Florida United Malacologists

Program and Abstracts

January 27, 2018

José H. Leal, Organizer

BAILEY-MATTHEWS
NATIONAL SHELL MUSEUM

WELCOME TO THE 9TH FUM!

We are delighted to have a sold-out crowd sharing the latest and greatest in "all-things malacological." Our program reflects that the study of mollusks (and their shells) holds an appeal for a wide variety of people and backgrounds. I'm often surprised and delighted to learn about a new topic or species. I think this group of presenters is our best ever and I can't wait to get started! Please let us know if there is anything we can do to make your day more enjoyable and informative. We encourage you to ask questions, discuss data, compare notes on methods and problems, and be inspired by your fellow malacologists. That's all part of the fun.

Welcome to Sanibel and the 2018 Annual Meeting of the Florida United Malacologists!

Dorrie Hipschman
Executive Director
Bailey-Matthews National Shell Museum

ENJOY FUM 2018!

Welcome! Like other casual, mollusk-related meetings across the country, FUM knows no boundaries in terms of the subjects covered. The one-day gathering is brief and informal, yet diverse in many ways. A glimpse at the abstracts in this booklet gives you an idea of the broad scope of topics, from shell inlays in musical instruments to the complex yet fascinating methods for determining the growth rates of Horse Conchs and other mollusks. Given its relaxed atmosphere, FUM is also the perfect launching platform for graduate students, citizen scientists, and naturalists who are beginning to find their way in the world of presentations at professional meetings. I want to thank the support received from Executive Director Dorrie Hipschman and the vital help from Museum staff members Lorin Buckner, Leigh Gay, and Rebecca Mensch.

Enjoy the presentations, discussions, and camaraderie at FUM 2018!

José H. Leal, Ph.D.
Science Director & Curator
Bailey-Mathews National Shell Museum

FLORIDA UNITED MALACOLOGISTS 2018
JANUARY 27, 2018
PROGRAM

9:00 Dorrie Hipschman, Executive Director, BMNSM
OPENING REMARKS
José H. Leal, Science Director & Curator, BMSNM
ANNOUNCEMENTS

SESSION 1

9:15 José H. Leal
THE BAILEY-MATTHEWS NATIONAL SHELL MUSEUM COLLECTION: RECENT ADVANCES AND THE NEAR FUTURE

9:35 Carole Marshall
EGG CASES OF SELECTED MARINE MOLLUSKS

9:55 Leigh Gay
"MOLLUSKS ON THE MOVE"

10:15 Gregory S. Herbert
EVIDENCE FOR INTENSE BIOTIC INTERACTIONS IN THE EASTERN GULF OF MEXICO AFTER A TWO MILLION YEAR HIATUS: INFERENCES FROM MURICID EDGE DRILLING BEHAVIOR

10:35 Break – 10 minutes

SESSION 2

10:45 Tom Annesley
HOW TO CREATE EFFECTIVE TABLES AND FIGURES WHEN PUBLISHING YOUR RESEARCH

11:05 Rebecca Mensch
UNSOLVED *OCTOPUS*

11:25 Anne Dupont
OPISTHOBRANCH SPAWN

11:45 Sahale Casebolt
FLORIDA'S FRESHWATER MUSSELS (UNIONIDAE): MONITORING IMPERILED SPECIES AND SURVEYING DECLINING POPULATIONS

12:05 LUNCH + Poster Session (1:10 hour)

Lunch provided at the Museum; choice of regular or vegetarian sandwiches, and assorted chips, soft drinks, and water (poster session continues at 4:00PM)

Posters:

Austin Hersh and Gregory S. Herbert
HOW HAS MOLLUSCAN COMMUNITY COMPOSITION IN THE GULF OF MEXICO CHANGED IN RESPONSE TO HUMAN STRESSORS? A COMPARISON OF LIVING AND PRE-1950 COMMUNITIES

Sarah Sharkey
SEXUAL DIMORPHISM IN SELECTED SPECIES: FRESHWATER MUSSELS OF FLORIDA

Shenelle West, Nasser Al Qattan, Gregory S. Herbert
USING THE FOSSIL RECORD OF INDUCIBLE SHELL DEFENSES IN MOLLUSKS TO DETECT HUMAN IMPACTS ON FOOD WEBS – A CASE STUDY USING VARICES ON JUVENILE FIGHTING CONCH

SESSION 3

1:15 Jon Dale
PEARL INLAY ON MUSICAL INSTRUMENTS

1:35 Lorin Buckner
THE FRESHWATER MOLLUSKS OF THE TEN MILE CANAL, FORT MYERS, FLORIDA

1:55 Harry G. Lee, Roger W. Portell, Richard L. Edwards
NEW DIVERSITY IN AN OLD FAUNA

2:15 David J. Karlen, Thomas L. Dix, Sarah E. Markham, Kevin W. Campbell, Joette M. Jernigan, Julie Christian, Anthony Chacour, Barbara K. Goetting, Chris Pratt, Brett Ursin
SPATIAL AND TEMPORAL TRENDS IN THE EPIFAUNAL AND MOLLUSCAN COMMUNITIES ON TAMPA BAY ARTIFICIAL REEFS: 2004 VS. 2016

2:35 Break 2 (10 minutes)

SESSION 4

2:45 Nicole Seiden, Gregory S. Herbert, Ryan Harke, Stephen Geiger
WHAT IS THE POTENTIAL FOR HORSE CONCH *TRIPLOFUSUS GIGANTEUS* POPULATIONS TO RECOVER FROM INCREASING FISHING PRESSURE? LIFE HISTORY ASSESSMENT USING STABLE ISOTOPE SCLEROCHRONOLOGY

3:05 John Slapcinsky and Ryan Corlett
HOW WELL DO WE KNOW THE WELL-KNOWN FLAMED TIGERSNAIL, *ANGUISPIRA ALTERNATA*?

3:25 Meindert Niejmeyer and Bill Emerson
SHELLZEE: AUTOMATED SHELL IMAGE RECOGNITION IN YOUR POCKET

3:45 CONCLUSION, CLOSING REMARKS

4:00 POSTER SESSION CONTINUED

4:30 [STAFF, ROOM BREAKDOWN]

5:30 DINNER at George & Wendy's. Prior reservation required. Address and location map at the end of this booklet (your own tab.)

Abstracts

HOW TO CREATE EFFECTIVE TABLES AND FIGURES WHEN PUBLISHING YOUR RESEARCH

Thomas Annesley
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The two factors that contribute to the success of a manuscript are scientific rigor and clarity. Authors put great effort into drafting a manuscript that is scientifically sound, yet ultimately fail because information is not clearly presented and the manuscript thus becomes tedious to read. Figures and tables are important items where improper formatting and a lack of clarity hurt a manuscript. There are simple rules that, when followed, make figures and tables easy to read. For example, figures are most visually balanced by use of the 1 by 1.3 rule. Bar graphs are more effective when the 50% space rule is followed. The most effective tables follow justification and common-element rules. This presentation will cover the above rules, and more, using examples to illustrate how bad figures and tables can be changes into good ones.

THE FRESHWATER MOLLUSKS OF THE TEN MILE CANAL, FORT MYERS, FLORIDA

Lorin Buckner
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During the past year I have been conducting an informal survey of the freshwater mollusks inhabiting the Ten Mile Canal in Fort Myers, Florida. It was done for the purpose of satisfying my curiosity and for the collection of specimens for the National Shell Museum collection but could serve as a base from which to conduct additional surveys as well providing an indication of the quality of that fresh water environment.

FLORIDA'S FRESHWATER MUSSELS (UNIONIDAE): MONITORING IMPERILED SPECIES AND SURVEYING DECLINING POPULATIONS

Sahale Casebolt
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Freshwater mussels (Family Unionidae) live throughout the Southeastern United States, including most of Florida's lakes, rivers, and streams. The state is home to 60 species, 16 of which are federally listed as endangered or threatened. The Florida Fish and Wildlife Conservation Commission (FWC) has expanded efforts in recent years to better understand the conservation status of Florida's freshwater mussel populations. As part of FWC's Freshwater Fisheries Research Division, the biologists of the Mussel Monitoring Program conduct quantitative long-term monitoring surveys throughout the state. This talk summarizes the initial results of these survey efforts, which contribute to a growing understanding of the distribution and abundance of Florida's unionids. Water quality, water quantity, and the status of the fish host populations all play a role in the health of Florida's freshwater mussel populations.

PEARL INLAY ON MUSICAL INSTRUMENTS

Jon Dale
Jupiter Ukulele*
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People, since the dawn of time, have loved shiny objects and shells were some of the first shiny objects. Come for a brief presentation on what makes mother-of-pearl so shiny, some of the more important sources, a discussion of how pearl inlay is done on musical instruments (with materials, tools, and examples), and what sorts of local Florida shells can be incorporated into the inlay color palette.

*www.jupiteruke.com

OPISTHOBRANCH SPAWN

Anne DuPont
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The presentation will take you on an underwater journey showing *in situ* photos of opisthobranch gastropods laying eggs capsules. Opisthobranch eggs come in every size, shape, and color imaginable. Their dramatic fluid shapes and bright colors are favorite subjects for me as an underwater photographer. The morphology of the egg mass varies dramatically; most commonly they look like coils or spirals of ribbons, whereas others appear as tangled string masses, chains of beads, or cylinders. The presentation includes photographs of the spawn of nudibranchs, Sea Hares (Aplysiidae), solar-powered Slugs (Sacoglossa), and Side Gill Slugs (Pleurobranchus).

"MOLLUSKS ON THE MOVE"

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"Mollusks on the Move" is an educational outreach program by the Bailey-Matthews National Shell Museum that brings live mollusks to students and adults throughout Southwest Florida. The program's focus is to educate students at Title I (underfunded) schools, and inspire them to pursue careers in STEM (Science, Technology, Engineering, and Mathematics) fields. Its hands-on activities and live touch tank time reveal the underappreciated world of marine mollusks to children who may have never before seen the ocean. Since its inception in February 2017, "Mollusks on the Move" has reached 3,180 children and adults in Lee, Collier, Hendry, and Sarasota Counties.

EVIDENCE FOR INTENSE BIOTIC INTERACTIONS IN THE EASTERN GULF OF MEXICO AFTER A TWO MILLION YEAR HIATUS: INFERENCES FROM MURICID EDGE DRILLING BEHAVIOR

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Edge drilling by muricid gastropods *Chicoreus dilectus* and *Phyllonotus pomum* has been observed in the laboratory under conditions simulating an enemy-rich environment and in Florida's Pliocene fossil record, but this behavior has never been observed in the wild and was presumed to be ecologically extinct for the last two million years. This study documents edge drilling by *C. dilectus* and *P. pomum* in a multi-year survey from 2002 to 2015 in St. Joseph Bay, a coastal lagoon in the northeastern Gulf of Mexico. Edge drilling was not recorded in a 2002 survey but was observed directly from 2007 to 2011. Edge drilling accounted for more than half of all drilling attacks in 2007, with frequency of occurrence declining thereafter. St. Joseph Bay has the highest densities of predators and lowest prey survival rates in the region and highest secondary productivity in any seagrass habitat globally, confirming the use of muricid edge drilling as an indicator of Florida's enemy hotspots and their fates in modern times and in the fossil record.

How has molluscan community composition in the Gulf of Mexico changed in response to human stressors? A comparison of living and pre-1950 communities

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Ecosystems of the Gulf of Mexico are facing multiple stressors, including warming temperatures, ocean acidification, pollution, and invasive species. While there have been numerous studies on the effects of these stressors on charismatic fauna, such as dolphins and large fish, much less is known about their impact on benthic invertebrates, which are critical components of the food web. This study is a preliminary investigation using Geographic Information Systems (GIS) to visualize changes in geographic occurrence of common species and community composition. Our data come from 44 dredge surveys of benthic mollusks off the west Florida shelf from 2008 to 2016, consisting of 4557 gastropod specimens. Change at the species and community-scale are inferred from comparison of live versus dead components of dredge surveys, which represent present day and, on average, pre-1950's ecosystems, respectively. Community-scale analyses will be done using detrended correspondence analysis, which is a common ecological technique for quantifying similarity between samples.

[POSTER]

SPATIAL AND TEMPORAL TRENDS IN THE EPIFAUNAL AND MOLLUSCAN COMMUNITIES ON TAMPA BAY ARTIFICIAL REEFS: 2004 VS. 2016

David J. Karlen*, Thomas L. Dix, Sarah E. Markham, Kevin W. Campbell, Joette M. Jernigan, Julie Christian, Anthony Chacour, Barbara K. Goetting, Chris Pratt, Brett Ursin
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The Environmental Protection Commission of Hillsborough County (EPCHC) conducted a survey of the epifaunal communities on three artificial reefs in Tampa Bay in spring and fall 2016 in order to evaluate the current condition of these reefs and to compare results with a previous survey conducted in 2004. The three reefs selected represented different locations along the estuarine salinity gradient in Tampa Bay. These reefs were the Howard Frankland Reef (HFR) in Old Tampa Bay (OTB); the Bahia Beach Reef (BBR) in Middle Tampa Bay (MTB); and the Egmont Key Reef (EKR) in Lower Tampa Bay (LTB). Each reef was sampled seasonally in the spring (April-May 2016 = dry season) and fall (August 2016 = wet season) to look at seasonal changes in the epifaunal community on the reef as well as differences between reefs within each season. Ten samples were collected on each reef during each seasonal sampling event by SCUBA divers using a 16 cm x 16 cm area epifaunal sampler. Epifaunal species were sorted and identified to the lowest practical taxonomic level and enumerated. Wet weight biomass was also measured for larger specimens and colonial organisms. Results showed seasonal changes in the species composition, with the oyster *Ostrea equestris* dominating the community in the spring while barnacles were dominant in the fall. Spatially, species richness increased with the salinity gradient with highest number of taxa being present on the Egmont Key Reef. Comparison with the 2004 study found changes in the epifaunal community between years. Most notable was a large drop in the abundance and biomass of the invasive Asian Green Mussel, *Perna viridis*, which was dominant in 2004 but nearly absent in 2016. Salinity and temperature appear to be the driving factors influencing the epifaunal communities on the artificial reefs. Salinity had a strong correlation with the epifaunal community structure between the three reefs within a given season and between 2004 and 2016. The combination of salinity and temperature were correlated with seasonal changes on the reefs.

*Presenter

THE BAILEY-MATTHEWS NATIONAL SHELL MUSEUM COLLECTION: RECENT ADVANCES AND THE NEAR FUTURE

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The Bailey-Matthews National Shell Museum collection (BMSM) currently encompasses about 123,600 catalogued lots. It includes private donations, collections originally in other institutions, and Museum-collected material. It consists mostly of Recent mollusks, with a focus on the Gulf of Mexico, Florida, and the Caribbean. A five-year cataloguing project funded by two Institute of Museum and Library Services (IMLS) Museums for America Collection Stewardship grants enabled the Museum to complete the entire collection backlog by mid-2017. In 2016–17, funding from one IMLS grant has allowed staff to update and consolidate the taxonomy and species-level nomenclature of more than 3,500 marine taxa. Collection metadata are available via the data aggregator resource iDigBio https://www.idigbio.org/portal/recordsets/b40e13f7-a79a-4265-93d9-3b4878dfc988 iDigBio/Global Biodiversity Information Facility (GBIF) at https://www.gbif.org/publisher/1c8732e1-36b1-4a7c-978e-f69542768ec3. About 9,300 lots are georeferenced through GBIF. Future needs include migration of the current software to Specify and funding for posting selected images through iDigBio (following iDigBio's standards and formats for linked metadata).

NEW DIVERSITY IN AN OLD FAUNA

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The Pinecrest beds (Upper Pliocene) of southern Florida are renowned for their abundant and well-preserved fossil mollusk remains. Furthermore, the species richness is legendary—estimates in excess of 1000 such taxa have appeared in the literature. On the other hand, the micromollusks of thus fauna have been undertreated heretofore. The most diverse of these families, comprised mostly of taxa with a maximum dimension <5.50 mm, is the Pyramidellidae. This presentation will demonstrate and interpret the constituents of this group based on collections made at a single exposure, SMR 10, a pit mine in NE Sarasota Co, FL, where the Upper Tamiami Formation has been excavated. Eighty-three species in 26 genera have been recognized, and SEM images of selected taxa will be presented.

*Presenter

EGG CASES OF SELECTED MARINE MOLLUSKS

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The egg capsules of marine mollusks are the least studied of all the molluscan systems. The reproductive system is usually covered for many species, but not the egg capsules themselves. Yet, each mollusk has an egg capsule that is unique to its own species. Some of the people who have worked extensively on egg capsules are Charles D'Asaro, Gunnar Thorsson, and Bea Winner. I would like to introduce you to them with a brief synopsis of their work. The remainder of this short program will be some of the more interesting egg capsules that I have found, in person or on the internet.

UNSOLVED *OCTOPUS*

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The number of octopuses found on the beaches and inside of shells on Sanibel seemed to be much higher last winter than in previous years, which created the opportunity to keep a live octopus in one of the BMNS Museum display aquariums. The species was assumed to be *Octopus joubini* Robson, 1929 (Atlantic Pigmy Octopus), which is well represented in the scientific literature and confirmed to live in our local waters. After just two weeks in the Museum aquarium, the specimen laid relatively large eggs, with benthic juveniles hatching about four weeks later. These two aspects meant the specimen could not possibly be *Octopus joubini*. This presentation will explore the current knowledge gaps, including the reasons why a positive identification is not currently possible, as well as the next steps in identifying this local octopus.

SHELLZEE: AUTOMATED SHELL IMAGE RECOGNITION IN YOUR POCKET

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Deep learning or "artificial intelligence" (AI) is a technology that is currently transforming many fields. Examples are self-driving cars in the automotive field, automated content generation in publishing and automated disease detection in medicine. Over the last 10 years the ability of machines to learn to reason about images and their contents have seen especially pronounced development. This presentation will showcase our work on Shellzee, a mobile app developed together with the Bailey-Matthews National Shell Museum. Shellzee is able to recognize a number of different shell types from images acquired through mobile devices. We would like for Shellzee to be a helpful tool for shell novices to figure out more information about the shell they just found on the beach. Any picture sent to Shellzee has the potential of helping her perform better as she is continually learning more about shells, what they look like and their unique characteristics. In the presentation we'll discuss the technology behind Shellzee, some of the challenges involved with current state-of-the-art AI tool development, some preliminary results on a small validation set and some of the limitations of Shellzee in her current form. If there is enough time, a brief demo will be given at the end of the presentation.

*Presenter

WHAT IS THE POTENTIAL FOR HORSE CONCH *TRIPLOFUSUS GIGANTEUS* POPULATIONS TO RECOVER FROM INCREASING FISHING PRESSURE? LIFE HISTORY ASSESSMENT USING STABLE ISOTOPE SCLEROCHRONOLOGY

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The horse conch (*Triplofusus giganteus*) is the second largest extant gastropod in the world and is the state shell of Florida. There is demand for these mollusks among commercial and recreational fishers and avocational shell collectors. Despite harvest, life history traits such as age at reproductive maturity and lifetime fecundity are unknown. In this study, we use oxygen isotope sclerochronology of two large shells close to record size to measure annual growth cycles that are recorded seasonally in the shell, a process similar to dendrochronology in trees. Data from this method will provide information on size-at-age from which life history traits might be estimated. Growth breaks along the shell suggest that these snails live > 10 years, a hypothesis supported by two oxygen isotope profiles from large specimens. The von Bertalanffy growth curves constructed from the data will also be used to estimate the age of the largest known horse conch, 606 mm, currently on display in the Bailey-Matthews National Shell Museum.

*Presenter

SEXUAL DIMORPHISM IN SELECTED SPECIES: FRESHWATER MUSSELS OF FLORIDA

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Sexual dimorphism is the difference in shape and/or size between males and females of the same species. This trait exists in a number of freshwater mussel species (Family Unionidae), including many of the common freshwater mussel species of Florida. Generally, if a unionid taxon exhibits sexual dimorphism, the sexes are distinguished by females having a more rounded posterior margin, in combination with a more inflated shell, compared to the males of the same species. This morphological difference may be due to females needing space to accommodate the eggs and glochidia (juvenile stage of freshwater mussels), which they develop in one or both sets of gills. Florida mussel species exhibiting sexual dimorphism include: *Lampsilis floridensis, Lampsilis stramenia, Villosa amygdalum, Villosa lienosa, Villosa vibex* and *Villosa villosa.* To assist with identification of Florida's unionids, this poster exhibits and highlights the morphological distinctions between males and females of these species.

[POSTER]

HOW WELL DO WE KNOW THE WELL-KNOWN FLAMED TIGERSNAIL, *ANGUISPIRA ALTERNATA*?

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Anguispira alternata was the subject of some of the earliest ecological studies on snails and is arguably the best studied land snail species in eastern North America. However, the last two major revisions of the genus are more than 70 years old and not in close agreement. Both revisions recognize only a few highly variable species with numerous subspecies. More recently, morphological and genetic studies focused on limestone outcrop specialists demonstrate that the taxa treated as forms or subspecies of *Anguispira cumberlandiana* are probably species level taxa. Our DNA sequence and morphological data suggest that *Anguispira alternata* is also a complex of species with molecular clades that are congruent with morphologically recognizable groups, many of which overlap in range. This suggests there are several species confused with the broad ranging *Anguispira alternata*. Some of these species appear to be narrow range endemics that may warrant conservation concern and protection.

USING THE FOSSIL RECORD OF INDUCIBLE SHELL DEFENSES IN MOLLUSKS TO DETECT HUMAN IMPACTS ON FOOD WEBS – A CASE STUDY USING VARICES ON JUVENILE FIGHTING CONCH

Shenelle West, Nasser Al Qattan, and Gregory S. Herbert
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Human overfishing has led to disproportionate declines of apex predators throughout the world's oceans, but the extent of their decline and, more importantly, impacts on the larger ecosystem remain poorly documented. A common consequence of apex predator loss in complex ecosystems is ecological release of mesopredators, the effects of which can cascade to predator-prey interactions affecting benthic invertebrates, such as mollusks. In this study, we examine how expression of shell anti-predatory defenses in the *Strombus alatus* (Florida Fighting Conch) species complex varied from the Pliocene to the present day. Juvenile *S. alatus* often develop thickenings of the shell lip, likely as a defense against peeling or crushing predators. On adults, these appear as humps or ribs on spire whorls. Animals collected in the wild nearly always have multiple internal varices, often two per whorl, but those raised in captivity in the absence of cues from predators do not. This suggests they are an inducible defense expressed only when needed, and their occurrence can tell us about the intensity of interactions with their shell peeling enemies over space and time. This study investigates expression of internal varices in Florida *S. alatus* to test the hypothesis that patterns of varix expression today are unique compared to the pre-anthropogenic baseline from the fossil record, which would indicate changes to the structure of modern food webs. Preliminary data show that varices are expressed at greater frequencies at higher whorl numbers and greater depths in modern shells and at greater frequencies today than in the past.

[POSTER]

Location of 5:30 PM dinner venue, **George & Wendy's**
2499 Periwinkle Way, Sanibel, FL 33957
(on the corner of Tarpon Bay Rd., next to Bailey's General Store)
(239)395-1263