Florida United Malacologists

Program and Abstracts

April 2, 2022

José H. Leal, Organizer

BAILEY-MATTHEWS
NATIONAL SHELL MUSEUM

WELCOME TO FUM 2022!

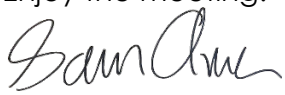
Dear FUM 2022 participants,

Welcome—or welcome back—to the Bailey-Matthews National Shell Museum! We are delighted you're here, and that Florida United Malacologists is again able to meet and bring together its vibrant community of scholars, students, and enthusiasts of mollusks here in Sanibel. I extend a special thanks to Dr. José H. Leal, our peerless Science Director and Curator, for leading and organizing the 2022 meeting.

This program features a highly diverse and interesting set of presentations by longtime FUM contributors, as well as new voices. Together we'll explore the latest in species health, biodiversity data, molluscan behavior, habitat and environmental conditions, and other subjects. We extend great thanks to our presenters for their work and sharing their knowledge, and to all of you for participating, contributing to the conversation, and advancing the cause, impact, and enjoyment of malacology here in Florida.

The Museum is honored to host you, and FUM. On a personal note, as the grateful newish Executive Director of this wonderful museum and one who is new to the field, I look forward to meeting all of you and learning more about how we can work together for deeper and broader understanding and appreciation of mollusks and their ecosystems, and achieve the conservation outcomes we so critically need.

Enjoy the meeting!



Sam Ankerson
Executive Director
Bailey-Matthews National Shell Museum

Dear FUM 2022 Participants,

After a couple of years of cancellations and postponements, it is great to have FUM back on Sanibel. We have record attendance for FUM events this year, with 88 registrants and 18 presentations! I want to thank Executive Director Sam Ankerson for his steadfast support, Director of Operations Ryan Powell for logistical assistance, Tom and Linda Annesley for sponsoring lunch, and to all of you for participating in FUM 2022!

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

FLORIDA UNITED MALACOLOGISTS 2022
APRIL 2, 2022
PROGRAM

9:00 Sam Ankerson, BMNSM Executive Director
WELCOME AND OPENING REMARKS

José H. Leal, BMNSM Science Director & Curator
ANNOUNCEMENTS

SESSION 1

9:15 Carole P. Marshall
WILL THE REAL *MACROCYPRAEA CERVUS* PLEASE STAND UP?

9:35 Aaron J. Avery, Federico Márquez, Nicole L. Seiden, Gregory S. Herbert, José H. Leal, Stephen P. Geiger
DIGITIZED MUSEUM RECORDS USED FOR CONSERVATION FIRST-NEED TAXONOMIC STANDARDIZATION: A CASE STUDY OF AN IUCN RED LIST CONE SNAIL

9:55 Lauren Bradley, John Slapcinsky
MORPHOMETRIC ANALYSIS OF THE LAND SNAIL GENUS *CHLORITIS* FROM SUDEST ISLAND IN THE LOUISIADE ARCHIPELAGO, PAPUA NEW GUINEA

10:15 José H. Leal, Haley Kraczek
MOBILIZING MILLIONS OF MARINE MOLLUSKS FROM THE EASTERN SEABOARD: DIGITIZATION ACTIVITIES AT THE NATIONAL SHELL MUSEUM

10:35 Break – 10 minutes

SESSION 2

10:45 Lyndsey Grossmann, Erin Pulster
MICROPLASTICS AND MOLLUSKS IN TAMPA BAY: A CASE FOR STUDY

11:05 Annabella Hernandez
CHLOROPLAST RETENTION RATES AND FIELD SURVEYS OF THE PHOTOSYNTHETIC SEA SLUG *ELYSIA ZULEICAE*

11:25 Erika Molina, Julia Piper, John Ambrosio, Daniela Gutierrez Andrade, Michael Middlebrooks
SEASONAL ASSESSMENT OF A LOCAL TAMPA BAY AEOLID NUDIBRANCH SPECIES, *NANUCA OCCIDENTALIS*

11:45 Daniela Gutierrez-Andrade, Michael Middlebrooks
EFFECTIVENESS OF CERATAL AUTOTOMY BY THE SACOGLOSSAN SEA SLUG *PLACIDA KINGSTONI* AS A DEFENSE MECHANISM AGAINST PREDATION

12:05 Group Photo
ON MUSEUM GROUNDS

12:15 LUNCH
Lunch provided at the Museum: your choice of regular or vegetarian sandwiches, plus assorted chips, soft drinks, water

SESSION 3

1:00 Stephen P. Geiger
HARVEST OF MARINE SNAILS IN FLORIDA

1:20 Rebecca Mensch
NOTES AND OBSERVATIONS ON THE GROWTH OF A TRUE TULIP (*FASCIOLARIA TULIPA*) UNDER HUMAN CARE

1:40 Mark Delves
MOLLUSK ENRICHMENT: NOT JUST FOR OCTOPUSES

2:00 Carly A. Hulse, José H. Leal
TIME-LAPSE VIDEO OBSERVATIONS ON THE MECHANICS OF EGG-CAPSULE DEPOSITION IN THE CROWN CONCH, *MELONGENA CORONA*

2:20 Megan Davis
QUEEN CONCH, *ALIGER GIGAS*, MARICULTURE IN THE CARIBBEAN

2:40 Break 2 (10 minutes)

SESSION 4

2:50 Gregory S. Herbert, Stephen P. Geiger, Stephen G. Hesterberg, Nicole Seiden, Jaime A. Rogers, Ryan M. Harke, Martin Šala, Kaydee J. West, Ethan A. Goddard
THE FLORIDA HORSE CONCH'S INTRINSIC VULNERABILITY TO EXTINCTION

3:10 Madelyn Mette
ARCTICA ISLANDICA—A PREMIER ARCHIVE FOR PALEOCLIMATE RESEARCH IN THE NORTH ATLANTIC

3:30 **Harry G. Lee, Roger W. Portell, Richard E. Edwards**
NONMARINE NANOMOLLUSKS FROM THE NASHUA FORMATION (LOWER PLEISTOCENE, ORANGE COUNTY, FLORIDA)

3:50 **John Slapcinsky, Cindy Bick, Diarmaid Ó Foighil**
MORPHOMETRIC AND ANATOMICAL DATA SUPPORT BOTH NARROW ENDEMISM AND MULTI-ARCHIPELAGIC DISTRIBUTIONS WITHIN *PARTULA* TREE SNAILS OF PAPUA NEW GUINEA AND THE SOLOMON ISLANDS

4:10 **Anton E. Oleinik, Claudio Zucarelli**
DEEP BLUE SEA AND TINY SHELLS—MOLLUSKS FROM FLORIDA BIOGENIC OOZES

4:30 **CONCLUSION, CLOSING REMARKS**

5:30 **DINNER at George & Wendy's. Prior reservation required. Address and location map at the end of this booklet. (Attendees will be responsible for their dinner expenses.) See last page of this booklet for driving directions.**

Abstracts FUM 2022

(In talks with more than one author, the names of the presenters are underlined.)

DIGITIZED MUSEUM RECORDS USED FOR CONSERVATION FIRST-NEED TAXONOMIC STANDARDIZATION: A CASE STUDY OF AN IUCN RED LIST CONE SNAIL

Aaron J. Avery[1§], Federico Márquez[2,3], Nicole L. Seiden[1,†], Gregory S. Herbert[†1], José H. Leal[4], Stephen P. Geiger[5]

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Georeferenced collections are important for identifying species in need of conservation, but these efforts are confounded by lack of standardization in taxonomic practices between and within collections. This study uses geometric morphometrics of specimens in museum and university collections to standardize identification of *Conasprella stearnsii* and reassess its range. This cone snail is on the IUCN Red List because it is endemic to Florida and occurs in areas of heavy urban development. The species is easily confused with *Conasprella pealii and Conasprella jaspidea.* We find that: (1) all three species occur in South Florida but have different distributions, and (2) specimens previously identified in deep waters as *C. stearnsii* belong to *C. pealii*; *C. stearnsii* is restricted to shallow coastal waters near urban development and conservation threats. Our study demonstrates how taxonomic standardization should accompany georeferencing efforts for digitized museum records.

MORPHOMETRIC ANALYSIS OF THE LAND SNAIL GENUS *CHLORITIS* FROM SUDEST ISLAND IN THE LOUISIADE ARCHIPELAGO, PAPUA NEW GUINEA

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Surveys of land snails in the Louisiade Archipelago of eastern Papua New Guinea in 2004 included visits to previously unsampled cloud forests at the summit of Mount Riu, the highest point on Sudest Island. These cloud forests harbor an unusual population of a small, low-spired land snail in the genus *Chloritis* that appears morphologically distinct from *Chloritis sudestensis*, which is widespread at lower elevations on Sudest. We investigated variation in shell morphology by conducting a morphometric analysis using MorphoJ and we looked at variation in reproductive anatomy within and between the two taxa. The new taxon appears restricted to high elevation cloud forest on Sudest Island. New Guinea and surrounding islands encompass the third largest tracks of uncut rainforest on the planet. However, deforestation rates are rapidly increasing, and it is important to document narrow-range endemic species before large-scale environmental change threatens them.

QUEEN CONCH, *ALIGER GIGAS*, MARICULTURE IN THE CARIBBEAN

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The Queen Conch, *Aliger gigas*, is the most important molluscan fishery in the Caribbean and is in a state of steady decline due to overfishing and habitat degradation throughout the Caribbean. The heritage of conch, a species of subsistence and economic importance, is deeply rooted in the island nations. As the plight of the conch persists, conch mariculture for restoration and sustainable seafood has received high interest as one of the solutions along with improved fishery regulations, to help conserve populations. Conch mariculture begins with collection of egg masses. The veliger larvae hatch after four days of incubation. These planktotrophic larvae are fed microalgae. They develop for three weeks before metamorphosis into benthic juveniles. The Queen Conch Lab at FAU Harbor Branch works with partners on community-based conch mariculture projects in Puerto Rico, The Bahamas, Curaçao, and others as a way to help with restoration of the Queen Conch.

MOLLUSK ENRICHMENT: NOT JUST FOR OCTOPUSES

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In recent years, animal enrichment has become a requirement in order for public zoos and aquariums to achieve accreditation with the Association of Zoos & Aquariums (AZA). Animals under professional care can benefit greatly from enrichment activities and devices designed to enhance physical and neural aspects of their lives. Enrichment allows the animals to make choices, while also adding a level of realism to their pristine habitats. Join me as I relate our most recent *Living Gallery* enrichment projects that do not include our Giant Pacific Octopus.

HARVEST OF MARINE SNAILS IN FLORIDA

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Saltwater snails harvested in Florida are sold as food or bait (like *Sinistrofulgur sinistrum*) and marine life (*Nassarius, Marginella*, *Turbo,* and *Lithopoma* species) and as collectable shells (*Cypraea*, *Cassis,* and *Cymatium* species) but the reporting guidelines for state and federal databases are not distinct. Landings of marine life snails can exceed one million individuals harvested per year but are commonly reported only from a few Florida counties. Randomized surveys in Monroe and Miami-Dade counties found that *Lithopoma* star snails occurred at 40% of stations while *Turbo* species were found at only 5% of stations, raising susceptibility to over-exploitation. Online searches reveal almost endless shells for sale, where asking prices for exceptional shells such as tritons, helmets, and very large Florida Horse Conch can reach hundreds of U.S. dollars. Current harvest rules rarely limit harvest and do not address collection of empty shells, making enforcing existing rules challenging.

MICROPLASTICS AND MOLLUSKS IN TAMPA BAY: A CASE FOR STUDY

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Tampa Bay surface waters and bottom sediments are inundated with microplastics. These pervasive pollutants exist at sizes small enough to subsequently be ingested or filtered by marine animals, particularly filter- and deposit-feeding mollusks, directly affecting the organisms and their environment. One of the least understood threats from microplastic particles is their ability to adsorb and deliver other organic pollutants, including Per- and Poly-Fluoro-Alkyl Substances (PFAS). This leads to the potential of compounding effects upon ingestion of microplastics, and calls for an investigation into the sources of these particles into Tampa Bay mollusk habitats. Sourcing these pollution pathways will serve to enlighten policy makers into actions that could be made to better serve Tampa Bay and its mollusk communities.

EFFECTIVENESS OF CERATAL AUTOTOMY BY THE SACOGLOSSAN SEA SLUG *PLACIDA KINGSTONI* AS A DEFENSE MECHANISM AGAINST PREDATION

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Autotomy is the voluntarily detachment of bodily structures in response to stressful stimuli. Sacoglossan sea slugs can autotomize a wide variety of anatomical structures, but few studies have assessed the effectiveness of this behavior as a defense mechanism against predation. The goal of this study is to evaluate the relationship between ceratal autotomy in the sacoglossan *Placida kingstoni* and its survival against the attacks of a generalist crustacean predator. Sea slugs were exposed to a predator for a ten-minute interaction. Most sacoglossans were attacked, but the majority autotomized their cerata and survived. The detached structures were often consumed by the predators, serving as a distraction that allowed slugs to crawl away. The results of this study suggest that autotomy is an effective defense mechanism for *P. kingstoni* against predation. Future research should evaluate the role of autotomy in other species and asses its effectiveness against predators with different modes of attack.

THE FLORIDA HORSE CONCH'S INTRINSIC VULNERABILITY TO EXTINCTION

Gregory S. Herbert[1*], Stephen P. Geiger[2], Stephen G. Hesterberg[3†], Nicole Seiden[1], Jaime A. Rogers[4], Ryan M. Harke[4], Martin Šala[5], Kaydee J. West[1], Ethan A. Goddard[6]

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The Florida Horse Conch, one of the world's largest gastropods, is widely thought to be protected from overharvest by its long lifespan and high annual reproductive output. In this study, we challenge this view with new information on the Horse Conch's life history. Using stable isotopes, we find that the record size Horse Conch was possibly as young as 11 years old when it died and was reproductively mature for perhaps less than half that time. The largest horse conchs found in the wild today are much smaller and younger than the record-size shell. Thus, most animals reproduce once or twice, if at all. Because of these life history traits, the horse conch has an intrinsic vulnerability to harvest and should be protected.

CHLOROPLAST RETENTION RATES AND FIELD SURVEYS OF THE PHOTOSYNTHETIC SEA SLUG *ELYSIA ZULEICAE*

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Sacoglossan sea slugs are a group of specialized herbivores that feed on macroalgae. Some exhibit kleptoplasty, the ability to steal functional chloroplasts from algae and conduct photosynthesis as a continuous source of nutrition. *Elysia zuleicae* is a small sacoglossan that feeds on algae in the genus *Udotea* and that can then photosynthesize for several weeks after feeding. This study recorded the distribution of *E. zuleicae* on *Udotea* species in St. Petersburg and Tarpon Springs, Florida, and evaluated chloroplast retention times as a function of algal diet. The greatest number of *E. zuleicae* were found on *U. luna*, with fewer slugs found on *U. looensis* and *U. flabellum*. Chloroplast retention times were measured, but did not differ significantly among the algal dietary items, despite differences observed in algal field distribution. This suggests that *U. luna* may have characteristics that attract *E. zuleicae* unrelated to a photosynthetic advantage.

TIME-LAPSE VIDEO OBSERVATIONS ON THE MECHANICS OF EGG-CAPSULE DEPOSITION IN THE CROWN CONCH, *MELONGENA CORONA*

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The Crown Conch, *Melongena corona*, is a common Southwest Florida mollusk. Individuals of the species are permanent residents of the warm-water touch pool in the *Beyond Shells Living Gallery* at the Bailey-Matthews National Shell Museum. This presentation is based upon a time-lapse video clip that documented the egg capsule-laying activities of a female individual when attached to the acrylic exhibit wall. Using the time-lapse video, we were able to drastically slow the video down to gain a better understanding of the mechanics of egg-capsule deposition. The time-lapse segment plays for only 27.07 seconds, while the actual total recording time was 113 minutes, or 6780 seconds. Once the playback frame rate was calculated, we could determine the actual timing of different phases of the spawning process, such as release of the packet of fertilized eggs, transport into pedal gland, ejection of the hardened egg capsule, and attachment of capsule to substrate.

MOBILIZING MILLIONS OF MARINE MOLLUSKS FROM THE EASTERN SEABOARD: DIGITIZATION ACTIVITIES AT THE NATIONAL SHELL MUSEUM

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"Mobilizing Millions of Mollusks of the Eastern Seaboard" (ESB) is a Thematic Collections Network (TCN) digitization project sponsored by the National Science Foundation§ that improves on our knowledge of mollusks from the East and Gulf coasts of the USA. Seventeen important U.S. collections collaborate in the ESB project, including that of the Bailey-Matthews National Shell Museum (BMNSM). ESB will improve reliability of and access to molluscan collection data for examining spatial and temporal changes in distribution, morphology, population size, and genetic variation. Among the BMNSM goals for the project are standardizing, cleaning and georeferencing existing collection records, digitizing new records, and adding new specimen images. At the inception of the project, the Museum had completed digitization of 20,836 ESB lots; since then, we digitized an additional 2,743 ESB lots consisting of 7,571 specimens, cleaned metadata for 6,600 lots, completely georeferenced circa 18,500 lots, and created about 800 new individual images.

§NSF Award DBI-2002528

NONMARINE NANOMOLLUSKS FROM THE NASHUA FORMATION (LOWER PLEISTOCENE, ORANGE COUNTY, FLORIDA)

Harry G. Lee*, Roger W. Portell, Richard E. Edwards
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Guy H. Means
Florida Geological Survey, Tallahassee, Florida
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Less than one year ago, two of us (RWP and GHM) were notified of an excavation immediately adjacent to, and in support of, the construction of the Florida Brightline Railway southeast of Orlando, Orange County. Here, a marine shell bed at the base is overlain by a 1 m thick nonmarine lens; both units are considered lower Pleistocene Nashua Formation. The section is capped by another marine shell bed considered to be the upper Pleistocene Ft. Thompson Formation. The nonmarine unit is noteworthy for containing abundant wood remains, and a rich assemblage of principally freshwater mollusks, including terrestrial species. Over three dozen species-level molluscan taxa have been identified from *in situ* bulk samples. Both the aquatic and terrestrial elements include a small number of extinct species and forms. While emphasis will be placed on these novel shells, the evolutionary status of the entire malacofaunule will be analyzed in stratigraphic, paleobiogeographic, and ecological contexts.

WILL THE REAL *MACROCYPRAEA CERVUS* PLEASE STAND UP?

Carole P. Marshall
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There are many shells with a close doppelgänger and with overlapping ranges. How do you tell them apart? Many have been synonymized, separated and synonymized again. I will give you some tips to help you tell a few of these apart. Some include how to distinguish the live animals in the field. A few pairs are: *Macrocypraea zebra – M. cervus*; *Tellinella listeri – T. Mexicana*; *Strombus alatus – S. pugilis*; *Nodipecten nodosus N. fragosus;* and *Chama macerophylla – Chama congregata; Neverita duplicata – N. delessertiana;* and a few more.

NOTES AND OBSERVATIONS ON THE GROWTH OF A TRUE TULIP (*FASCIOLARIA TULIPA*) UNDER HUMAN CARE

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The True Tulip (*Fasciolaria tulipa*) is a large marine gastropod native to the Western Atlantic Ocean and to Southwest Florida in particular. As with many other marine mollusk species, there is very little published research on the life history of *Fasciolaria tulipa*. In January and February of 2017, multiple True Tulips successfully hatched in one of the Bailey-Matthews National Shell Museum (BMNSM) aquariums, from a beach-stranded egg case. While intended to be serve as a case study on general care of and feeding in the species, one specimen is still alive at BMNSM five years after hatching.

ARCTICA ISLANDICA—A PREMIER ARCHIVE FOR PALEOCLIMATE RESEARCH IN THE NORTH ATLANTIC

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The long-lived marine bivalve, *Arctica islandica*, is commonly found from along the U.S. eastern seaboard, Iceland, the North Sea, and the entire Norwegian coastline. The incredible lifespan (>500 years) and distinct annual growth banding within the shell of *A. islandica* have made this species a prime target for paleoclimate researchers seeking to reconstruct past environments. The width and chemistry of the growth bands depend on the environmental conditions (e.g., temperature, food) each year, resulting in a historical archive of information that is preserved in the shell. In the past few decades, major advances have been made in understanding how to "unlock" this archive and discover new insight into ocean climate of the past few hundred years. This presentation will introduce *A. islandica* and the strategies researchers use to extract information from bivalve shells, including growth band measurement, crossdating, and geochemical analysis.

SEASONAL ASSESSMENT OF A LOCAL TAMPA BAY AEOLID NUDIBRANCH SPECIES, *NANUCA OCCIDENTALIS*

Erika Molina*, Julia Piper, John Ambrosio, Daniela Gutierrez Andrade, Michael Middlebrooks
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Studies of population dynamics of sea slugs are challenging because many species are rare and often difficult to observe. However, we have found a large population of *Nanuca occidentalis*, an aeolid nudibranch that specializes in feeding on hydroid polyps, in St. Petersburg, Florida. In June 2021, we launched a year-long population study of *N. occidentalis* found on colonies of the hydroid *Eudendrium carneum*. Each month, four hydroid colonies were collected and examined in the laboratory for the presence of *N. occidentalis* and other sea slugs. The size of each slug and the dry weight of each colony was recorded. The highest population of *N. occidentalis* was recorded in July with 109 specimens, and lowest in September with 9 specimens. Fifteen other species of heterobranch sea slugs have also been found inhabiting the hydroids. This study represents a rare opportunity to determine the seasonal variation in the population of a nudibranch.

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DEEP BLUE SEA AND TINY SHELLS—MOLLUSKS FROM FLORIDA BIOGENIC OOZES

Anton E. Oleinik*
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Claudio Zucarelli
JLA Geosciences Inc., Jupiter, Florida
*aoleinik@fau.edu

Sediments collected on Pourtales and Miami terraces and the Blake Plateau in depths of 400 to 792 m, during the submersible dives around South and Eastern Florida reveled the existence of localized sediment drifts of biogenic sediments or hemipelagic oozes composing primarily of a mix of foraminifera and mollusks. Mollusks and foraminifera-rich sediments are being trapped by deep sea lithoherms of ahermatypic coral mounds composed primarily of species of *Lophelia* and *Stylaster* corals, forming localized sediment drifts. Eighteen foraminifera, 15 pteropod, and 11 gastropod species were identified in the thanatocoenosis. The most abundant pteropod species are *Limacina inflata*, *Creseis acicula*, and *Styliola subula*. The majority of gastropod specimens appear to be juveniles. The grain size and composition of hemipelagic oozes are strongly influenced by the proximity to the coast, and Gulf Stream transport. Some samples show signs of diagenetic alteration from aragonite to calcite with traces of dissolution.

MORPHOMETRIC AND ANATOMICAL DATA SUPPORT BOTH NARROW ENDEMISM AND MULTI-ARCHIPELAGIC DISTRIBUTIONS WITHIN *PARTULA* TREE SNAILS OF PAPUA NEW GUINEA AND THE SOLOMON ISLANDS

John Slapcinsky*
Florida Museum of Natural History
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Cindy S. Bick, Diarmaid Ó Foighil
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Partula with their attractively banded polymorphic shells are among the best studied oceanic tree snails and, unfortunately, also among the most endangered. However, partulids of Papua New Guinea and the Solomon Islands, remain understudied and their taxonomy is unstable. Sampling from 2000–2016 allows comparative conchological, anatomical, and molecular analyses. The current taxonomy of the group is not supported by morphometric analyses of shells. Similarly, reproductive morphology supports the presence of only four regional species. Two species of *Partula* are found in Near Oceania: *P. cramptoni*, is endemic to the Rennell Archipelago and *P.* grisea, has an unusual multi-archipelagic distribution, often on small low islands and in coastal villages and not in native forests. Two more species are found in the Santa Cruz Islands, one of these *P. vanikorensis* is a single island endemic and the other, *P. auraniana*, is found in both the Santa Cruz Islands and Vanuatu.

Location of 5:30 PM dinner venue:

George & Wendy's
2499 Periwinkle Way, Sanibel, FL 33957
(corner of Tarpon Bay Rd., next to Bailey's General Store)
(239)395-1263