guadalupe River in eastern Texas. We are investigating the phylogeographic structure of *Glebula rotundata* throughout its range using mitochondrial DNA sequences of two protein-coding genes (CO1 and ND1) under a DNA “barcoding” framework. Thus far, eighty-three individuals from twelve Gulf tributaries have been sequenced and analyzed. Results will be presented in light of regional geologic history and biotic features of *G. rotundata*, both of which make it particularly likely that recent gene flow has been important in its evolution.

^aPresenting author

SUB-TIDAL, SOFT-SEDIMENT MOLLUSCAN COMMUNITIES OF TAMPA BAY

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Molluscan species abundance and occurrence data were compiled from the Environmental Protection Commission of Hillsborough County's benthic monitoring database. The database comprised 3,412 sediment grab samples collected over a 16-year period (1993–2008) as part of the Tampa Bay Estuary Program's Bay-wide Benthic Monitoring Program and several shorter-term monitoring projects. Samples encompassed a wide range of salinity zones and sediment habitat types. A total of 1,442 benthic macrofaunal taxa were identified with mollusks being represented by 385 species (26.7%). Mollusks ranked as the third most species-rich phylum behind the annelids and arthropods. The mollusks were represented by 226 gastropods, 146 bivalves, six chitons, six scaphopods, and a single aplacophoran. The bivalve *Mysella planulata* was the most abundant and the most frequently occurring mollusk in Tampa Bay, accounting for 13% of the molluscan abundance and present in 33% of the samples.

^aPresenting author

THE ONLINE GUIDE OF SOUTHWEST FLORIDA SHALLOW-WATER MARINE MOLLUSKS: A COMMUNITY-BASED PROJECT

José H. Leal

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The coast of Southwest Florida, including the islands of Sanibel and Captiva, possibly represents one of the best-sampled areas in the world for shallow-water (intertidal to shallow subtidal) mollusks. The online guide *Seashells of Southwest Florida* (<http://shellmuseum.org/shells.cfm>) was originally based on Perry and Schwengel's seminal 1955 work *Marine Shells of the Western Coast of Florida*. The guide combines materials from the Shell Museum's extensive regional mollusk collection (<http://shellmuseum.org/collection.cfm>) with specimens collected locally by amateur malacologists and hobbyists. The guide, now including in excess of 300 records, is updated on an ongoing basis to include new records and material illustrating the biology and natural history of local species. The guide results from a genuine community-based effort, as seasonal and full-time residents, students, and members of local environmental and educational agencies alike have been instrumental in collecting specimens and contributing additional data to the project.

**A RE-EXAMINATION OF *DAEDALOCHILA* BECK, 1837 *SENSU STRICTO* (EUPULMONATA:
STYLOMMATOPHORA: POLYGYRIDAE)**

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This landsnail assemblage, here defined as the *Polygyra auriculata* group of Pilsbry (1940: 592), or those species occurring on the Coastal Plains E of the Mississippi River, has its metropolis in Florida. Of its 15 nominate species-level taxa, all but three are zoogeographically confined to this state. Based on intensive collecting efforts and museum-based study, the ecology, life-history, taxonomy, and evolution of the group will be presented with emphasis on new perspectives. This work is being conducted in the context of a multidisciplinary approach to a better understanding of natural relationships within and outside this generic unit.

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MOLLUSKS OF THE LAKE WORTH LAGOON BETWEEN THE CITIES OF LAKE WORTH AND LANTANA, FLORIDA

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The Lake Worth Lagoon is a 22 mile-long body of water formed about 23,000 years ago parallel to the Atlantic Ocean, between the towns of Juno Beach and Boynton Beach, Florida. Until the late 1880s, Lake Worth was a freshwater lake. After the opening of the Lake Worth inlets the lake water changed to salt and/or brackish. Much attention has been given to the molluscan fauna in the area around Peanut Island, but no studies have been done in the Lagoon between Lake Worth and Lantana. During 2009, a partial survey was conducted to discover which species were living in this area. This is a preliminary report on some of those species.

**EVOLUTIONARY PATTERN AND PROCESS WITHIN THE *VERTIGO GOULDII* (GASTROPODA:
PULMONATA: PUPILLIDAE) GROUP OF MINUTE NORTH AMERICAN LAND SNAILS**

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A phylogenetic analysis of 19 sibling taxa in the *Vertigo gouldii* group was conducted on 73 individuals sampled across North America using mitochondrial and nuclear DNA sequence data. These results suggest that some previous members of the traditional *V. gouldii* group may actually be more closely related to *V. modesta*. They also suggest that *V. gouldii* may itself consist of seven species-level branches spread across two deeply rooted clades. They also confirm that *Vertigo* species commonly possess continental-sized ranges in spite of their minute size and limited active dispersal ability. High levels of sympatry within the group are also validated, with up to four species being known to co-occur within single microsites. This analysis also suggests that diversification rates have been non-constant, with a 10-fold diversification pulse being indicated from 6.7–7.0 my BP. This time period is coincident with known mid-late Miocene global climate changes.

**DNA SEQUENCING AND MOLLUSK SPECIES:
WHAT ARE WE LEARNING FROM LARGE-SCALE EFFORTS?**

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With the cost of DNA sequencing falling, we can now rapidly sequence genes from any species for which tissue is available. At FLMNH, we are currently sequencing tens of thousands of mollusks and other invertebrates through several large-scale initiatives. Through MARBOL (Marine Barcode of Life) we are sequencing representatives of all appropriately-preserved marine invertebrate species in our collection. Through Moorea BIOCODE we are doing the same for the fauna of Moorea Island (Polynesia), while with the BIOTAS project we are pursuing sequencing of marine species from the SW Indian Ocean. We are also assembling tissues from marine invertebrates in Florida and from land snails around the world for these and future efforts. We'll discuss these initiatives and emerging results. In particular we will discuss what we are learning about species diversity, morphological variation, cryptic species, and species limits through these efforts.

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***KALIDOS*, A MADAGASCARAN ENDEMIC GENUS OF LAND SNAILS**

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Kalidos is a diverse and poorly defined genus of helicarionoids endemic to Madagascar. Most species were known from a handful of shells and, as a result, knowledge of the biology of the group remains in an embryonic stage. Recent extensive collecting is uncovering additional species and providing anatomical material, allowing investigation of the group using morphological and genetic data that had not previously been available. Genetic and anatomical data suggest the genus is made up of several large clades. Within these, several species appear to be complexes of narrowly distributed species that are restricted to Madagascar's dwindling forests. Determining the relationships among these species may provide insight into the development of diversity on Madagascar. Uncovering the island's hidden diversity and determining the mechanisms for this diversity are particularly important given that less than 15% of the island's primary vegetation remains, threatening much of the island's biota with habitat loss.

THE SEASHELLS OF CORAL COVE PARK, JUPITER ISLAND, FLORIDA

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I plan to talk about collecting at Coral Cove Park, Jupiter Island during the winter months of 1996, 1998, 2000–03, and 2007–10. Over this time period I have found approximately 220 species, solely by scouring the beach at sunrise for 1–3 hours. I will produce a list of species and a representative sampling of these species.

THE WEST INDIAN LANDSNAIL FAMILY CERIONIDAE IN MEXICO

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A new genus with three new species of Cerionidae occur in northeastern Mexico. The genus differs from other Cerionidae by lacking a parietal lamella. Anatomical data confirm the placement of the Mexican genus in the Cerionidae. The species occur at 2300-2600 m elevation and about 200 km inland in mountainous areas, in contrast to West Indian cerionids, which occur at coastal localities of less than 100 m.

**ASSESSING BAY SCALLOP RECRUITMENT SUCCESS AND INITIATING A
COMMUNITY-BASED POPULATION ENHANCEMENT PROGRAM
IN LOWER PINE ISLAND SOUND, FLORIDA**

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Historically, bay scallop (*Argopecten irradians*) populations in Pine Island Sound, FL (PIS) were abundant, supporting a relatively healthy fishery. However, in the 1960s, one or more factors (overfishing, water quality, flow modifications) lead to declines and fishery closure. SCCF, partnering with Mote and FWRI, initiated a monitoring program to assess larval, juvenile, and adult populations with the ultimate goal of restoring scallop populations. As part of this effort, we monthly sample recruitment units and enumerate recruits at nine sites in lower PIS. Regular recruitment monitoring suggests a significant increase in bay scallop settlement during 2009. Additionally, in 2008-09, we worked with FWRI and volunteer home owners to deploy and assess survival and growth of juvenile caged scallops hung from docks at 30 sites in and outside of residential canals. The cages provide a predator-free space for the scallops to grow and ultimately spawn, thereby increasing the likelihood of successful reproduction. Growth and survival were greater at sites outside of canals.

^αPresenting author

ROLE OF OYSTERS IN SETTING FRESHWATER INFLOW TARGETS IN THE CALOOSAHATCHEE ESTUARY: A CASE STUDY

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To assess the effects of watershed runoff and freshwater inflow into southwest Florida estuaries, oyster responses were examined seasonally and spatially in the Caloosahatchee estuary. Oyster spawning and larval recruitment occurred between March and October, a period that is concomitant with seasonal rainfall, upstream freshwater releases, watershed runoff, and consequently with reduced estuarine salinities. High volumes of fresh water discharges during the summer months result in flushing of larvae to downstream locations, where, during the drier winter months, they are exposed to high salinities and predation, which is unfavorable for their survival. *Perkinsus marinus* infections increased with increasing salinity and decreases with high freshwater inflows into the system. These results suggest that small, periodic freshwater releases (< 4000 CFS) for durations of less than 2 weeks would result in lower disease prevalence and intensity, and higher juvenile oyster survival and create a more favorable salinity regime for spat recruitment and survival.

^aPresenting author

CURRENT STATUS OF THE FRESHWATER MUSSELS OF FLORIDA PROJECT

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The project objective is to produce a book on the freshwater mussels of Florida. Of the 300 species of mussels in the U.S., about 60 (in 20 genera) occur in Florida. The mussel fauna is highly endemic, with 39 species confined to the state and rivers flowing into the state from Alabama and Georgia. Presence of seven additional species is considered hypothetical as they occur only in streams in Alabama and Georgia that flow into Florida. Shell morphology, soft anatomy, and genetic analysis are being used to delineate distribution, identify cryptic diversity, and evaluate taxonomic status of poorly known mussels. Ongoing field efforts include sampling all major river drainages of Florida. Review of museum collections will provide the historical baseline for evaluating the current conservation status of the fauna. The final product will include shell photographs, dot distribution maps, life history and host fish information, habitat, ecology, and conservation status.

^aPresenting author

