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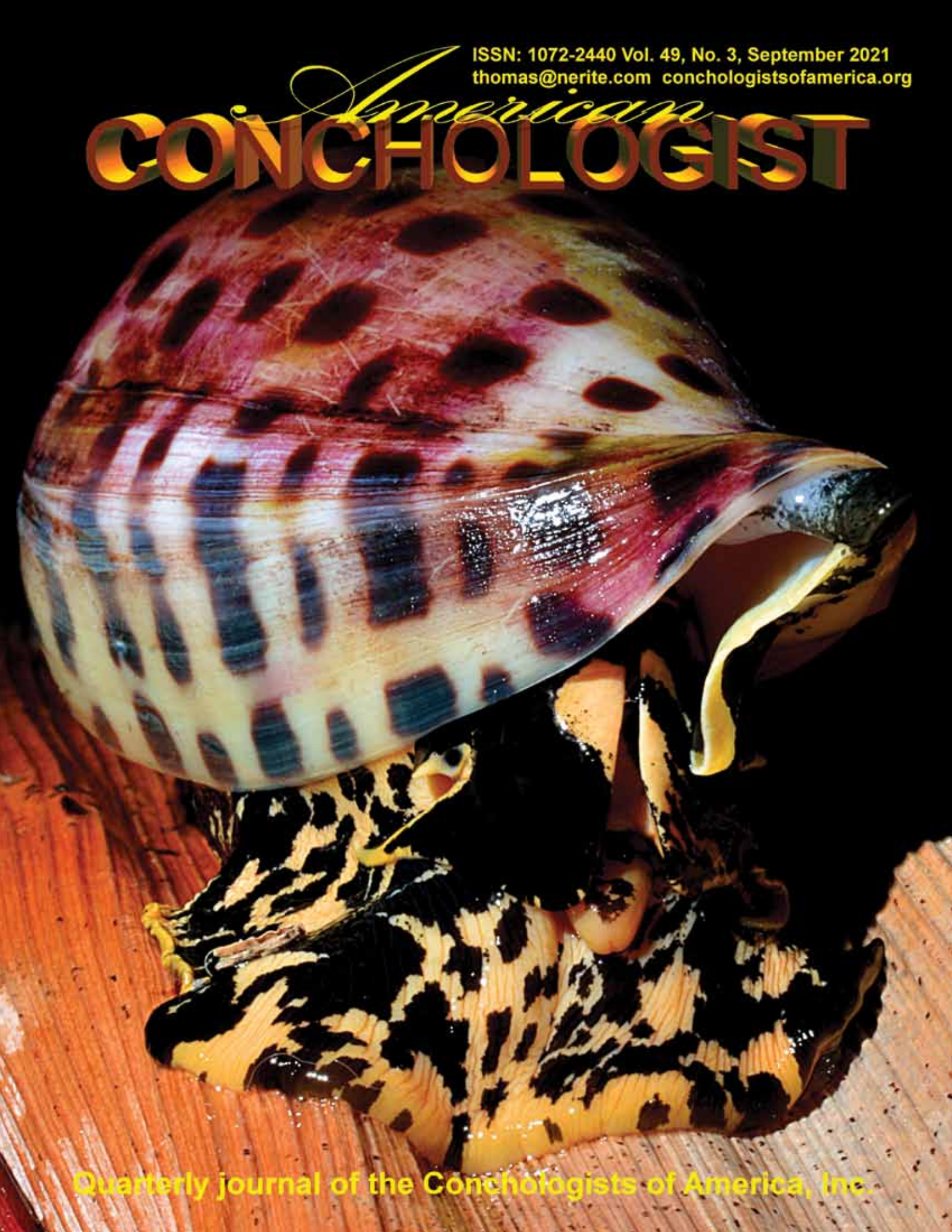
American CONCHOLOGIST



Quarterly journal of the Conchologists of America, Inc.

CONCHOLOGISTS OF AMERICA, INC.

In 1972, a group of shell collectors saw the need for a national organization devoted to the interests of shell collectors; to the beauty of shells, to their scientific aspects, and to the collecting and preservation of mollusks. This was the start of COA. Our membership includes novices, advanced collectors, scientists, and shell dealers from around the world. In 1995, COA adopted a conservation resolution: Whereas there are an estimated 100,000 species of living mollusks, many of great economic, ecological, and cultural importance to humans and whereas habitat destruction and commercial fisheries have had serious effects on mollusk populations worldwide, and whereas modern conchology continues the tradition of amateur naturalists exploring and documenting the natural world, be it resolved that the Conchologists of America endorses responsible scientific collecting as a means of monitoring the status of mollusk species and populations and promoting informed decision making in regulatory processes intended to safeguard mollusks and their habitats.

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BACK ISSUES are available from Karlynn Morgan, COA President. Prices: prior to 1999, $3 each, 2000 to 2008 $4 each, 2009 to current, $5 each; postage extra.

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In This Issue

Editor's comments: *mea culpa*! In the last issue (June 2021), on pages 22-23, figs. 1 & 3, the snails identified as *Cepaea vindobonensis* are mislabeled and should be labeled *Caucasotachea vindobonensis*. Apologies to the author, Susan Hewitt.

In this issue we cover the 2021 COA Convention, an exciting new shell book, unusual photography of Terebridae, a fictional account of the search for *Cymbium pepo*, the COA Lifetime Achievement Award for Donald Dan, *Neptunea* Award results for 2020 and 2021, a new COA membership challenge, the 2021 COA Academic Grant Report and individual awardee reports, and a taxonomic examination of a popular western Atlantic cassid. Enjoy...

Front cover: *Scaphella junonia* (Lamarck, 1804), photographed at the Bailey Matthews Shell Museum, Sanibel, Florida, by COA member Charles Rawlings. Long a favorite of collectors, it was once a rather difficult shell to obtain. There are five subspecies in WoRMS and only a single synonym (discounting the original designation, *Voluta junonia*). An online search turned up plenty of shell images, but none of the living animal. Once again Charles introduces us to a more complete 'picture' of a molluscan species.

***S. junonia* display at the Bailey Matthews Shell Museum.**

Back cover: another photo by Charles Rawlings. This time a rather striking ovulid, *Simnialena rufa* (G.B. Sowerby I, 1832) (originally *Ovulum rufum*, then *Simnia rufa*). This small (10mm) ovulid was photographed by Charles during a recent (2021) trip to La Paz, Mexico, at 70 feet with current, at La Reyna, off Cousteau's Island (Isla Cerralvo), south of La Paz.

***S. rufa* specimen from the Yale Peabody Museum by E.A. Lazo-Wasem. Reproduced IAW Wikipedia Commons.**

COA Melbourne Convention ~~2020~~ 2021

Thomas Eichhorst (images by Beverly Dolezal)

Alan Gettleman, Phyllis Gray, Anne Joffe, and every COA member who made the COA Melbourne Convention a success deserve accolades, thanks, and the sincere appreciation of convention attendees. Planning for a convention for a few years, working hard to set one up for over a year, and then having Coronavirus (COVID-19) pull the rug out during final preparations had to be frustrating, if not heartbreaking. So 2020 was a bust and our intrepid planners could not be sure of 2021, until the final few months. They planned a full convention, including the application of sensible COVID restrictions. And then they made it work. The 2021 COA Convention in Melbourne, Florida, was a ringing success. Well done and thanks from a grateful COA!

There were, of course, a few issues and bumps in the road. The absence of foreign dealers at the bourse was a disappointment, although it was a full bourse. There was also a lower than normal attendance for a Florida convention and we didn't quite fill the contracted hotel rooms (see the sidebar by Anne Joffe). And that was pretty much it! The auction shells were of great quality and quite diverse; the programs were well done, educational, and interesting; the social events were well attended and seemingly enjoyed by all; and the business meeting resulted in a new slate of COA officers ready to carry on the business of COA.

I was personally unable to attend, but Beverly Dolezal sent me a thumb drive packed with images of the convention. Thank you Beverly.

Please plan now on attending the **2022 COA Convention in Galveston, Texas - May 30 through June 4, 2022**. This somewhat isolated beach area is full of great places to eat, great places to shop, and great places to just relax and enjoy the view. It should be a fun time - see you there.

Snail parade

Clockwise from above: 1. Phyllis Gray won First Place for her snail using an actual shell, 2. Jan & John Reeves won People's Choice with their "Drafting at Daytona," and 3. Snail of Show was a snail carving belonging to Dave Green.

COA 2021 Board (Left to right): José Leal (Outgoing Immediate Past COA President - heck of a title), Linda Powers (COA Membership), Anne Joffe (COA Convention Coordinator), Alan Gettleman (COA Historian), Harry Lee (Immediate Past COA President), Karlynn Morgan (COA President), Bruce Neville (COA Trustee & Endowments Director), Vicky Wall (COA Awards Director), Tom Ball (COA Member at Large and Academic Grants Chairman), Steven Coker (COA Treasurer), Everett Long (COA Vice President). Not shown: Thomas Eichhorst (*American Conchologist* Editor) and Amelia Ann Dick (COA Secretary).

Why stay at the convention hotel???

Anne Joffe

As the membership of COA dwindles, our annual convention grows smaller. This past convention in Melbourne, Florida, has shown us an upcoming scenario and a trend to the future.

Here is some of what is involved when we put on a convention. Three years out from the actual year, I negotiate with a hotel in the host city. Rental for the meeting rooms, bourse ballroom, silent auction and its pick up room, and a registration area; all these cost money, and in most cases, about $12,000 per day. When I book out the hotel room nights, I have to guesstimate how many will actually stay in the hotel, how many will attend the banquet, the welcome party, and the consumption of food and beverage - we then come up with a number of rooms and a price to meet for our convention package. The contract is signed and it is COA's responsibility to meet these figures.

If we fail to meet the forecast numbers for rooms, or food and drinks, **COA is liable for the costs**. This is what happened in Mobile in 2009, and it cost the organization well over $30,000 in penalties. Since then, I was put in charge of seeing this does not happen ever again.

This past meeting was unique. Covid hit and the convention had to be moved back a year, but the contract stayed the same. We still needed to meet the original requirements. So it actually was negotiated 4 years out. Of the 135 attendees registered for the convention, 58 stayed in a different location. Since this was the least expensive hotel room rate in the past 9 years, why and what caused this shortage? I heard every excuse and I understand some of them, but the root of the issue is that we were not going to meet the hotel room requirement, putting us once again at risk for penalty. That, plus the fact that no foreign dealers would be able to attend (and we all know they stay at the hotel), put us in dire straits.

Many used Hilton points to either book the whole stay or upgrade using points. We get no credit for this. Some used Expedia, Trivago, or Hotels.com to book, trying to find a less expensive rate; again, we get no credit. Some just booked a room and did not give the code! Remember, all the meeting space for the programs, the parties, the auctions, and the bourse is based upon our meeting the contract requirements. Yes, you can find a less expensive price in other hotels, BUT, COA IS THE LOSER. The cost of the room gives COA all the perks and free meeting space.

Next year, the Moody Gardens is a private facility, so no one can use hotel points. Once again, we need to meet the room nights. Please, Please, consider this when you book in the hotel. You MUST use the code of COA 2022 to give us full credit.

If you have any problem with hotel bookings, please contact me at **sanibelchiton@aol.com**. I will gladly intervene to provide any help needed.

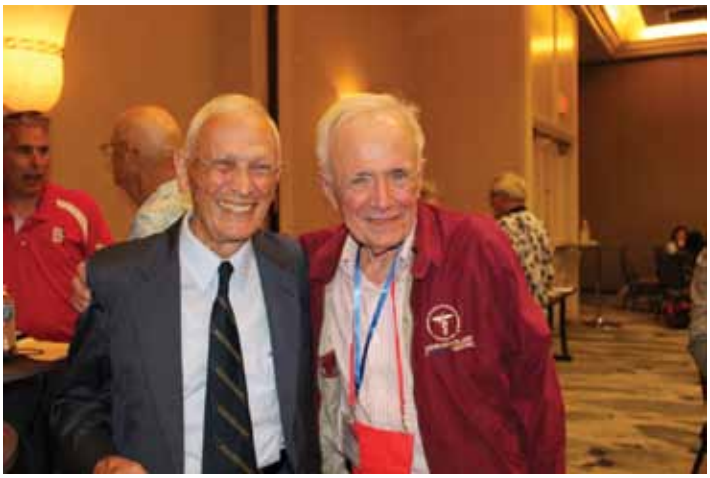
This same issue will happen again in Wilmington when we are back at a Hilton. We need each attending member to step up to support our organization.

Anne Joffe - COA Convention Coordinator

Socializing

José Leal & Kim Nealon

Bernice & Gary Schmelz



Wycliffe Hoffler MD (left, 40 years at NASA, guest speaker) & Alan Gettleman (right, put together a great convention).

Bill & Carol Lyons

Bob & Alice Pace

Dave & Jody Watts

Duane Kauffman

Jeanne & Don Pisor

Jeannette Tysor & Ed Schuller

June Bailey, Bev Dolezal (our photographer for this article) & Andrea Hutchinson

Linda & Dave Green

Linda & Jim Brunner

Vicky Wall (COA Awards Director)

Anne (COA Convention Coordinator) & David Joffe

Mary Jo & Ron Bopp

Rapt attention during a program.

The bourse

Bev Dolezal

Brian Hayes & Greg Curry

Scott & Shiela Robichaud

Dave & Jody Watts

Don & Jeanne Pisor

Kim & Paul Lamb

Leslie Crnkovic

Linda & Kevan Sunderland

Linda Zylman & Emma Varland

Randy Allamand

Rex Stilwill

Jody Watts with the 22 mm, sterling silver, diamond studded, lion's paw pendant raffle prize donated by Donald Dan.

How do you put on a convention in a pandemic?

Alan Gettleman

Every aspect of the long pandemic and response presented untold challenges without answers. In 2020 convention registrar Marsha Kirtley and treasurer Linda Green received scores of registrations and then had to shut down the convention and return the registrations. In December 2020, they started the process over again.

Many untold hours occurred to try to anticipate what health restrictions of March would be in effect in mid-June. We knew there was an increasing number of people getting COVID vaccinations but would it be enough? What restrictions would be required on number of attendees, social distancing, seating for Welcome Party and Banquet, bus seating for a field trip or would some have to be cancelled?

COVID 19 precautions affected the three planned field trips the most. We had to request spaces from the Sea Turtle Preservation Society long before the convention. Fortunately, everyone who wanted to go went. Their reward: two nesting turtles laying eggs at midnight in the rain. Turtle folks seem as hardy as diehard shellers. Unfortunately, no photographs were allowed so as not to disorient the turtles. Our fieldtrip to Harbor Branch Oceanographic Society had to be cancelled as they never reopened to visitors after the COVID shutdown.

We did have a bus to the Kennedy Space Center Visitors Center. The center is a place of interest and entertainment equal to any Disney or SeaWorld attraction, but with science and the thrill of human exploration of space.

The convention hotel was great with specific requirements and cleaning protocols. They did show us they could accommodate our organization with tables set further apart and fewer chairs at each.

We had fewer helpers as the host club is a small club. Our attendees were very patient with the host club, realizing we had to improvise for the conditions. Annual events continued such as the shell club tables, the Club representatives meeting, and the always popular silent and oral auctions.

Our speakers were fantastic with great science programs and a special program on the space program. A popular favorite was a video on underwater diving for shells in Hawaii by Dave Watts. Dave had a very small but advanced camera that really did make you feel as if you were there.

Our Banquet speaker continued the recent tradition to provide a program on a subject other than shells. Dr. Wycliffe Hoffler was a NASA physician and gave a riveting program of his participation on many of the Navy ship recoveries for the Apollo mission including Apollo 11. Dr. Hoffler, when asked, indicated he thought Neal Armstrong, first person on the moon, was his favorite.

Screen capture of the author explaining how the 2021 convention would incorporate COVID restrictions and precautions into the daily operations of the convention.

The Bourse was different without international dealers, who could not travel to the U.S. This allowed several new dealers to participate. The Bourse, always a favorite activity, was really appreciated by attendees.

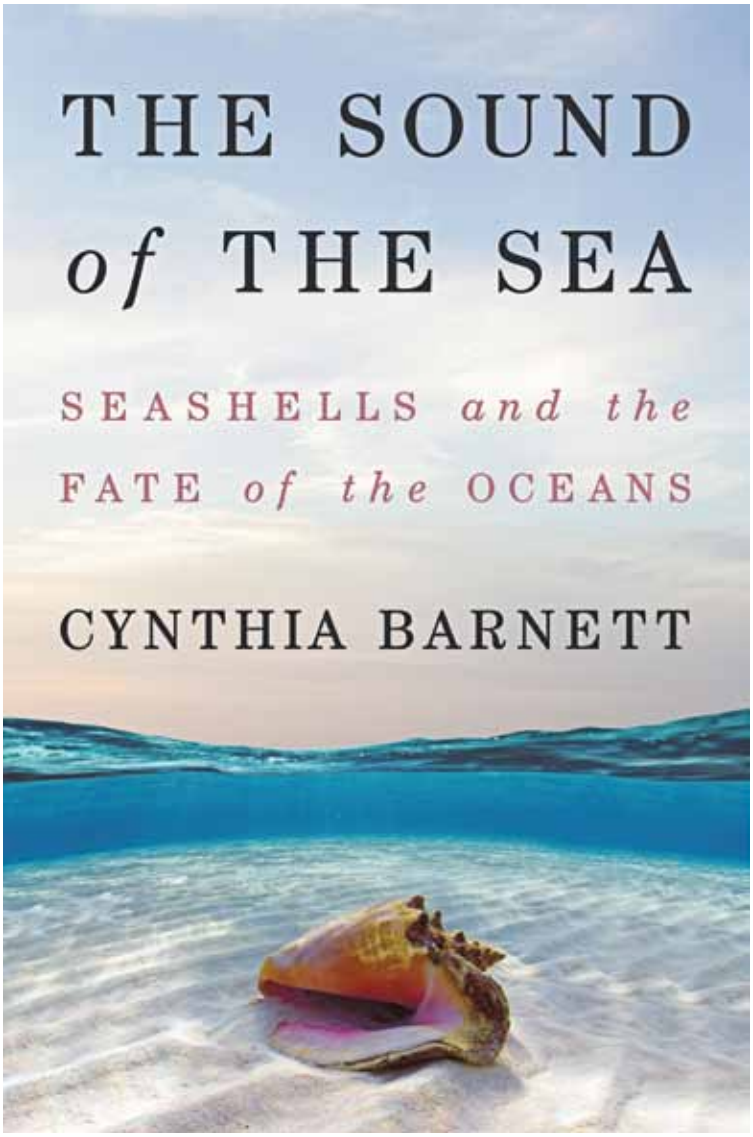
The 143 registered COA participants demonstrated we could safely and successfully meet. One offered the review: "They had fun!" This bodes well for the 2022 larger convention in Galveston, Texas, in early June. This return to a full convention with foreign participants promises to be a great event.

As for the 2021 convention, I extend my sincere and heartfelt thank you to all of the volunteers and attendees for making our convention such a success.

"The Sound of the Sea: Seashells and the Fate of the Oceans"

by Cynthia Barnett

ISBN-978-0-393-65144-7
W.W. Norton & Co., New York & London,
2021, pp. 417, $23.06 – hardcover, 14.16 – Kindle



This is an incredible book written by a most talented and accomplished writer. Cynthia Barnett (author of three previous books, including National Book Award-longlisted "Rain") takes the reader from the discovery of shelled organisms formed 800 million years ago through the pre-history and history of man and mollusks right up to the present. Along the way she stops at most every significant bit of history in our relationship with shelled mollusks. These stops are fairly well-known to most of us with some familiarity of the subject, but the details, side excursions, and rich narrative will provide something new for every reader. All of this is based on, and backed up with, interviews, quotes, and research results from the actual people involved. COA readers will recognize many of the names: from past luminaries like Henry Pilsbry, Bill Clench, and R. Tucker Abbott, to present workers in the field like Geerat Vermeij, José Leal, Paul Callomon, and Harry Lee. There are, however, scores of other names, each an expert in his or her field, that our author researched and often interviewed or corresponded with, in museums, public and research aquariums, and on boats, in order to bring an unparalleled completeness to her research and writing. This is a superbly researched and thoroughly documented book, covering a complex subject from many different aspects, **BUT**, it reads like a fascinating adventure story. The author takes what could be rather dry scientific facts and history and presents them with an unsurpassed duality – accurate and detailed enough for a professional well-versed in the subject, while at the same time clear, understandable, and interesting to an amateur. This is a really important point. If you are a member of COA, if you have any interest in conchology, malacology, or picking up worn beached shells, then you will find this book both enjoyable and informative.

"The Sound of the Sea" has three main sections and a total of 14 chapters. The chapters have headings like: "Shell Money," "Shell Oil," and "Saving the Queens." Each of these does indicate a topic in the respective chapter, but there will also be a multitude of related side excursions and obscure (but often very important) issues and facts interwoven into a central theme. A section of "Author's Notes" provides both formal references and explanatory notes. There is also an extremely complete index – useful later when you grab this book off the shelf to look up a shell related issue.

From the online Amazon review: "From the eerie calls of early shell trumpets to the evolutionary miracle of spines and spires and the modern science of carbon capture inspired by shell, Barnett circles to her central point of listening to nature's wisdom—and acting on what seashells have to say about taking care of each other and our world." I cannot overstate how important this book is. For the price of fast food for two, you can share the author's wonder and love of the world of shells and learn a thing or three.

Tom Eichhorst

The view from the top

Yves Terryn and Simon Aiken

originally published in *Pallidula* vol. 51, no. 1, April 2021;
adapted with permission from *Pallidula*
(The British Shell Collector's Club: http://www.britishshellclub.org)

We humans have an innate fascination with the natural world. For taxonomists, this interest is intertwined with our quest for logical and mathematical patterns. As shell collectors, we nurture this logical-mathematical part of our brains by saturating ourselves with the many forms that mollusks have to offer, coupled with the challenges of obtaining the specimens and identifying and curating them. The judgmental call of organizing our collections (or nature, for that matter) by categorizing morphospecies and groups of different species into a systematic arrangement incites that logical and mathematical part of our brains.

Generally, our observations of marine gastropod shells are characterized by a number of 'views' of a given specimen. Foremost we absolutely require a complete overview, which is most often the ventral side. The ventral view offers valuable information on the aperture, columella, and canal. (An interesting exception to this may be the cowries, where we focus much of our judgment on the dorsal view.) As we proceed to more detailed examination, we study the spiral and axial sculpture, the whorl outline, the protoconch, the suture, *etc*.

Prof. Geerat Vermeij (University of California, Davis) has emphasized the importance of the adapical view of mollusks, and in particular of burrowing mollusks. The features of the adapical side (including the columella and basal plate) are the first part of the shell to come into contact with the substrate upon burrowing. The adapical side is important for both growth and motility, and it could be a key feature in taxonomy because of its relationship to the shell's environment (sediment particle size, shape, composition, sediment density, depth, prey/predator, *etc*).

Unfortunately, the apical view is neglected, perhaps because it often offers little detail not seen in the ventral and dorsal views. Illustrations of a gastropod's apex are usually limited to the depiction of the protoconch and first teleoconch whorls, in order to measure the expansion rate and width of the protoconch. It is not a simple task to produce a true apical view, converting a 3-D object into a 2-D image. The challenge is always to find a suitable working distance that maintains the required level of detail. The equipment for digital macrophotography, however, has become cheaper, and 'stacking' software has largely eliminated the traditional problems of depth-of-field. Anyone who holds a camera close to a shell and tries to focus will soon realise that it is hard to get the entire shell in-focus. Using a small aperture (high f-number) will help to some extent, but many shells are still infeasible to photograph by this traditional method. The most challenging shells to photograph apically are those with a low width/length ratio; but such photography can often reveal elaborate and diverse sculptural features. The most troublesome gastropod families in this regard include the Turritellidae, Pyramidellidae, and Clausiliidae; the Terebridae could be considered the most difficult of all.

On the following 4 pages we present test photographs of 31 Terebridae species, in apical view for the first time. The almost circular 2-dimensional projections of these elongated, slowly-expanding helicoidal shells are pleasing to the eye, and satisfy our naturalistic and mathematical curiosity. We immediately recognize the characteristic expansion of the Archimedean spiral in the continuation of the suture. The arrangement of the sculpture could even be enumerated by Vogel's model for the Archimedean equation.

A typical example of this is the arrangement of the seeds in a sunflower (*Helianthus*) head, which is strikingly similar to the dispersal of sculpture in *Punctoterebra succincta* (page 16), *Terebra neglecta* (page 18), and *Myurella fortunei* (page 19). As for the *Hastula* species, their sculpture is often limited to axial striae, and their apical views show a discrete patterning as well (page 17). This contrasts with the arrangement of the relatively coarser sculptures of *Neoterebra angelli* (page 16) and *Myurella mindanaoensis* and *M. suduirauti* (page 19), which are almost reminiscent of some succulent plant species (*e.g.* genus *Aloe*). Another mathematical phenomenon can be seen in *Partecosta tenera* (page 16), in which the axial ribs connect to those on the previous whorl. In the 2-D representation, it appears a fairly simple equation with a beautiful result, but it may be challenging to enumerate it in its actual 3-D expanding helicoidal shape.

The apical view may turn out to be an additional useful tool for species identification, taxonomy, and ethology, for Terebridae and for other gastropod families. There is no doubt that we will intensify our future efforts to document Terebridae in this manner.

Terebridae specimens >*c.*30mm length were photographed with a macro lens (**1**; Sigma® 105mm, aperture typically f/14) on a photographic copy stand (**2**; Kaiser®). All backgrounds are black velvet (**3**), but the specimen (**4**) is centered in an all-white nylon cube (**5**). The light sources are four flashguns positioned *outside* the cube (**6**), each with a diffuser (**7**). This gives an 'even' light with no harsh shadows. The flashguns (Nikon® SB-R200) are synchronized by a wireless (infra-red) commander unit (**8**; Nikon® SU-800) mounted on the camera (**9**; Nikon® D3200), which is fired by an infra-red control (**10**).

Typically 15–18 individual photos are required for each specimen, and the focus is adjusted slightly each time, stepping down from the protoconch to the body whorl. Two fiber-optic lights (**11**) are purely for the convenience of focusing. The individual photos are 'stacked' using Helicon® software, which essentially detects which portions of each 'slice' are in-focus. Perspective is adjusted in Adobe® Photoshop®. The smaller Terebridae were typically photographed with a trinocular microscope rather than a copy stand.

The apical views of all 32 shells are shown 'to scale' on page 17. The numbering is the same as for the protoconch illustration on page 16. This illustration gives a sense of the scale relative to a US quarter.

Reference:

Vermeij, G. 2018. Shell function and the history of life: an arena and bedrock of evolution. *The Malacologist* 71: 12 (abstract for the 125th anniversary symposium of The Malacological Society of London.) http://malacsoc.org.uk/wp/wp-content/uploads/2018/10/The_Malacologist_Vol_71.pdf

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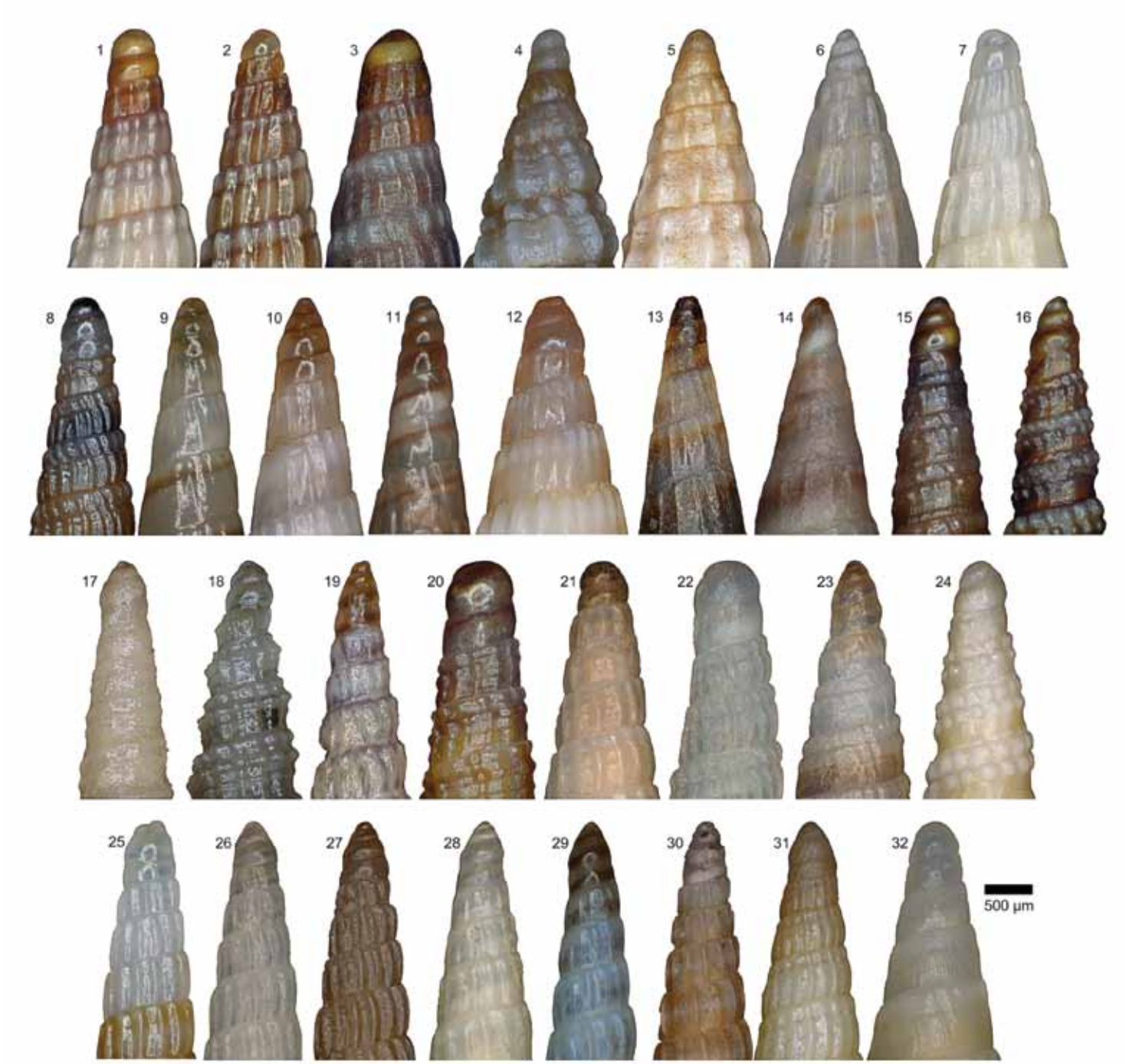
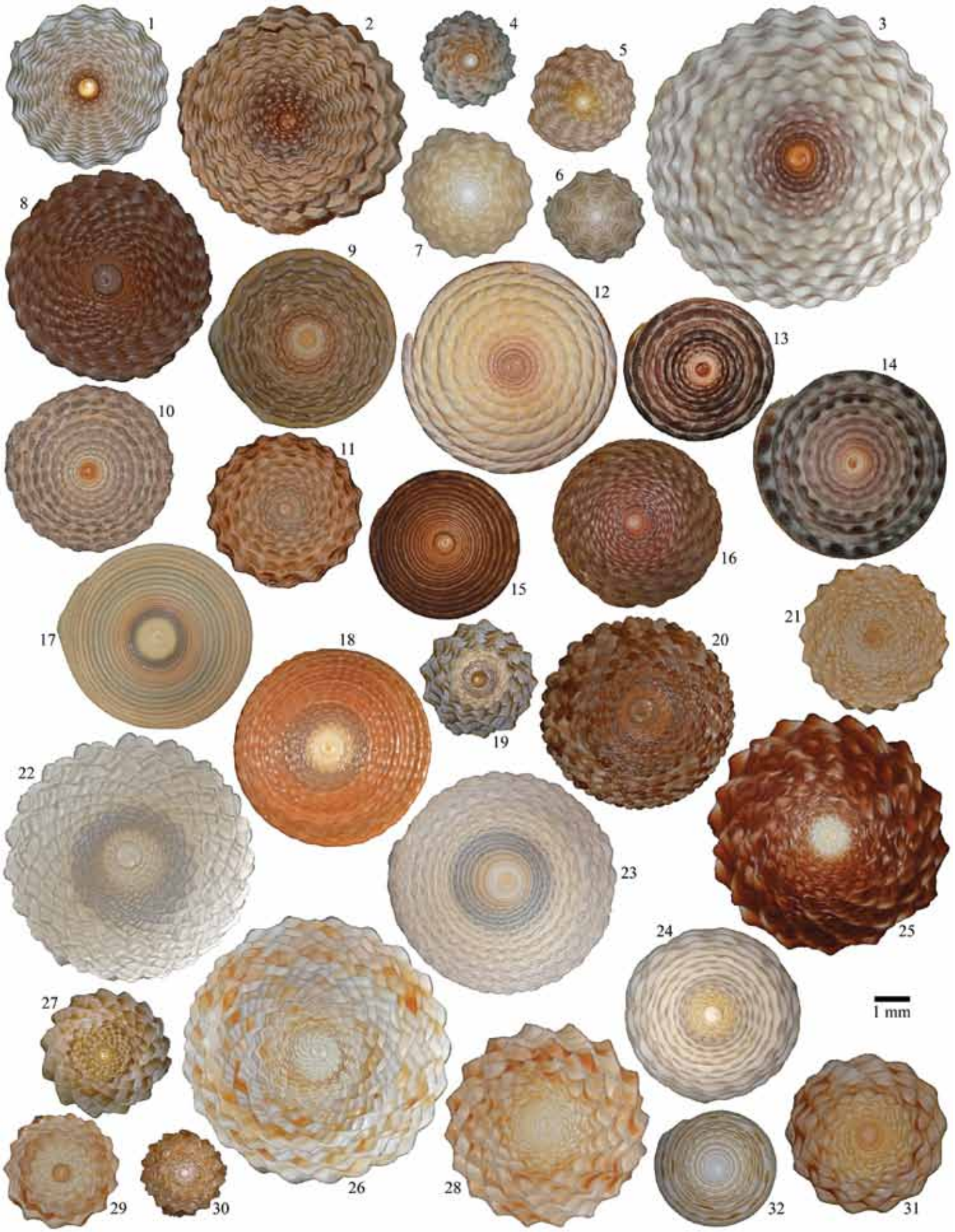


Traditional views of the protoconchs of the Terebridae species used for apical photography. 1. *Duplicaria crakei* (Western Australia, 18.7mm); 2. *D. duplicatoides* (Thailand, 26.6mm); 3. *Neoterebra dislocata* (Florida, USA, 35.8mm); 4. *N. angelli* (Venezuela, 8.5mm); 5. *Partecosta* aff. *herosae* (South Africa, 9.3mm); 6. *P. tenera* (Pakistan, 10.2mm); 7. *Gradaterebra* (?) *capensis* (South Africa, 12.4mm); 8. *Punctoterebra succincta* (Philippines, 30.7mm); 9. *Hastula cuspidata* (Angola, 28.7mm); 10. *H. leloeuffi* (Angola, 22.9mm); 11. *H. lepida* (Senegal, 23.5mm); 12. *H. albula* (Madagascar, 25.4mm); 13. *H. luctuosa* (Pacific Panama, 18.4mm); 14. *H. salleana* (Florida, USA, 23.0mm); 15. *Terebra anilis* (Philippines, 24.4mm); 16. *T. anilis* (Philippines, 31.2mm); 17. *T. laevigata* (Philippines, 34.6mm); 18. *T. jenningsi* (Philippines, 38.4mm); 19. *T.* aff. *noumeaensis* (Philippines, 17.5mm); 20. *T. neglecta* (Philippines, 33.5mm); 21. *T. levantina* (Philippines, 22.9mm); 22. *T.* aff. *subtextilis* (Philippines, 44.5mm); 23. *T. elliscrossi* (Philippines, 34.6mm); 24. *T. aikeni* (Solomons, 28.4mm); 25. *Myurella mactanensis* (Philippines, 51.2mm); 26. *M. fortunei* (Philippines, 59.4mm); 27. *M. suduirauti* (Philippines, 23.8mm); 28. *M. mindanaoensis* (Philippines, 29.2mm); 29. *M. multistriata* (Philippines, 24.2mm); 30. *M. brunneobandata* (Philippines, 14.3mm); 31. *Myurellopsis parkinsoni* (Hawaii, 23.3mm); 32. *Oxymeris swinneni* (Cape Verde, 12.3mm).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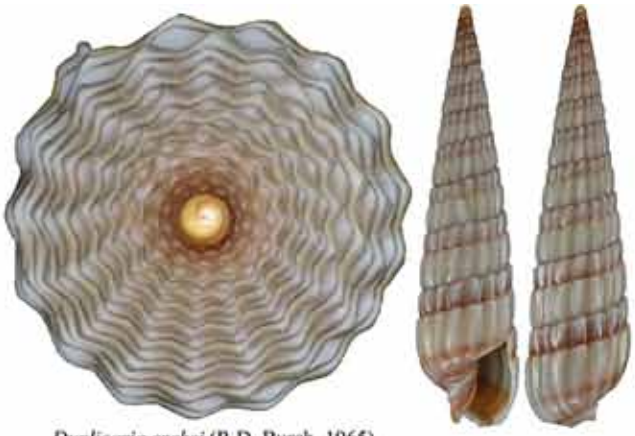
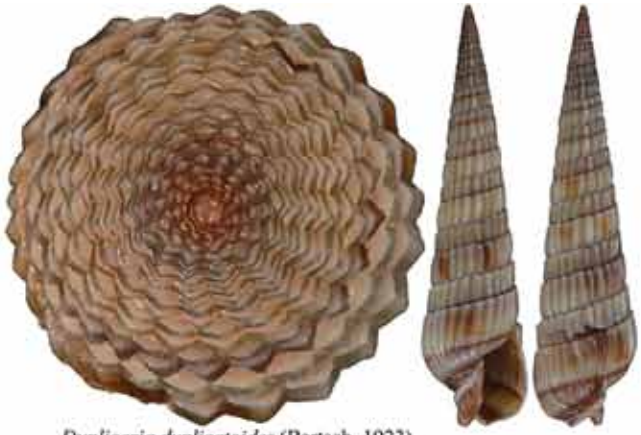
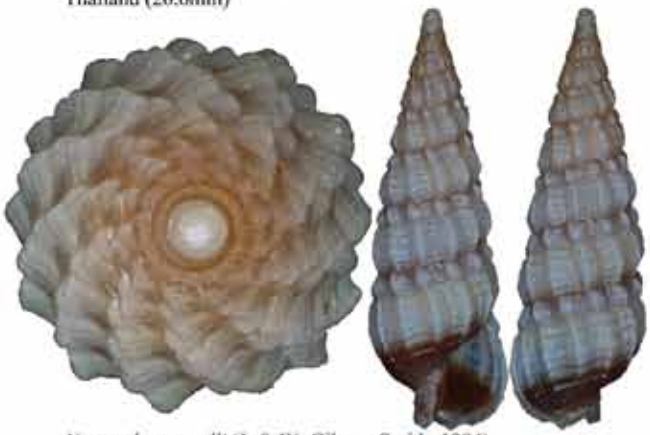


Duplicaria crakei (R.D. Burch, 1965)
Western Australia (18.7mm)



Duplicaria duplicatoides (Bartsch, 1923)
Thailand (26.6mm)

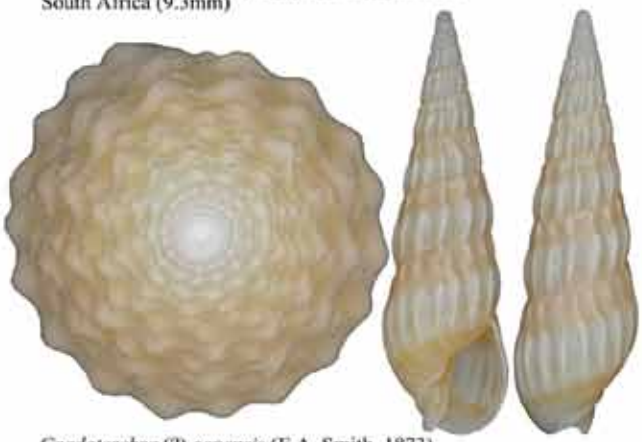
Neoterebra dislocata (Say, 1822)
Florida, USA (35.8mm)



Neoterebra angelli (J. & W. Gibson-Smith, 1984)
Venezuela (8.5mm)

Partecosta aff. *herosae* (Terryn & Rosado, 2011)
South Africa (9.3mm)

Partecosta tenera (Hinds, 1844)
Pakistan (10.2mm)



Gradaterebra (?) *capensis* (E.A. Smith, 1873)
South Africa (12.4mm)

Punctoterebra succincta (Gmelin, 1791)
Philippines (30.7mm)

Hastula cuspidata (Hinds, 1844)
Angola (28.7mm)

Hastula leloeuffi Bouchet, 1983
Angola (22.9mm)

Hastula lepida (Hinds, 1844)
Senegal (23.5mm)

Hastula albula (Menke, 1843)
Madagascar (25.4mm)

Hastula luctuosa (Hinds, 1844)
Pacific Panama (18.4mm)

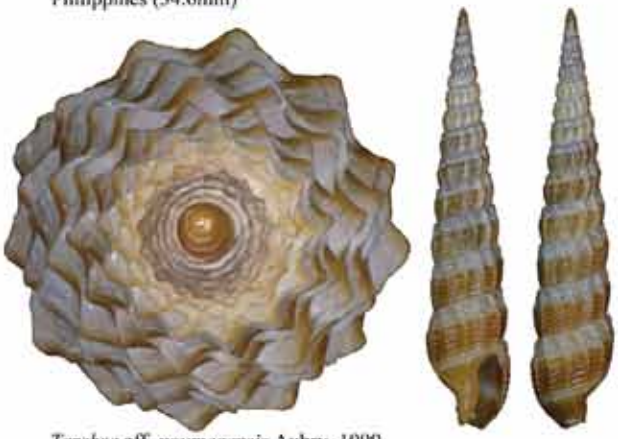
Hastula salleana (Deshayes, 1859)
Florida, USA (23.0mm)

Terebra anilis (Röding, 1798)
Philippines (24.4mm)

Terebra anilis (Röding, 1798)
Philippines (31.2mm)

Terebra laevigata Gray, 1834
Philippines (34.6mm)

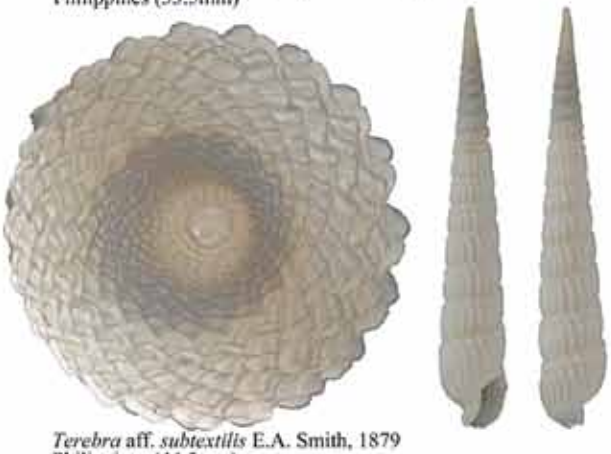
Terebra jenningsi Burch, 1965
Philippines (38.4mm)



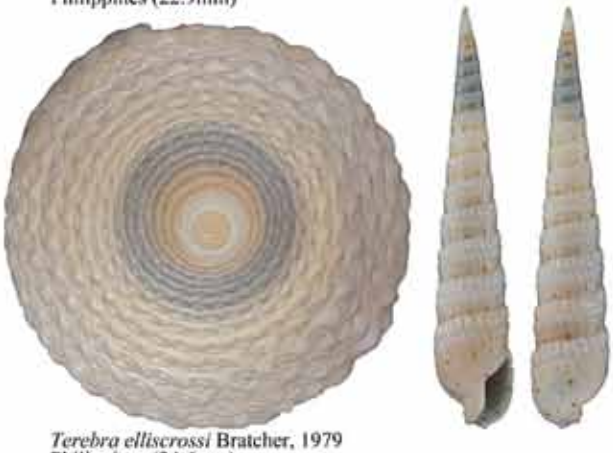
Terebra aff. *noumeaensis* Aubry, 1999
Philippines (17.5mm)

Terebra neglecta (Poppe, Tagaro & Terryn, 2009)
Philippines (33.5mm)

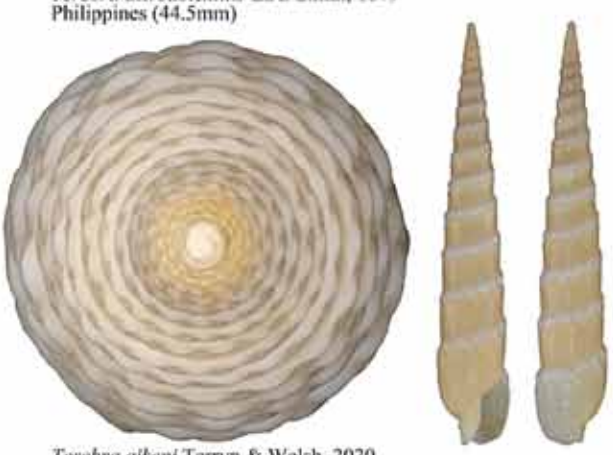
Terebra levantina Aubry, 1999
Philippines (22.9mm)



Terebra aff. *subtextilis* E.A. Smith, 1879
Philippines (44.5mm)



Terebra elliscrossi Bratcher, 1979
Philippines (34.6mm)



Terebra aikeni Terryn & Welsh, 2020
Solomons (28.4mm)

Myurella mactanensis (Bratcher & Cernohorsky, 1982)
Philippines (51.2mm)

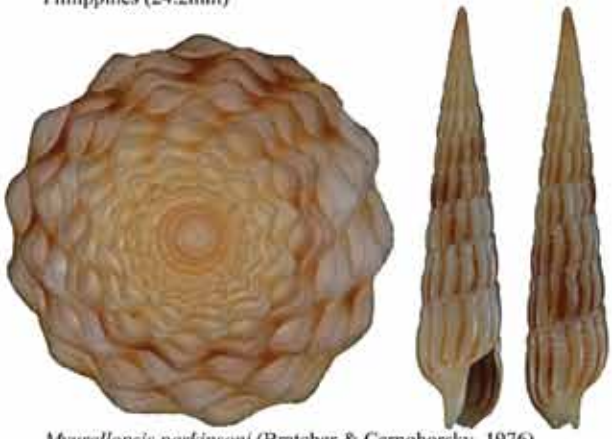
Myurella fortunei (Deshayes, 1857)
Philippines (59.4mm)

Myurella suduirauti (Terryn & Conde, 2004)
Philippines (23.8mm)

Myurella mindanaoensis (Aubry, 2008)
Philippines (29.2mm)

Myurella multistriata (Schepman, 1913)
Philippines (24.2mm)

Myurella brunneobandata (Malcolm & Terryn, 2012)
Philippines (14.3mm)



Myurellopsis parkinsoni (Bratcher & Cernohorsky, 1976)
Hawaii (23.3mm)

Oxymeris swinneni Terryn & Ryall, 2014
Cape Verde (12.3mm)

An enlightenment: a fictional account of the search for *Cymbium pepo*

Sally Gray-Nottage

Bill sat with his back to the mullioned windows. Though a nice example of Romanesque architecture when viewed from the outside, they allowed too much of the sun's heat into his office. Wearing his standard professor attire: black suit, black leather shoes, white dress shirt, and the essential bow tie – he was overly hot. On the other hand, the rays provided a beautiful luminous color; they emitted a golden glow reminding him of light shining through a halved chambered nautilus. Although the nautilus was not a perfect golden spiral, he was drowsy enough to feel hypnotized as the rays appeared to spread out in an ever largening circle produced from the stained-glass design above the window's arch. He was pleasantly lost in his thoughts when his phone rang; interrupted, he responded with a terse "Bill Clench here." Speak a little louder, he thought. "Yes, you've reached the curator of Harvard's mollusk collection." He began to flip through a stack of research assistant applications on his desk. "Who wants to speak with me? Tucker Abbott?" Hearing the name Tucker snapped him out of his reverie bringing an immediate smile to his face. "Of course! Put him on."

"Mumbling, " was the only response Bill could hear.

Bill said authoritatively, "Tucker, speak up! How's the Delaware Museum treating you?"

Tucker apologized. "Sorry Bill!" he said. "I'm eating on the run. The museum is treating me fine, but I have an important favor to ask of you. I realize this is last minute."

"That's ok, Tucker. Anything for my favorite protégé!"

Tucker began to talk while chewing, trying not to mumble. "Remember part of my doctorial research dealt with locating the habitat for *Cymbium pepo* ([Lightfoot], 1786) - the African Neptune Volute? The habitat continues to remain a mystery. After years of searching, I think I have a real deal lead from a Senegal contact, but I need your help – fast. Do you have a field expert that can meet a group of amateur collectors in Dakar next week?" Bill tried to respond, but Tucker quickly continued. "The group has space for one more traveler, and the Delaware approved the funding."

Bill liked that Tucker's enthusiasm hadn't diminished one bit. "Today is your lucky day! You might recall my mentioning Dian Augustine Leakey last year? She recently contacted me to see if I had any work for her. Somewhere on my desk is her contact letter. I was just looking for an article she wrote on a new prehistoric site in North Wales, a snail cave rock shelter – she found a pierced cowry in a midden when the shelf floor was excavated. I bet it was used for money and not food. I wonder what other mollusk shells there might be."

Tucker excitedly broke in. "Bill, she may be the perfect choice!"

Bill ignored the interruption and continued describing her latest work. "You know the place, the Great Orme headland area. She holds a degree from Oxford, PhD. in both archeology and marine biology, with a special interest in malacology. She is a hard worker – extremely focused and detail oriented. She lives on Anglesey Island off NW Wales, but I bet we can connect her to Dakar through London Heathrow Airport since direct flights depart to Dakar all the time. Booking the four-hour flight from Wales to London will be trickier. I'll call her immediately to confirm."

"Bill, I **knew** I could count on you."

Bill smiled as he said, "Yup, Tucker, today is your lucky day. I feel finding her is an auspicious sign – both a malacologist AND archeologist with experience rooted in African history. For sure, Tucker, this *is* your lucky day."

***

Dian awoke as the jet banked into a long slow turn away from the rising sun in preparation for landing at the Dakar Airport. The loss of light through the tiny window had created a shadow, cooling her face. Needing sleep, she was appreciative of the larger, first-class seat. Having driven straight to the Wales airport from a dig, she had no time to change, and her hair and clothes were a bit rumpled.

The woman next to her wore an elegant, hand tailored Saville Row suit, but was obviously inebriated. She gave her a blatant once-over; noting she was awake, then said over the rim of her martini glass, "Dress in a hurry dear?"

She was shy, but not so shy she couldn't help but retort tartly, "What's wrong with khaki and sturdy boots? I'm ready for work. Oh, and be careful getting off the plane; martini's this early can be deceiving on how they impact you at altitude." After speaking, her green eyes intently looked back into the slightly glazed eyes of her seat mate. The plane had banked back towards the sun again, so it shone through the window causing a reddish-gold glimmer in her auburn hair. Seeming delicate and light, she projected a sense of mystery and otherworldly appearance. The woman knew when to stop talking.

Looking out the window with her ears popping from the descent, Dian moved her head around excitedly trying to

see from every angle as the ground swelled up into view. She remembered her grandparents' bedtime stories of monkeys swinging through trees, colorful birds flying through treetops, and exotic wild animals roaming the plains. There were bold colors, bananas, coconuts, and lush green jungles where vines twined around tree trunks. Expecting the large continent of Africa as a place of shadows, mysterious and magical, she thought Africa as a place for great adventures. She kept thinking hurry up and land as she continued looking out the window. She was hoping to see a canopy of jungle before landing, something to greet her as a reminder of those bedtime stories. Professor Clench believed in her. She was going to find *Cymbium pepo*; this is Africa where anything is possible!

Left: William (Bill) Clench (1897-1984) and right: R. Tucker Abbott (1919-1995), on August 1, 1975, ca. the time of the narrative. Photo from the Jacksonville Shell Club archives.

***

First class gets to lead the pack through the cabin's front exit door, but she patiently stood bent over beneath the overhead bin waiting for her seat mate to move. After the woman grabbed her purse from the overhead bin, she pushed her way to the front of the line. Her face wore a skeptical look while watching the woman wobble down the stairs on her stiletto heels – almost falling flat on her face. Thinking I told you so, she retrieved her duffle bag from under the seat in front of her and went out the cabin door into the bright light. She moved carefully while going down the portable stairway. As she stepped onto the tarmac she slowly looked around. Becoming aware of where she was, she almost yelled **Africa**, ***I AM in Africa*!** Suddenly she sensed Africa's presence. She felt a state of existence that could not be seen – more so than any other place she had ever been. She smelled the scent of antiquity rising from the land and in the air all around her; *Homo sapiens* originated on this land. Her senses told her the continent carried the weight of time. She was transposed from the order of her life to experiencing a magical and mysterious sensation that subtly filled her with a calming, ancient presence.

Noticing drumming sounds towards the horizon over what seemed to be a ridgeline of green jungle, she interpreted the quiet thrumming beats as a language announcing her flight's arrival. Instinctively she knew Africa was recognizing her ancestral connection to the land and that she was able to perceive and acknowledge this truth. The sound was low and soft – pulsing slowly, steadily, and rhythmically, as if whispering a secret. She imagined being carried away on an undulating wave of sound from where she was standing. This magical feeling seemed to be welcoming her as a long-awaited friend back to Africa, a land that, to her, already felt like home.

Corralling her thoughts back into the present moment, she first had to pass through the immigration station, and afterwards, hopefully the group she was to join would be waiting in the lobby. The group's flight from New York had just landed ahead of her, and the flights were on time. As she walked towards the terminal, sweat became to trickle down her back. She was hot since she hadn't changed from her black, long sleeved woolen shirt to something cooler. Her squishable hat was packed in her only piece of luggage, a thin but tough, old brown leather duffle bag. Pieces of discarded ticket stubs, dust and other debris whirling in the hot air caused her to take notice of the small details at hand. The tarmac was a barren, dusty dry asphalt surface with tufts of dried weeds growing in cracks caused by weight of planes and the heat. Since there were no jetways connecting flights to the interior of the terminal, the area was dotted with movable, rickety looking metal stairways that could be rolled up to access the cabin doors. She continued walking, moving slowly towards the windowless, small, whitewashed stone building. Inside were fans attempting to create a cooling breeze that moved the hot air past the once white walls. The movement of air only succeeded in moving pieces of falling paint off the plaster.

Guarding the entrance to the lobby, in front of a swinging wooden gate, one lone immigration agent sat on a tall, three-legged stool behind a wooden structure that served as a desk with a drawer for a passport stamp and pen. The official was dressed in khaki shorts and a short-sleeved khaki shirt that, given the heat, actually appeared starched. A faded patch was sewed onto his breast pocket. Once white but dingy now, the patch had immigration stitched onto it in black hand-embroidered letters that were fraying along their

edges. Overhearing the official speak in what sounded like jumbled French mixed in with Wolof, the local Senegalese dialect, she thought uh oh, I barely speak French, the official language. She had forgotten Wolof was also spoken in Senegal. Wolof isn't tonal; there are no pitch changes like English and French have. If he spoke French, she would at least be able to tell if she needed to answer yes or no. Next in line to have her passport checked and stamped, she walked up to the official's counter. Approaching the counter, she observed the cluster of people that had been ahead of her were happily chattering away in English as they filed through the swinging gate into the brightly lit lobby. She shouldn't have a language problem if they all managed to get through. Handing over her passport, the official appeared to ask Dian a question, so she stumbled with the little French she knew. "Non French, parles tu Anglaise?"

The official replied with an agitated voice while tapping his pen on the desktop. "Oui, yes, a little. Your documents **NO** in order!"

"**That is impossible**," she replied in a panicked but authoritative voice.

Pointing to the visa and official passport dates, the official shrugged his shoulders. "Oui, possible, **NO GOOD**!" He began tapping his pen on the wooden desktop again, looking expectant, as if now anticipating something.

She knew her documents and passport were in order. She had been inoculated with every vaccine possible: plague, yellow fever, tetanus, and cholera. She had even taken the precaution of being vaccinated with smallpox. A special order had been required because the vaccine wasn't available to the general public. All this was listed in her little yellow vaccine booklet filled with original signatures and attached to her passport stamped with the official authorization for travel to West Africa. She was perplexed and began to get anxious as she repeatedly pointed out these details to the official.

The official responded each time by repeating, "***NO GOOD*!**"

Hearing someone shout her name, she looked around bewilderedly and saw a man past the gate who appeared to be waving at her. He shouted, "I'm Pete, your tour leader. I've been looking for you. Is everything alright?"

She blurted out a loud, "**NO!**" In response, many heads simultaneously swiveled around to see what the commotion was all about.

With so many people watching him, the official threw his hands up in the air and then angrily pounded the seal authorizing entrance to Africa into Dian's passport. "**PROCEDER!**" he said with intense disapproval.

She didn't need a translator to understand go, so picking up her duffle bag she took some short quick steps towards the swinging gate to enter the lobby. Pushing the gate hard, she let it swing back against the wall with a bang, and then took a deep breath of relief. Pete hastened towards her saying, "Thankfully Professor Clench forwarded a photo of you to me. I don't understand. We had no problem at all. Must be that you're a young woman travelling alone."

She still felt anxious but laughed at a sudden idea. "Do you think he wanted a *bribe*?"

***

Once outside the terminal Pete introduced her to his group. They all huddled together while taking a good long look around. The entrance road was congested with a crowd of swarming people, all pushing their group closer and closer together. Pete had known to warn her in a phone call prior to departure that she had to be careful with her camera and wallet, but not of a fast shoeshine. As she looked down at the ground, she noticed one of her boots was in the process of being polished by a little boy who was quickly dipping a swab of material into a glass jar of brownish paint. She grinned inwardly at the idea of spending the rest of the trip with shoeshine peeling off her boots; her boots were heavily waxed with waterproof protection. The little shoe shiner excitedly accepted a ball point pen in return. She had brought pens for gifts as they topped the suggested items list released by the tourism department. The government, however, was adamant: NO candy due to lack of available dental care. She doubted if the child even had any paper. "Hahahahaha," Dian laughed out loud. She was thinking maybe the child was a smart little businessperson and would sell the pen to the immigration official.

Salma, the group's guide in Dakar, was not only bilingual, but she was also the daughter of a United Nations official: the entire family was involved as representatives in some manner or the other. Professor Clench had explained to her that Salma's connections opened doors not normally available to civilians. Dian's research credentials didn't hurt either. He also had to call in some favors in order to get permission go to where Tucker suspected his *C. pepo* would be found. The fishing village was off limits to any visitors, so his store of favors must have taken a heavy loss. She wondered momentarily why it was off limits, but was distracted by a commotion in the crowd in front of her.

Salma suddenly emerged from the midst of the swirling, colorfully dressed people that were jamming the road and parking lot in front of the terminal. She made a fast path towards Pete whilst sternly speaking in French and Wolof to the crowd, "Move aside, please make way, move aside." She simultaneously waved a card at the end of a long stick with Pete's name on it written in large block letters. She wore the traditional Senegalese dress, a boubou, which is a robe or tunic similar to a caftan that both the men and women wear in Dakar. Dakar was known for its locally batiked colors in bright orange, yellow, black, and brown, and designed in geometric, angular patterns. Salma's boubou seemed to have every color imaginable. She looked so authoritative and formidable for being only 25. Very impressive, Dian thought, but then after all, she and her family were part of the United Nations delegation.

Salma had to raise her voice to compensate for all the voices shouting greetings to other arrivals. She briskly instructed, "Quickly, follow me, over here. Get in the van." She managed to propel the group with all their luggage into a shiny white Mercedes touring van before the crowd could close the remaining space.

Dian let out a sigh of relief feeling the blessed air conditioning wash over her as she sat in a seat towards the back. As the van started towards town and their hotel, the group seemed to get a second wind. Though the road was unpaved and dusty, everyone was too excited to care about the bumps or the heat and began jabbering to each other while pointing in all directions at the scenery moving by. Someone asked Salma about the drums they had heard at the airport. She knowledgeably answered. "The drums act as a telegraph wire where sound passes the local news and gossip from village to village. When one village receives the news, a few miles away another drummer takes up the message and passes it along to the next village drummer. Your arrival is news because we don't see many Americans."

Moving with the rhythm of the van, Salma swayed side to side down the aisle while holding onto the seat backs as she came over to Dian. Sitting down beside her she said with a smile, "You're so quiet. Please do not worry. Professor Clench and his energetic friend he calls Tucker both went into great detail with me on the telephone explaining what they hope to find. However, I do need to confirm with you exactly what this mollusk looks like. In all the excitement, neither Tucker nor Professor Clench forwarded a photograph."

She shook her head smiling at hearing this while saying, "Salma, they were like two little kids when I spoke to them before I flew out of London. The mollusk, or shell, is shaped, well think of looking at it like it's a Persian melon – a cantaloupe. I'm sure you have melons in your markets." Dian suddenly exclaimed, ***"WAIT!*** Pepo is Latin for edible gourd, but it can also mean melon. Salma, I think the discoverer named it pepo because the outside looked like a round Persian melon and the inside was orange like the melon – ***not*** that it came from the Persian Gulf. This may be why the habitat has not been found since the 1700's. The species epithet pepo meant Persian melon, not Persian Gulf. Something got lost in translation."

Salma interjected excitedly, "I bet you are correct!"

Dian continued with her explanation. "If you were to cut a top to bottom wedge out of the melon and hollowed out the seeds, there would be a large area exposed. The shape reminds me of the outside of a person's ear. That's why I call it a bailing shell since it looks like it could be used to scoop water; the opening of the shell leads to a spiral interior that the animal can retract into, like a land snail! The inside is glossy, and the color is light tan to an orange color just like a cantaloupe. I hope you can picture it from my description."

Salma sighed. "Well, I certainly know what you mean, but I need to tell you, I've never seen anything quite like what you describe. Although, no one has come looking for shells before, we do have melons at our local market. On the other hand, my source that I cannot disclose, appeared to understand exactly what you are searching for when I met him at the bazaar earlier. She then said while laughing, "OK, I believe I understand. A large round melon with some of its edible orange fruit scooped out. Interesting."

She continued in a serious voice. "I have arranged for the entire group to go by dugout to a fishing village where it is suspected you will find your mollusk. Pete understands the plans and timing, and his group is excited at this unexpected opportunity to visit a place that would normally be off limits. I will say no more about the village, other than please be quiet and respectful. It is highly irregular that any one is allowed access, and the villagers will be extremely suspicious of why we are there. Let me do all the talking, please."

Bouncing along the road, Dian was deep in thought as she looked out of the large windows designed for optimum viewing. She started to notice how bleached and parched the land looked. The trees were a forest of dry looking matchsticks, sparse and almost leafless. The trees stood in formation like an army of tall, thin ghosts. They were illuminated by the bright sunlight which made the entire area look chalky white and old. There was no green, dense jungle. No monkeys swinging through trees, or colorful birds flying through treetops. People were treading slowly along a dusty tan path by the side of the road carrying baskets on top of their heads, seeming to ignore the rotting cattle carcasses that lined the road. She hesitantly asked Salma, "Where are the birds and the monkeys? I don't see anything in the trees, and why are there so many cow carcasses on the side of the road?"

Salma's composed, serious reply shattered the illusions and expectations Dian's childhood bedtime stories had created. "The animal carcasses are left rotting by the side of the road because the livestock starves. Poachers kill and take parts, leaving the animal to rot, wasted. Poverty is our people's way of life. My people are starving."

Dian's dreams had become meals, her jungle cut down for firewood, and the land was now barren. She reacted with tears running down her cheeks. "Oh Salma, I am horrified. I never knew this." The bleached white appearance of the scenery caused her to feel as if she were travelling in a dream through an ancient excavation site where people lived only in the past. Thinking this thought, she noticed the thrumming of the drums in the far-off distance.

Salma tried to cheer her by saying, "Tomorrow we shall make the journey down river to the ocean. Hopefully, we can make your trip a success. However, what you will encounter in the village is not like what you have seen of Dakar so far. You must see for yourself."

***

The next day Salma took the group in the van that would drive them to the river; they would travel downstream to the village by dugout canoes. Each canoe had a steersman who stood in the back, rowing like a gondolier. Dian was surprised to see the steersman wearing a black Nike T-shirt with a white swoosh. Even in the midst of an African jungle, the multinational corporation made its presence known. The scenery was the same as the journey into town had been from the airport – bleak and dry with twigs for trees. Next to their dugouts where they were to enter the water, a cow had been draped across a dugout that was pulled up onto the riverbank, but there was no one to be seen. Selma said the owner was taking the cow to a vet when the tide was high. As the group glided down river, Dian noticed the drums were reaching a crescendo as they approached the village.

Arriving, the dugout glided up onto the riverbank, and the drumming abruptly fell silent. Dian could see the river ended at the mouth to the ocean some distance away. Where the river met the ocean, a large promontory appearing as large as the Great Orme in Wales, jutted out into the ocean. The promontory abruptly ended at the edge of a cliff resulting in a sheer, perpendicular drop down to the water below. At the edge of the cliff, she saw a caricature of a man. Tall and thin, he stood as if frozen in place. His profile seemed to stare thoughtfully out to sea: a black silhouette starkly etched against a misty gray sky. As suddenly as she had noticed the figure, the gray mist softly seemed to flow around it, enveloping it until it disappeared leaving only an empty gray sky.

The village headman cautiously helped each person out of the dugout. He then turned to speak privately with Salma. Meanwhile, the group stood in stunned silence at the appearance of the village as she explained the reason for their visit. The headman then turned around to talk to the few village men that stood behind him. He told his men the group hoped someone would know of a certain creature from the sea, possibly collected off their shoreline. She told the group he had described the shell exactly as Dian had: a bailing shell.

While Dian waited next to her group, heads were turning as discreetly as possible to look around. The village had an appearance of desolation and extreme impoverishment. Most of the villagers stayed in the distance, not coming close to them. The ground itself carried a dark brown patina on its surface, worn shiny over a long period of time by bare feet. The area was cluttered with broken pots, discarded, unlabeled rusted tin cans, and pieces of paper flying low to the ground in the light breeze. Dian noticed charred remains of something she could not identify that littered the blackened ground near previous cooking fires. The fire pits lined the remaining wall of a building that had collapsed long ago. Vegetation, what there was of it, wound in and out of empty spaces that once had been windows in the wall. The windows looked like black, orbless eye sockets bleakly staring back at the intruders. There was no latrine, no sanitation, and no source of clean water.

She then noticed a woman with haunted, empty eyes staring at her. The woman was barely covered; her clothes were rags, almost falling off of her emaciated body. She was so skeletal in appearance Dian could not tell how old she was. The woman sat on the ground hugging her knees to her chest while leaning back against a downed tree trunk. By her feet sat an empty, rusted tin can, and a blackened handle-less pot. She sat beneath a piece of salvaged tin roofing, about three feet wide by seven feet long, that angled up from the ground and was propped up against the top of the downed tree the woman sat against. The metal piece served as the woman's roof. This was her home. There was no evidence of domestic animals for they had all been consumed, such was the poverty. Humidity covered the sky with its vapor causing the surrounding trees and village to appear as monochrome silhouettes; the people were death's marionettes.

Thrumming drums in the distance jarred loudly in Dian's mind and then fell silent as suddenly as they appeared. She wondered if she had really heard the drums, just as she had wondered if she had seen the figure on the cliff. She shook her head to clear her thoughts as a few villagers returned to the group. They stopped in front of Salma. One villager stretched out both his arms to present an object to Salma, holding it in both of his palms like an offering. The object was charred and round like a melon. It was about six inches in diameter, with a wide blackened opening on one side. Dian gasped. The object was *C. pepo*.

The man looked confused as he asked Selma if this was what the group was looking for. He did not understand why foreigners would have any interest in what the village ate. Horrified at seeing the burnt offering, the group was shocked into deeper silence. The shell had been destroyed while cooked in a fire to consume the meat. Dian looked around the area more closely. She realized what she had thought were ashes and burned wood around the fires that lined the wall in the distance were actually blackened shells. These charred remains that littered the ground, hundreds, were *C. pepo*. What they called the bailing shell was the village source for food.

One man in Pete's group burst out loud, "Oh my god, escargot. No, sorry, not funny, but I don't believe what I'm seeing." Salma scowled at him making him drop his head to his chest.

Dian suddenly felt the urge to flee. The historic colonization and exploitation by foreigners of Africa's natural resources was obvious in everything she had been observing. Though it was clear she had found a habitat for

C. pepo, her newly acquired insight would not allow her take part in research that might result in pushing an entire village further into starvation. No wonder the government did not want outsiders to visit this village.

***

No one spoke on the return upriver, and the drums were silent. When they landed at the same spot from which they had departed, the cow was still draped over the dugout. No one was around like before, but now the cow was dead.

Reaching the hotel, everyone returned to their rooms leaving Salma to conclude her business with Dian. Noting how saddened and withdrawn she was over what she had seen, Salma gently touched her arm while saying quietly, "Do not be disappointed. I have my contact, and somehow, I will not let you return home empty handed. But you now understand why I said you had to see the village for yourself. Even I did not know the source of the village food until we arrived."

Salma was true to her word. At the departure gate the next day Salma handed her a large box to carry on her flight. She peeked beneath the lid. Inside lay a fresh and carefully cleaned *C. pepo*. Salma said, "My source was able to obtain this for you. It is beautiful as you described."

She gave Salma a tearful hug. "I will never be able to thank you enough for all your help, and especially all I have learned from you. Goodbye my friend." She then turned away, and carefully carrying her precious box in one hand and her duffle in the other, she walked across the dusty dry tarmac to the portable stairs. As she reached the top, she stopped briefly before entering the cabin. She turned to take one last look around and realized no drums beat a message of goodbye. She sighed, turned, and slowly entered the plane. This was one expedition where the mystery would have to remain a mystery.

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I wish to thank Dr. Lee for his historical information and assistance with the final editing process.

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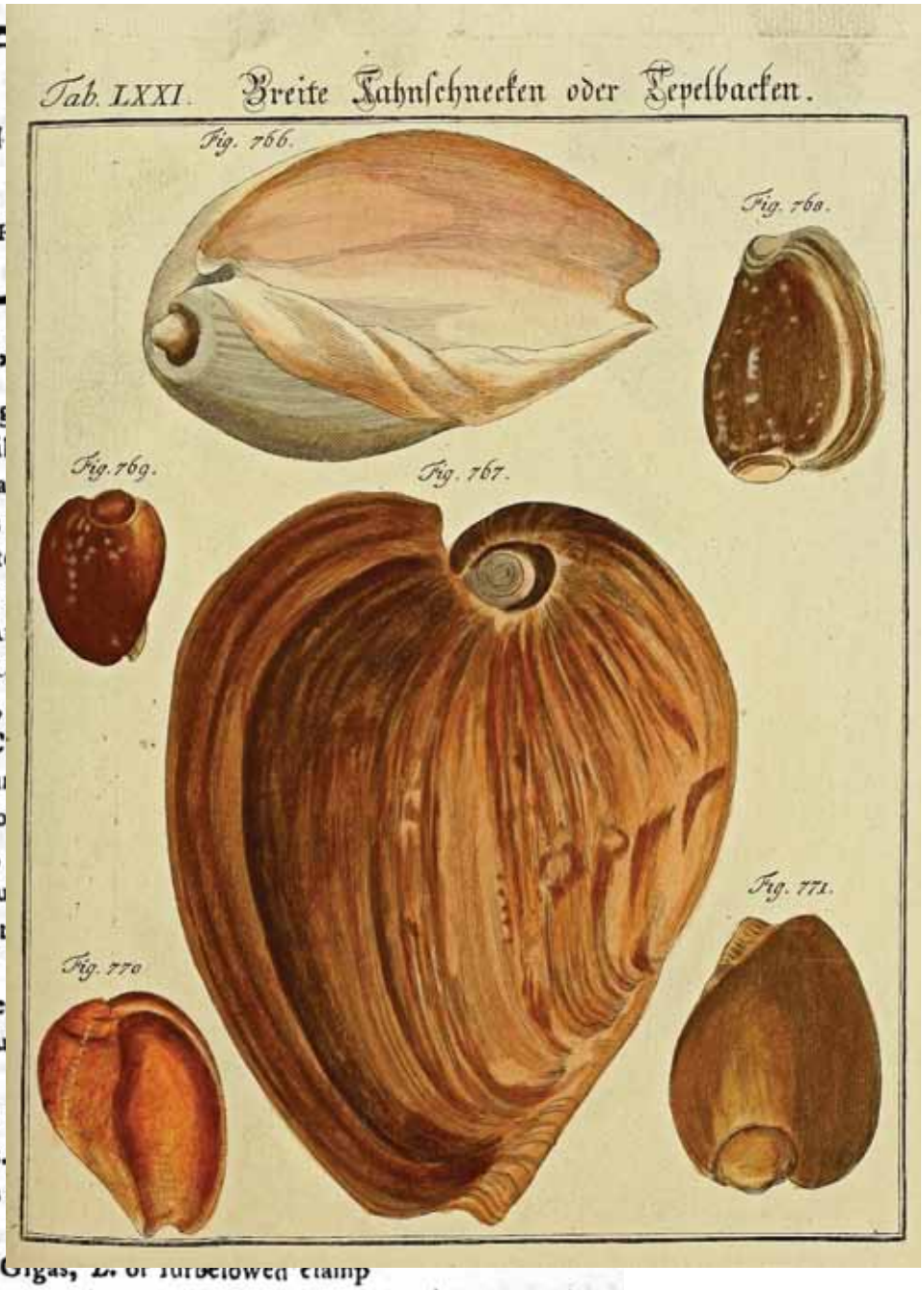
Cymbium pepo **([Lightfoot], 1786), 200mm, Senegal. Image from Wikipedia Commons.**



NINETEEN

MONDAY TH

SHELLS,

LOT

1924 FIFTEEN cards, containing Canrena, albumen, Mamil

1925 Four fine Oſtreæ, viz. Eburnea

1926 Eight fine Petrifactions, viz. 2 *fig.* 64. an Anomia Gryphit

1927 Fourteen Bivalves of various Oſtrea maxima, *L. fine*, 3 A

1928 Nine cards of various ſpecies phalangium *male and female*, *by Pennant*, and the eared C

1929 A very large and fine Buccinu

1930 Six different curious Ovaries o *Liſter*, 23. 21. ſome pearls,

1931 Seven cards containing variou cardium, 2 odd valves of ret gatum, *S.*

1932 Fourteen cards of different ſpe tum, lanceatum, *S.* toroloſu & fuſus, *S.*

1933 A ſmall Echinus roſaceus and

1934 Six fine ſpecies of Venus, viz.

1935 Two pair of very rare ſpecies *S.—fine*

1936 Two fine varieties of Chama Gigas, *L.* or Turbelowed Clamp

1937 A beautiful Oſtrea nodoſa, or Duck's-foot Pecten, and Oſtrea plica, *L. both rare*

1938 Three fine varieties of Murex ramoſus, viz. the Stag's horn, and 2 others

1939 Three kinds of Pholas, *one imbedded in wood*, a ſmall rare Solen, a Mya, &c.

1940 A fine pair of Voluta cælata and another of Pepo, *S. ~~Martyn~~, Vol.* III. *fig.* 768—770 error pro *Martini*

1941 A pair of very fine Trochus Solaris, *L.* or Sun ſhell, from the *W. Indies—rare*

1942 Six fine ſpecimens of Trochus, viz. 2 of Granoſus from *New-Zealand*, *Martyn*, *Vol.* I. *fig.* 37. *r.* 2 maculatus, *L.* and 2 others

Cymbium pepo **as originally described by Lightfoot in *A Catalogue of the Portland Museum...*, a sales catalog of the collection of the Duchess Dowager of Portland, Margaret Cavendish Bentinck (1714 - 1785). In Lightfoot's description, he references the description and illustration by Martini, Vol. III, fig. 768-770, shown above. More can be found about the Portland Catalogue and Lightfoot in the following articles in *American Conchologist*: 28(4): 9; 40(1): 6,8-9; 47(1): 10, 11; 47(2): 4, 6; 48(4): 6, 48(4): 13, 14.**

An interesting snail

Thomas Eichhorst

Indrella ampulla (Benson, 1850) (Ariophantidae) is a strange moderately-sized (± 55mm) land snail with a polymorphic body. Unlike many land snails with brightly and variously colored and patterned shells, this species (the only one in the genus *Indrella* – monotypic) has a dark green to brown shell, but the body of the snail is variously colored and patterned from white, to orange, to red, to black, to yellow, to grey. This is a tree-dwelling tropical rainforest resident of the western Ghat Mountains of India, where it seems to feed primarily on fungus. The shell is extremely thin with only three whorls and a wide aperture (almost 2/3 the overall shell size). Because the shell is mostly constructed of periostracal material with limited amounts of calcium carbonate, it is extremely fragile and prone to shattering when dried. All images except top-right are Wikipedia Commons. Image at top-right = Vipin Baliga on Trek Nature, www.treknature.com/gallery/Asia/India/photo217785.htm used IAW posted TOU.

Donald Dan's years of service to COA recognized with the COA Lifetime Achievement Award

Tom Eichhorst

It is with great pleasure that the Board of Directors for the Conchologists of America present the Lifetime Achievement Award to Donald Dan.

Donald has been an active worker and contributor to COA since the early 1980s and was given the position of COA Trophy Chairman back in 1985, a position he kept until two years ago. He has been the Endowments Director since the inception of COA's academic endowment donation program, with a current endowment balance of $ 194,257.73. His fund raising promotion includes an annual brochure that broadcasts our latest academic grants. He also served as the Academic Grants Chair. He served on the COA Board of Directors for decades, just recently retiring. In addition to all these accomplishments, he also prints and pays for the annual trifold for each upcoming convention, as well as distributing them at all shell shows.

Donald Dan with his ever-present smile and can-do attitude.

Donald was interested in shells as a high school student. Soon after graduating high school, along with friend Toto Olivera (who first introduced him to the wonder of shells while both were in high school), he started a shell mail order business (see Eichhorst, Dec 2020: 14-16). Donald and Toto attended college during the week and cleaned and packed shells on the weekends. Their business was extremely successful and soon involved more workers, including brother Victor, who eventually purchased the business and switched it to wholesale only. In 1964 Donald immigrated to the USA and continued to pursue his interest in shells.

Years ago, when the COA raffle started, Donald always donated a spectacular item for the raffle. This past year he outdid himself by fashioning a magnificent silver lion's paw pendant with a large diamond in it. This was in a separate raffle and Jody Watts from Hawaii was the very lucky winner. Donald also twice purchased laptop computers for use by the COA.

As you all know, Donald has also been a loyal and faithful shell dealer at the COA annual bourse. He

Donald Dan and Anne Joffe in Anne's shell room (I know!!), where Anne presented Donald with a well-deserved COA Lifetime Achievement Award. Between those two are some 80 years of dedicated service to COA. At right is the COA Lifetime Achievement Award, which is limited to a biennial presentation.

also runs the Sanibel Show Shell sales table yearly, raising big money for the club. He participates in all of the various shell shows, including many overseas, always showing his support for the clubs as well as the national organization.

His ever present humor, generosity, loyalty, and dependability have been Donald's trademark these many years, and he is most deserving of this great honor.

Two years of *Neptunea* awarded

One of the fallouts from the COVID 19 pandemic was the cancellation of the 2020 COA Melbourne Convention and accompanying presentation of the 2020 *Neptunea* Award. Everett Long made certain that the board was presented with the full nomination package and able to vote online prior to the convention dates. He then made certain that the awardees received their *Neptunea* Awards, convention or no.

Everett followed up by presenting the awards to both the 2020 and 2021 awardees at the 2021 COA Melbourne Convention. Congratulations. Each awardee was certainly deserving of recognition for their service:

2020
Ed Shuller & Jeannette Tysor
Paul Callomon

2021
Roger Portell
Doug Wolfe
Paul Kanner

Roger Portell – 2021

Ed Shuller & Jeannette Tysor – 2020

Doug Wolfe – 2021

Paul Callomon – 2020

Paul Kanner (unable to attend) – 2021

COA new membership challenge

Maybe it's time to think "outside the box." Time to create new ways to recruit new COA members.

C.L.A.M. (Committee Looking Ahead [for] Members) was formed at our 2021 Annual Convention. We were tasked to come up with new ways to attract members. To that end, we are announcing our **First Annual New Membership Challenge**. Starting September 1, 2021, and running until May1, 2022, the shell club which brings in the most new members will receive a $150 cash prize to be presented at the 2022 COA Convention in Galveston, TX.

Do you know a child who is interested in shells? Give them a membership. Even if they are a little too young to understand, perhaps their parents will also become interested. Do you have a friend or relative who loves shells and is impossible to buy a gift for? Give that person a birthday, Christmas, Christmas-in-July gift of an annual COA membership. An appropriate card will be included with a gift notation. Does your club have monthly raffles? Raffle an annual COA Membership.

A new Membership Application form is included in the September 2021 issue of *American Conchologist*. Additional forms can be obtained from the membership director, Linda Powers (linda.powers1@gmail.com). If your club decides to participate in the **Challenge**, assign a membership chairperson, complete the membership form as indicated, and batch your new memberships to Linda monthly.

In addition to the **Challenge**, every junior exhibitor in a local shell show sponsored by COA will receive a new COA annual membership.

Last but not least, COA will provide a shell club with up to two free annual COA memberships to promising student winners of science fairs, local club scholarship winners, etc. A club may, of course, choose to sponsor more COA memberships paid for by the club. These student winners must be verified by a teacher or sponsor. Memberships paid for by COA do not qualify for the **Challenge**.

Karlynn Morgan

Steven Coker, José Leal, Harry Lee, Everett Long, Linda Powers
C.L.A.M.

Karlynn Morgan

2022 shell shows and related events

The following information is subject to change. *Due to the uncertainties with Covid 19, please verify with individual organization. Also, please check the **COA Web page** for events/updates: conchologistsofamerica.org

January 8-9, 2022
56th Annual Broward Shell Show, Pompano Beach, FL
Emma Lou Olson Civic Center, 1801 Northeast 6th Street
Contact: Alice Pace
Email: alicepace90@att.net Tel: 305-301-1296
Website: browardshellclub.org

January 15-16, 2022
41st Space Coast Seashell Festival/Show, Melbourne, FL (Astronaut Trail Shell Club)
Eau Gallie Civic Center, 1515 Highland Avenue
Contact: Alan Gettleman
Email: lychee@cfl.rr.com Tel: 321-536-2896
Website: spacecoastseashells.com

February 5, 2022
Florida United Malacologists 12th Annual Meeting
National Shell Museum
3075 Sanibel-Captiva Road, Sanibel, FL 33957
Contact: José H. Leal, Ph.D.
Email: jleal@shellmuseum.org

February 11-12, 2022
58th Annual Sarasota Shell Show, Sarasota, FL
Potter Building at Robarts Arena, 2896 Ringling Blvd., Sarasota, FL
Email: Donna Cassin
Email: dcassin9411@verizon.net Tel: 941-362-3302
Website: sarasotashellclub.com

February 18-19, 2022
74th St. Petersburg Shell Show, Seminole, FL
Seminole Recreation Center, 9100 113th St. N
John Jacobs
Email: johncheryl@earthlink.net Tel: 813-309-2608
Website: stpeteshellclub.org

February 25-27, 2022
16th Australian National Shell Show-Sydney
Balgowlah RSL Memorial Club
30-38 Ethel Street, Seaforth, NSW 2092
Contact: Sydney Shell Collectors Club 1401706
www.sydneyshellclub.net; shellshow@sydneyshellclub.net

March 3-5, 2022
85th Sanibel Shell Show, Sanibel, FL
Sanibel Community Center, 2173 Periwinkle Way
Sanibel Island, Florida 33597
Contact: Joyce Matthys; Email: joycematthys1@gmail.com Tel: 503-871-1082
Contact: Mary Burton; Email: marybsanibel@hotmail.com Tel: 561-301-2971
Website: sanibelshellclub.com

March 10-12, 2022
40th Marco Island Shell Show, Marco Island, FL
United Church of Marco Island, 320 North Barfield
Contact: Jae Kellogg
Email: pjsailkw@gmail.com Tel: 239-253-8483
Website: marcoshellclub.com

March 26-27, 2022
Gulf Coast Shell Show, Panama City Beach, FL
Panama City Beach Senior Center, 423 Lyndell Lane, Panama Beach, FL
Contact: Jim Brunner Tel: 805-215-2086 email: jili1043@comcast.net
Website: gulfcoastshellclub.weebly.com/facebook

May 6-8, 2022
North Carolina Shell Show
Crystal Coast Civic Center
2502 Arendell St. Morehead City, NC 28557
Contact: John Timmerman; email: ncshellclub@gmail.com
Karlynn Morgan; email: karlynnmorgan@earthlink.net
Website: www.ncshellclub.com
Facebook: North Carolina Shell Club

May 31-June 4, 2022
Conchologists of America Annual Convention, Galveston, Texas
Moody Gardens Hotel, Spa & Convention Center
One Hope Boulevard, Galveston, Texas 77554; 409-744-4673
Registration: Patty Humbird; Email: humbirdpatty@gmail.com; tel: 979-373-8602
Chairman: Dave Green; Email: dgreen2@entouch.net; tel: 713-435-9971
Website: conchologistsofamerica.org

August 20-21, 2022
Annual West Coast Shell Show, San Diego, CA
Casa Del Prado, Room 101, Balboa Park
Contact: David Waller: Email: dwaller@dbwipmg.com Tel: 858-768-1864
Website: sandiegoshellclub.com and Facebook

October 14-16, 2022
Sea Shell Searchers Shell Show AND 2021 Texas Shellers' Jamboree
Lake Jackson Civic Center, 333 Hwy 332, Lake Jackson, TX
Shell Show Contacts: Wanda Coker; Tel: 979-236-5274 email: emptybobbin51@yahoo.com
Patty Humbird; Tel: 979-373-1247 email: phumbird@earthlink.net
Jamboree Contacts: Lucy Clampit; email: lclampit@comcast.net
Houston Conchology Society: www.houstonshellclub.com

*Information Source: **Vicky Wall,** COA Awards Director, 303 Wall Road, Mayodan, NC 27027, USA E-mail: vwallsheller@gmail.com Tel: 336-348-3260

COA Academic Grants 2021

- **COA Grants Committee**
  - Jann Vendetti, Assoc. Curator, Malacology, Natural History Museum of Los Angeles County
  - Andrew Kraemer, Department of Biology, Creighton University, Omaha, Nebraska
  - Jinghchun Li, Professor and Curator of Invertebrates, U. of Colorado, Boulder
- **Applicant/Application details**
  - 23 applications: USA (21), Brazil (2)
  - 18 grants awarded: 12 Ph.D. students, 2 masters students, 2 postdoctoral researchers, 2 research scientists
  - Geography of award recipients: USA (16), Brazil (2)
- **Named awards**
  - Paul and Heather Johnson Award: Kindall Murie, University of Washington
  - Jacksonville Shell Club Award: Alex Franzen, University of Oklahoma
  - Walter Sage Memorial Award: Jamie Bucholz, University of Alabama
  - Clench and Turner Memorial Award: Joshua Lord, Moravian College
  - Frederic Weiss Memorial Award: Lily McIntire, San Diego State University
  - Toto Olivera and Donald Dan Award: Alisha M. Saley, University of California, Davis
  - Anne Joffe Award: Alexandria R. Marquardt, Virginia Institute of Marine Science
- **Total amount awarded: $26,125**

Recipient name	Amount Awarded	Project Title	Academic Institution	County of Scholarship
Alex Franzen	$1,685	Diagnosing species boundaries in *Fusconaia flava* using an integrative delimitation approach (Bivalvia: Unionidae)	University of Oklahoma	USA
Alexandria R. Marquardt	$1,685	Post settlement growth and mortality in eastern oysters (*Crassostrea virginica*)	Virginia Inst. of Marine Science	USA
Alisha M. Saley	$1,400	A 'fresh' perspective: examining the effects of salinity and carbonate chemistry on performance and growth in a coastal ecosystem engineer, *Mytilus californianus*.	UC Davis	USA
Erika Nielsen	$800	Documenting Shifts of Marine Epibiont Communities Using Museum Collections	U. Colorado, Boulder	USA
Fernanda Dos Santos Silva	$975	Molecular Phylogeny of Megasnails (Stylommatophora, Strophocheilidae)	University of São Paulo	Brazil
Ian Oiler	$1,685	Galápagos Land Snails' Microbiomes Through Evolutionary Time	U. of Idaho	USA
Jamie Bucholz	$1,685	Dead but not buried: utilizing museum specimens to understand temporal trends in freshwater mussel communities	U. of Alabama, Tuscaloosa	USA
John G. Phillips	$1,685	Genomic Exploration of South American Land Snail Biodiversity	U. of Idaho	USA
Joshua Lord	$1,200	Does Ocean Acidification Interfere with Mud Snail (*Tritia obsoleta*) Foraging?	Moravian College	USA
Joshua Millwood	$1,685	Comparative genomics of *Villosa nebulosa* and *Fusconaia cerina* (Family: Unionidae)	University of Alabama, Tuscaloosa,	USA
Kally Arnzen	$1,685	Slime Microbiome Community Assembly Dynamics in Idaho Mountain Land Snails	U. of Idaho	USA
Kindall Murie	$1,685	Does the marine gastropod *Lacuna vincta* benefit from bull kelp's ability to modify local seawater chemistry?	University of Washington	USA
Lily McIntire	$1,200	A comparison of the thermoregulatory behavior of intertidal molluscs	San Diego State University	USA
Matthew McDonald	$1,685	Amino Acid Racemization age profiles for three Jamaican land snail species derived from historically collected museum specimens.	Drexel University	USA
Morgan Goulding	$700	Describing natural variations in shell growth among an invasive population of apple snails	Georgia Southwest. University	USA
Nicole Moyen	$1,685	Winners vs. losers with climate change: Unraveling how an animal's thermal history alters its epigenetic responses to heat stress	Scripps Ins. of Oceanography	USA
Shaquilla Hamlett	$1,400	Assessing Spatial Memory and Learning in Invertebrates with Cephalopods as a Model	Nova Southeastern University	USA
Patricia Mirella da Silva Scardua	$1,600	Immunological Responses of Cultured Oysters of *Crassostrea gasar* to the protozoan parasite *Perkinsus* spp	Federal University of Paraíba	Brazil

COA Academic Grant Brief Report: Reconstructing the evolutionary history of flying squids (family Ommastrephidae Steenstrup, 1857)

Dr. Fernando Ángel Fernández-Álvarez

Ryan Institute and School of Natural Sciences, National University of Ireland Galway (NUIG)

Members of the family Ommastrephidae Steenstrup, 1857, sustain large and economically important fisheries. As a result, many biological aspects related with fisheries (e.g., reproductive biology, trophic ecology) have been extensively studied. Despite this interest, several other aspects, such as the relationships between the members of the family, remain poorly known and controversial. Currently, the family is formed by 25 species sorted in 11 genera. Those genera are separated in three to five subfamilies according to criteria of different taxonomists. Traditionally, three subfamilies have been recognized (Roeleveld, 1988): Illicinae Posselt, 1891, Todarodinae Adam, 1960, and Ommastrephinae Steenstrup 1857. Two additional subfamilies were described, but not widely recognized: Todaropsinae Nigmatullin, 2000 and Ornithoteuthinae Nigmatullin, 1979.

Recent phylogenetic works using multiloci analysis obtained through Sanger sequencing obtained phylogenies that do not agree with either of these subfamily treatments (see Pardo-Gandarillas et al., 2018). The more problematic taxa are the genus *Todarodes* Steenstrup, 1880, which seems to be diphyletic (see Fig. 1) and the subfamily Todarodinae, that is likely to be paraphyletic, since it includes members of the genus *Ornithoteuthis* Okada, 1927, which are usually classified either as Ommastrephinae or Ornithoteuthinae. My research project attempts to solve the phylogeny of members of the subfamily Todarodinae through the Next-Generation Sequencing method Genome Skimming (Dodsworth, 2015) and provide systematic treatment of the family Ommastrephidae that represents the actual relationships among their species.

We obtained the complete mitogenomes of *Nototodarus gouldi* (McCoy, 1888), *Nototodarus sloanii* (Gray, 1849), *Todarodes angolensis* Adam, 1962, *Todarodes pusillus* Dunning, 1988, and two new species of the genera *Todarodes* and *Todaropsis* Girard, 1890. A maximum likelihood phylogenetic tree was developed through the IQTree portal (Trifinopoulos et al., 2016) [available at http://iqtree.cibiv.univie.ac.at] using the automatic model selection feature, based on 13 mitochondrial protein genes including all the available mitogenomes from GenBank. Uncorrected p-distances of the whole matrix were calculated through MEGA6 (Tamura et al., 2013). Figure 2 depicts the phylogenetic relationships among 19 flying squids. *T. pacificus* and *T. pusillus* cluster with *Nototodarus* spp with full support. This clade forms a threetomy with two fully supported clades formed by *T. angolensis* and *T. filippovae*, and *T. sagittatus* and *Todarodes* sp, respectively. Illicinae and Todaropsinae forms a fully supported clade that clusters with all Todarodinae species with full support. All Ommastrephinae samples cluster together with high support. The uncorrected p-distances among flying squids range from 2.2 to 19.5 % (average: 14.3 %). Distances between *T. sagittatus* and *Todaropsis* sp. nov. and between *T. eblanae* and *Todaropsis* sp. nov. are 8.9 and 3.8%, respectively. These distance values are consistent with distance values among related flying squids (Fernández-Álvarez et al., 2020). Adult individuals of the new species of the genus *Todaropsis* are available from one of my collaborators, but the material cannot be accessed until the pandemic is over. We plan to describe the species as an additional unexpected output of this research project.

Acknowledgements

I am grateful to my collaborators Louise A. Allcock (NUIG), Heather E. Braid, and Kathrin S. R. Bolstad (Auckland University of Technology), Malcolm Dunning (Queensland Museum), C. C. Lu (Museum Victoria and National Chung Hsing University) and Morag Taite (NUIG and Aberystwyth University) for their valuable samples and help. This project was possible thanks to the funding provided by the Conchologists of America Academic grant. I am supported by an Irish Research Council – Government of Ireland Postdoctoral Fellowship Award (Ref. GOIPD/2019/460).

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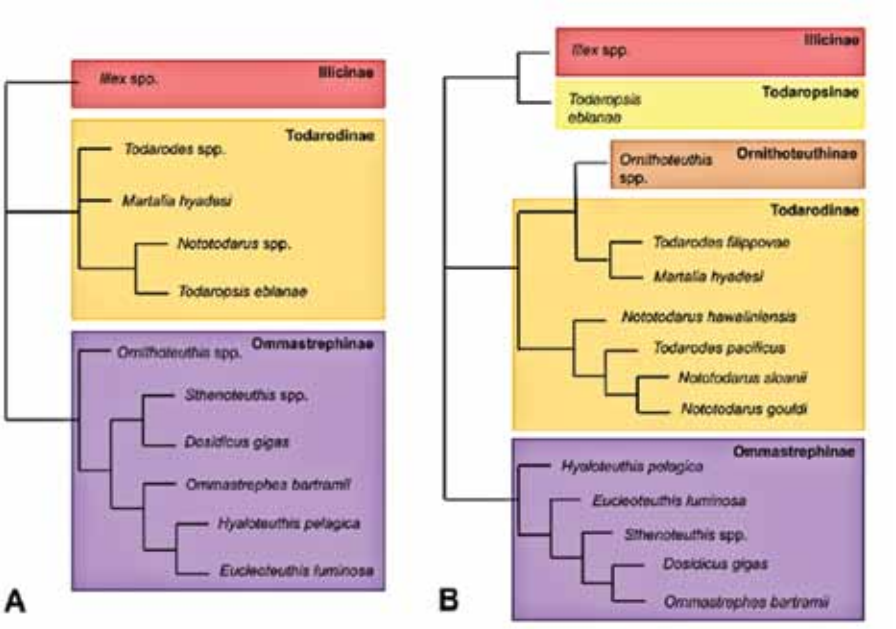

Fig. 1 Brief summary of different systematic treatments for the family Ommastrephidae. (A) The traditional three subfamilies taxonomy based on Roeleveld (1988). (B) Systematic treatment based on the published molecular phylogeny of Pardo-Gandarillas et al. (2018). Note that the genus *Todarodes* is diphyletic and the subfamily Todarodinae as considered here is paraphyletic.

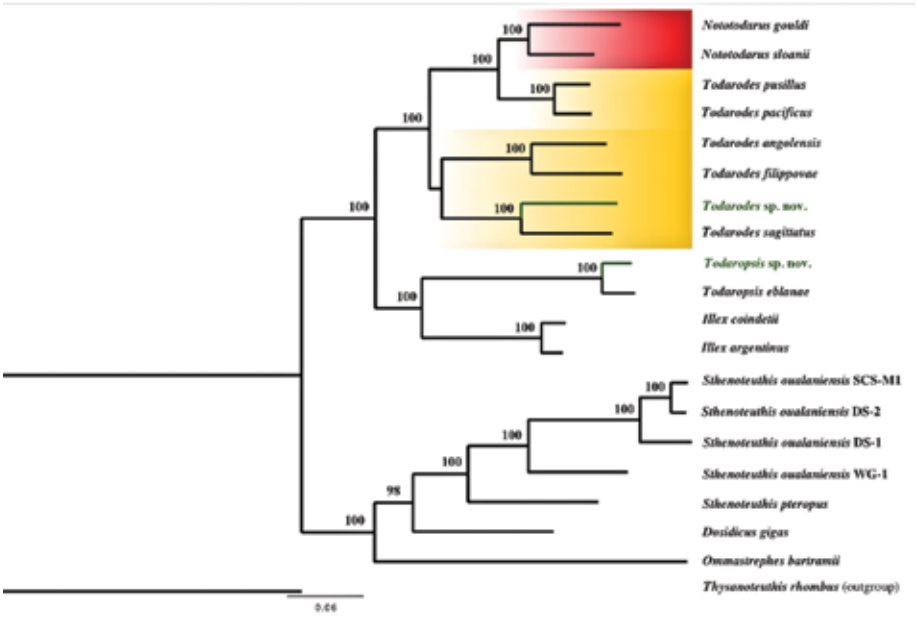

Fig. 2 Maximum Likelihood tree obtained through the IQTree portal (Trifinopoulos et al., 2016) [available at http://iqtree.cibiv.univie.ac.at] using the automatic model selection feature. This tree was based on the 13 mitochondrial protein genes (11202 nucleotides) Bootstrap percentages were calculated after 1000 ultrafast bootstrap generations; values above 75 % are represented over the nodes. New species detected are highlighted in green.

COA Academic Grant Update: Investigating morphological and behavioral adaptations to visual predation in Galápagos endemic land snails

Nicole K. Recla, Christine E. Parent
Department of Biological Sciences, University of Idaho, Moscow, ID 83844

Background

Organisms are constantly faced with multiple threats that they must escape (e.g., predation and harsh abiotic conditions) while still finding resources needed for survival (e.g., food, shelter, and mates). Over the course of an organism's lifetime, many factors may arise that affect its fitness, making these interactions difficult to study. An ideal situation for examining this interplay is an environment where a reduced number of interactions and factors influencing fitness are affecting the evolutionary trajectories of organisms. The depauperate nature and isolation of island systems make them particularly suitable to track the factors that influence an organisms fitness. The Galápagos Islands are known for their remarkable fauna, such as Darwin's finches (Lamichhaney et al., 2018; Grant & Grant, 2011), the land and marine iguanas (MacLeod et al., 2015), and giant tortoises (Lewbart et al., 2018). These are, however, lineages that each include at most 16 species, offering limited replicates to study how species might evolve solutions to the challenges they face.

With over 65 described species, the Galápagos endemic land snails of the genus *Naesiotus* are a particularly suitable group to study how different factors can influence their evolutionary trajectories (Parent & Crespi, 2006). The species are found on all major islands, all vegetation zones, and up to 11 species can be found at a single site. The snails vary greatly in shell morphology, including color, shape, and size, as well as in the microhabitats they use. Visual predation by birds has been one of the factors thought to influence their fitness (Kraemer et al, 2019; Recla, in preparation). More specifically, we expect three possible responses from snails to escape visual predation: 1) snails will evolve shell color that blends with their resting background (i.e., camouflage), 2) snails will evolve shell shape and size to resist predation, and 3) snails will modify their behavior and use microhabitat inaccessible to visual predators.

In 2017, researchers from the Parent Lab visited Santa Cruz Island to study shell color as an outcome of selection from visual predation and found that conspicuous shells were more likely to be attacked (Kraemer et al., 2019). In June 2019, I expanded the research on Santa Cruz Island to include a larger sample size and replicated the research on two additional islands, San Cristóbal and Isabela, and found that conspicuous shells were more likely to be taken than inconspicuous shells (confirming the findings of Kraemer et al., 2019). Notably, I observed that snails on Isabela Island had significantly lower attack rates, regardless of shell conspicuousness. Although camouflage is one possible outcome of selection by visual predators, we found that not all species are blending in with their background (particularly in snails on younger islands).

Map of the Galápagos Islands. Previous research on shell color was conducted on Isabela, Santa Cruz, and San Cristóbal Islands. Microhabitat surveys were conducted on Santa Cruz, Floreana, and San Cristóbal Islands. Winter 2020 transects were conducted on Santa Cruz and San Cristóbal Islands.

Project Objectives

My project will test the hypothesis that Galápagos endemic land snails (genus *Naesiotus*) with conspicuous shells evolved to avoid predation by visual predators (e.g., mockingbirds, genus *Mimus*) in two possible ways: either by adapting morphologically (by evolving a predator-resistant shell) or behaviorally (by using microhabitats inaccessible to predators). To test this hypothesis, I will quantify snail microhabitat use, compare predation intensity on snails found in various microhabitats within their environment, and quantify their shell morphologies (robustness and color). I predict that snails with conspicuous shells are minimizing predation by evolving predator-resistant shells or by utilizing microhabitats inaccessible to predators (behavioral adaptation).

Research Progress

In the winter of 2020, I investigated microhabitat use and the behavioral responses to visual predators. I and other

members of the Parent Lab visited Santa Cruz, San Cristóbal, and Floreana Islands, where we conducted microhabitat use surveys. We measured population density at each site, as well as surface temperature, ambient temperature, and humidity of the microhabitats utilized by each individual. Live snails were found in a variety of locations, and microhabitat use varied between species. On Santa Cruz and San Cristóbal Islands, we applied the data collected from the microhabitat use surveys to transects that measured predation pressure. At each site, empty shells were collected and spray-painted a color to match that of the live snails. Clay was used to attach the empty shells to locations representative of the results from the corresponding microhabitat survey (e.g., on and under rocks, on live vegetation). After 48 hours, we collected the shells and recorded presence/absence of shells. Absence of shells indicated that the placement of the shells was accessible to visual predators. Analyses are currently in progress. Morphological data of 34 species has been collected thus far, though additional data are still being collected.

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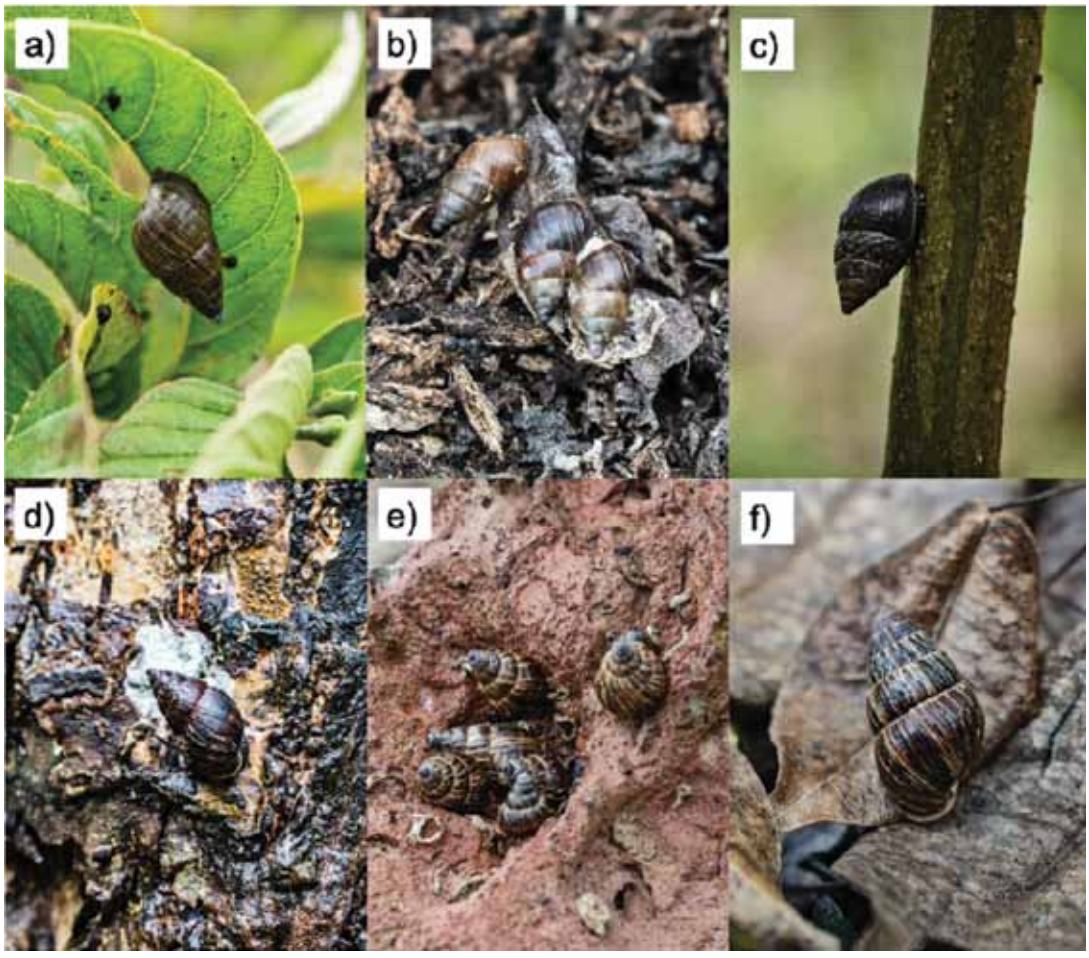

Sample of microhabitat usage in *Naesiotus*: a) on vegetation, b) under leaf litter, c) on branches, d) on tree trunks, e) under rocks, and f) on leaf litter.

COA Academic Grant Brief Report: What governs population structure in isolated ecosystems?

Kelly Martin
Advising Professor: Dr. Christine Parent
University of Idaho

Elucidating the processes that drive diversification remains one of the biggest questions in the study of evolution. Recent scientific development has identified important ecological and evolutionary factors generating biodiversity[1]. Despite these advances in knowledge, the mechanisms that underlie the processes of speciation and diversification remain relatively unknown[2]. For example, speciation rates are known to differ between taxonomic groups and geographic contexts[3], and this variation is likely linked to how readily populations differentiate and evolve reproductive isolation. Generalization as to how species formation might vary across the landscape remains limited, however. Examining species on a landscape scale can help us identify the micro-evolutionary processes that have macro-evolutionary consequences. One such process is gene flow, which is known to dictate population structure.

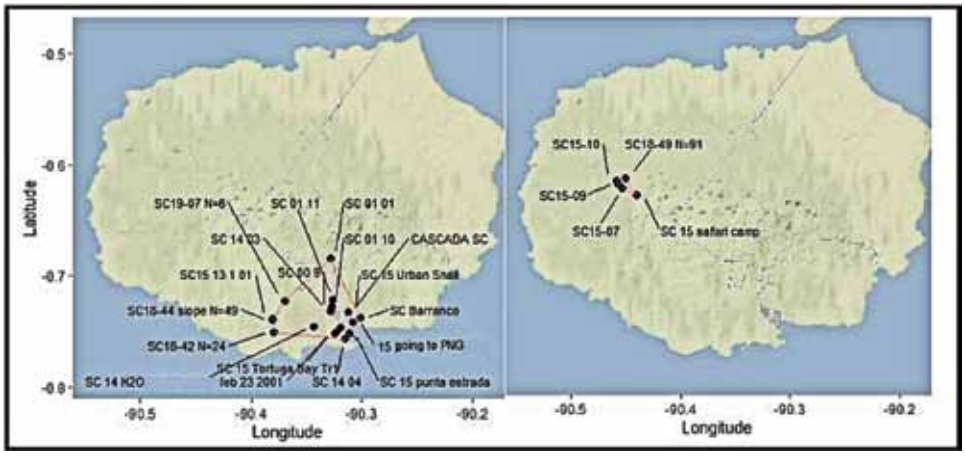

Fig. 1: a) RADseq phylogeny of *Naesiotus* with vegetation zones on tips b) Net diversification rate (NDR) of *Naesiotus* in arid and humid zones c) NDR determined by a state-dependent speciation and extinction branching In this study, I address two process model (BiSSE).

This research proposed to use Galápagos endemic land snails (genus *Naesiotus*), a radiation of 60+ species[3], to assess differences in population genetic structuring and detect spatial and ecological features that influence gene flow in different parts of the insular landscape. All *Naesiotus* species are single-island endemics and restricted to one of the two main vegetation zones (humid or arid). Preliminary results suggest that the net rate of diversification in Galápagos *Naesiotus* is higher in the humid than in the arid zone[4] (Fig. 1), and thus unique environmental or landscape features to these vegetation zones might contribute to this difference. In this study, I address two questions: (1) How does population structure differ between vegetation zones? (2) How do spatial and ecological features impact gene flow among populations within species? I hypothesize that population genetic structuring will exhibit more differentiation and estimates of gene flow will be lower in the arid zone. Furthermore, I predict that higher temperatures and lower annual rainfall has restricted gene flow, leading to increased isolation in the arid zone compared to the humid zone.

To test these hypotheses, I focused on two species on Santa Cruz Island: *Naesiotus wolfi* (arid zone) and *N.* cf. *ochsneri* (humid zone). Phase 1 of the project involved digitizing the shell collection of *Naesiotus* sp. from Santa Cruz Island (~12,000 samples) and generating distribution maps for the two species of interest (Fig. 2).

This summer I will begin Phase 2. I will utilize the previously generated distribution data to collect 10 individuals of each species from 6 populations. I will calculate Fst values to describe levels of gene flow between populations and collect genetic diversity metrics (e.g., heterozygosity) to quantify variation. I will delineate population boundaries, determine the number of genetic groups, and generate a 'geogenetic' map to visualize patterns of population structure. Lastly, I will detect and compare spatial and ecological features influencing gene flow between vegetation zones across islands. I will combine local population characteristics (relative abundance), spatial data (Euclidean geographic distance, vegetation zone area, and elevation), and ecological variables (temperature, precipitation, and habitat heterogeneity) with population genetic data into a gravity modeling framework. This model, which incorporates the influence of at-site and between-site processes, will estimate the functional connectivity among populations for each species.

Future Work:

The proposed research will serve as an important first step to develop a model of intraspecific genetic variation that I will expand to other land snail species in the Galápagos Islands with two main objectives: (1) test the impact of island formation and colonization on the patterns

of population structure, and (2) test if the population genetic structuring can explain the variation in speciation rates between the humid and arid zones. Specifically, I will detect signatures of dispersal and gene flow early in the process of community assembly and population structuring by targeting species on young islands. I will compare these patterns to those identified on older islands, where communities have had longer to form.

Significance:

If we hope to understand processes governing speciation, a thorough understanding of microevolutionary processes is essential. Testing dispersal patterns, identifying barriers to gene flow, and assessing population structures will bolster this aim. This research provides an opportunity to evaluate how speciation rates differ between isolated contexts and contributes data regarding how species formation might vary across a common landscape. Importantly, the methodology developed through this study can be used to quantify population structure in other island-like systems aiming at assessing genetic variation for ecological, evolutionary, and conservation purposes.

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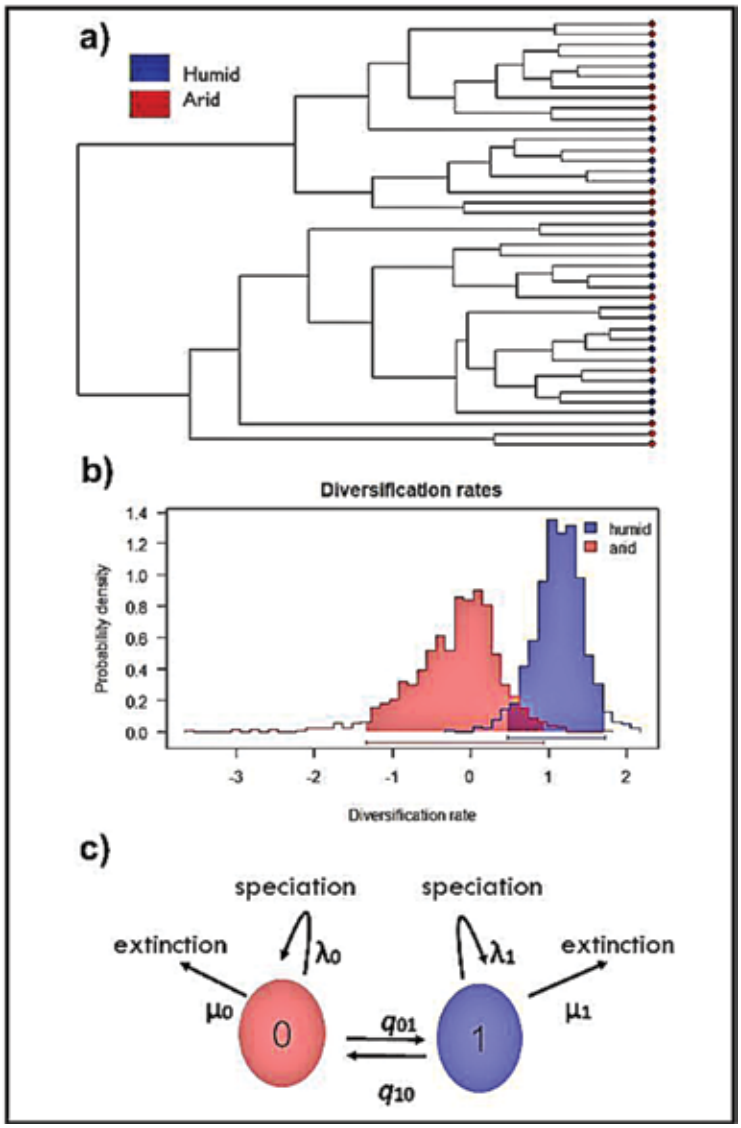
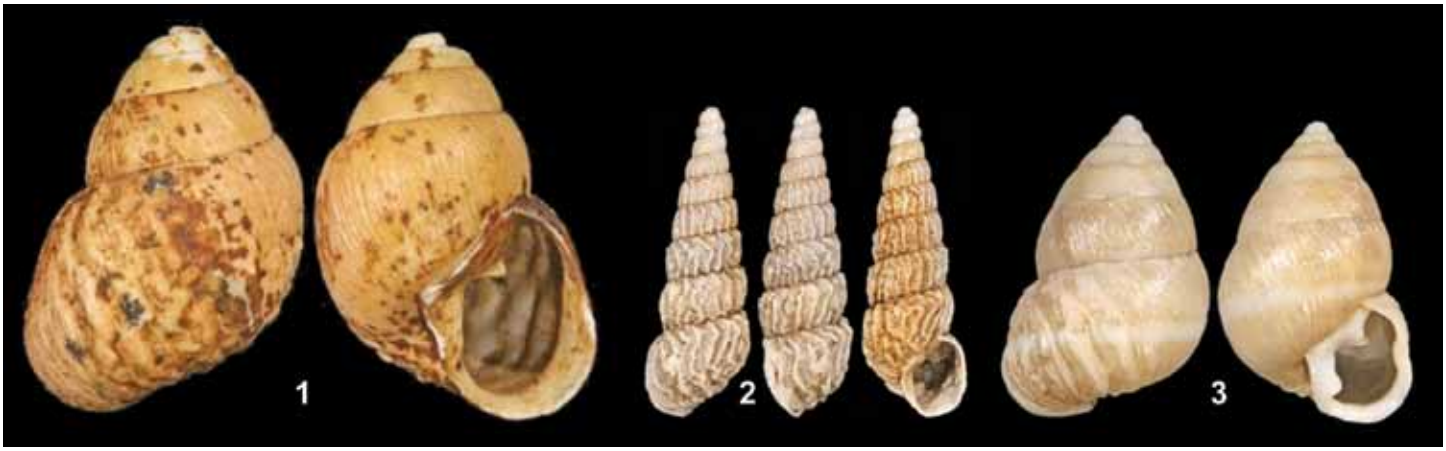


Fig. 2: Distribution maps for *Naesiotus wolfi* (arid zone) (left) and *N.* cf. *ochsneri* (humid zone) (right) on Santa Cruz Island.



1. *Naesiotus adelphus* (Dall, 1917) 19mm, 2. *Naesiotus reibischii* (Dall, 1895), 13mm, 3. *Naesiotus wolfi* (Reibisch, 1893), 13mm, all from Santa Santa Cruz Is, Galapagos, Ecuador, anon.

COA Academic Grant Report: Examining a transgenerational acclimation of *Kelletia kelletii* to marine heatwave temperatures via field & lab experimentation

Awardee: Xochitl Clare, Dissertation Advisor: Gretchen Hofmann

Background

Shellfish species such as the Kellet's whelk (*Kelletia kelletii*) may be able to provision their progeny to be more resilient to oncoming thermal stress as a result of marine heatwaves via transgenerational plasticity (TGP), although, how TGP may play a role in increasing whelk larval thermal tolerance to marine heatwave (MHW) temperatures may differ at fished sites versus more "pristine ecosystems". For example, harvesting can influence physical and chemical environmental characteristics that may alter the behavior of organisms in fished areas (i.e. sediment composition, role of primary producers) [1]. I will examine impacts of MHWs at a fished site by establishing a field and laboratory based study on adult and larval stages of *K. kelletii*.

***Transgenerational plasticity*:** My Conchologists of America (COA) research award supports my Ph.D. work at the University of California, Santa Barbara (UCSB), in conducting a TGP assessment in the lab and in the field to provide greater ecological context to my lab-based findings on larval thermotolerance. My work will investigate how habitat characteristics at fished sites influence TGP in whelk larval thermotolerance via a field acclimation.

***Adult size, feeding, and growth*:** The COA has also funded my proposed work to monitor parental whelks during this acclimation to further evaluate differences in thermal tolerances of progeny that originate from a fished site. While I originally proposed to monitor feeding rates of adult whelks during the acclimation period, I recognize the research limitations due to COVID-19 may make collecting feeding rate data from the field incredibly challenging. Therefore, in consideration of current research restrictions, I will simply measure adult whelk size and growth during the field acclimation period.

Completed Work & Timeline Adjustment

Like my past experimental work on this species, this project will be conducted within my research group, the Hofmann Lab as a part of the UCSB Santa Barbara Coastal Long-Term Ecological Research (SBC-LTER) program. Since we are only currently ramping up our research protocols and capacity to conduct fieldwork given COVID-19 adjustments, this project will be scheduled to begin 2022 (a year after originally proposed). Nevertheless, given our campus's progress in conducting research under COVID-19 circumstances, my ability to acclimate whelks in the field from February-May 2022 as originally planned is optimistic. Thus far, I have not collected data for this work, but I have been successful in maintaining adults to reproduction, larval development, and hatching for MHW temperature assessments under controlled conditions in past experiments. Further, as of my award date, I have already begun examining the role of TGP in thermotolerances of Kellet's whelk larvae from a fished site, Carpinteria Reef (CARP), in a controlled setting at UCSB. The data I am currently collecting will greatly inform this work. Finally, since my award date, I have advanced to candidacy and as a part of my candidacy examination developed my research plan for this project in greater detail with my dissertation committee (Professor Gretchen Hofmann, Professor Deron Burkepile, Professor Halley Froelich, and Professor Linda Adler-Kassner). The following sections provide the updated project design and rationale for my upcoming work.

Fig. 1. Kellet's whelk, *Kelletia kelletii* (Forbes, 1850). Photo by Steve Lonhart.

Methodology & Rationale

Site selection: While I proposed to examine TGP in larval thermotolerance in a field experiment that compares MPA to non-MPA sites in my original COA proposal, since we do not have "perfect" site-to-site replicates for comparison within the SBC-LTER, I have altered my research question. I have decided to focus on the unique traits of each research site, that is: **How do unique traits of sites within the SBC effect adult provisioning, and subsequentially larval thermotolerance?** In designing this work, I am fully aware that the scope of the project may downsize or expand depending on the status of our campus COVID-19 research protocols and how research activities grow in flexibility over the course of the upcoming academic year.

***Specimen collection and acclimation*:** Prior to their reproductive window (June-July), I will collect adult whelks

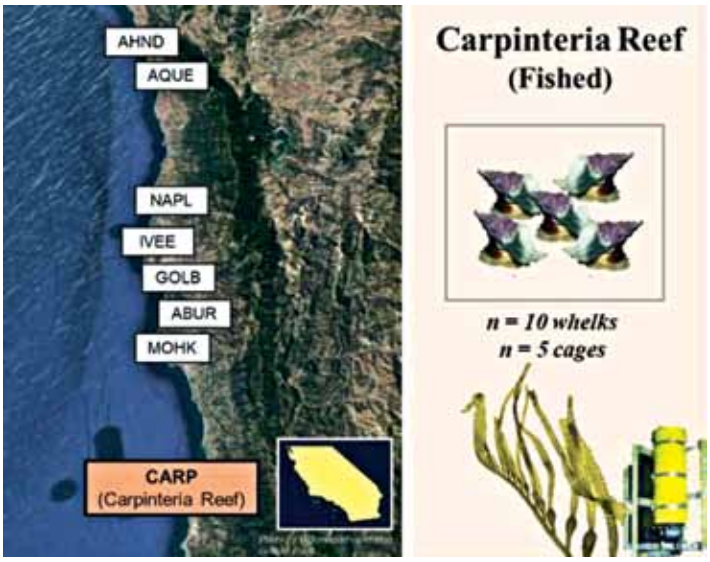


Fig. 2. Prior to conducting larval thermal tolerance trials, I will acclimate and monitor parental whelks (n = 50 whelks) at CARP. SBC. SBC-LTER resources will be used to record benthic temperatures where whelks will be caged.

from a fished site within the SBC-LTER, CARP, where they will be acclimated and monitored from February-May 2022 (i.e. I will cage parental whelks at their site of origin). Whelks will be collected across three size classes: 8 cm, 10 cm, and 12 cm (n = 50 whelks) and placed into cages (n = 5 cages, n = 10 whelks per cage).

***Adult size and growth*:** After a one week starvation period, I will feed whelks bi-weekly and record weights and sizes of parental whelks once a month over the course of the acclimation. Cage temperatures will be recorded at the beginning and end of each feeding. I will place temperature sensors maintained via the SBC-LTER at the research site to monitor temperature during the field acclimation.

***Larval collection and sampling*:** Following the field acclimation, as soon as whelks have reproduced and laid egg capsules (March-June 2022), I will collect capsules from cages and conduct thermal tolerance trials on the progeny from each site at two larval stages: veligers and hatchlings. I will gather egg capsules from field sites as they are laid (whelk mating and egg laying may be asynchronous). Separated by site and cage in 5 gal tanks in a flow-through seawater system, I will hold egg capsules to a 12 to 12 light cycle in ambient seawater. I will record daily temperatures in all egg capsule holding tanks as they develop into veligers and hatchlings over four weeks. I will also record larval morphometrics and the number of larvae in capsules sampled for the experiment.

***Thermal tolerance trials*:** Per methodology I developed in my past whelk larval thermal tolerance studies, I will conduct acute one hour thermal tolerance trials on larvae to determine the median lethal temperatures (LT50), a standard metric used to assess temperature sensitivity, and also assess developmental abnormality (AB50) in a similar fashion to my previous thermotolerance work.

***Scoring*:** After thermotolerance trials, larvae will be processed and scored in the same fashion as outlined in my previous thermotolerance experiment.

***Statistical analysis of LT50 and AT50 data*:** I will use a generalized linear mixed-effects model to test larval thermal tolerances, where LT50s will be calculated using a logistic regression for each temperature (via lme4 [2], MASS [3], R version 3.5 base packages).

Predictions

Adult size and growth: I predict that "wildtype" feeding behaviors of whelks at CARP will remain the same during caged field acclimations and monitoring — therefore, this experiment will document growth rates of adult parental whelks at a fished site prior to reproduction. I hypothesize that there is greater conspecific foraging competition at fished sites and that whelks at the fished sites might be more voracious consumers than whelks from "pristine environments" (that might have more whelk predators).

***Thermal tolerance trials*:** Overall, I hypothesize that larval performance in thermal tolerance trials will be a function of parental provisioning. I predict larvae that come from parents that had faster growth rates will be better provisioned and have higher thermal tolerances.

Feasibility & Resources

The major resources to conduct this work have already been funded by COA and, in addition, are supported by resources within the SBC-LTER. My research group also has longstanding experience in acclimating marine invertebrates in the field for TGP assessments in the lab. My research group has historically maintained temperature sensors and has been able to maintain temperature sensors in the field during COVID-19.

Summary

By staging this field and lab based TGP experiment I will investigate TGP with respect to MHWs for an invertebrate fishery species in an ecologically informed context. I will also investigate site specific effects on adult whelk reproduction and larval success. Additionally, in executing this work, I will engineer protocols to observe adult whelk size and growth in the field.

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COA Academic Grant report
Molecular phylogeny of Orthalicoidea land snails

Rodrigo B. Salvador, PhD

Museum of New Zealand Te Papa Tongarewa

The superfamily Orthalicoidea, typically includes medium to large-sized land snails, usually bearing colorful shells patterned in yellows, browns, and reds. This has made the group a favorite of shell enthusiasts, from early naturalists to the present.

Orthalicoidea has a Gondwanan origin, but its branches outside of Latin America are almost of no consequence compared to their outstanding Neotropical diversity. Even so, their phylogeny and classification have only very recently started to settle on what looks like a more definite system, based on the molecular study of Breure & Romero (2012). Those authors proposed a new arrangement of the group, reclassifying several genera within seven families: Orthalicidae, Amphibulimidae, Bothriembryontidae, Bulimulidae, Megaspiridae, Odontostomidae, and Simpulopsidae. An eighth (and extinct) family, Vidaliellidae, was later allocated in the Orthalicoidea (Hammouda et al., 2017), but that classification remains contentious.

Of the seven extant families, the Bulimulidae are the most diverse, but it still counts with several species allocated in the wastebasket genera *Bostryx* Troschel, 1847, *Bulimulus* Leach, 1814, and *Drymaeus* Albers, 1850 (Salvador, 2019). Furthermore, while some of its traditional genera (e.g., *Leiostracus* Albers, 1850, and *Rhinus* Albers, 1860) have been recently reclassified into Simpulopsidae, several other genera still remain to be tested under the new molecular framework.

Thus, the goal of the present project is to improve upon the work of Breure & Romero (2012). To that end, I will add to those authors' taxa coverage by including several species from absent or underrepresented genera, with a special focus on the diverse Brazilian fauna (Salvador, 2019). Furthermore, I will test the monophyly and classification of some contentious Bulimulidae genera, such as *Kora* Simone, 2012, *Oxychona* Mörch, 1852, and *Pseudoxychona* Pilsbry, 1930.

Methods

DNA will be extracted from tissue clips of ethanol-preserved specimens from the following natural history collections: AM (Australian Museum); CMRP (Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Brazil); FLMNH (Florida Museum of Natural History, USA); FMNH (Field Museum of Natural History, USA); MZSP (Museu de Zoologia da Universidade de São Paulo, Brazil); NMNZ (Museum of New Zealand Te Papa Tongarewa); NMSA (KwaZulu-Natal Museum, South Africa); UFAC (Universidade Federal do Acre, Brazil).

A multi-locus approach was chosen to make full use of the published data of Breure & Romero (2012). The same combination of four nuclear and mitochondrial markers of those authors will be used: ITS2, 28S, H3, and COI. The resulting dataset will be compiled for phylogenetic analyses through Bayesian Inference and Maximum Likelihood.

Research Plan

Originally, I proposed that the whole project could be completed in about one year. That estimate, however, considered normal circumstances and is in retrospect, very unfortunate. The global pandemic has put severe limitations on the functioning of museums worldwide and on their staffs. The majority of institutions have not been able to operate normally and could not send specimens out on loan. As such, I am still waiting to receive the larger portion of the specimens I require for this project.

In the meantime, I had a few specimens readily available and managed to receive a few more. As of now, I have sequenced the markers of 14 species, as follows: *Bulimulus guadalupensis* (Bruguière, 1789), *B. tenuissimus* (d'Orbigny, 1835) [two specimens, from distant localities], *Corona regalis* (Hupé, 1857), *Drymaeus papyraceus* (Mawe, 1823), *D. multilineatus* (Say, 1825), *Hyperaulax ridleyi* (E.A. Smith, 1890), *Leiostracus carnavalescus* Simone & Salvador, 2016 [two specimens of distinct color morphs], *L. demerarensis* (Pfeiffer, 1861), *Orthalicus zoniferus* Strebel & Pfeffer, 1882, *Plectostylus broderipii* (G.B. Sowerby I, 1832), *P. peruvianus* (Bruguière, 1789), *Rabdotus levis* (Dall, 1893), *Rhinus botocudus* Simone & Salvador, 2016, *Tomigerus corrugatus* Ihering, 1905.

I am currently waiting for further specimens from five collections (AM, CMRP, FLMNH, MZSP, NMSA) to proceed with the project. Considering a very optimistic timeframe, I estimate that the project (excluding publication) will be concluded by the end of the year. I hope this work will be an important contribution to Orthalicoidea classification and serve as a basis for more focused revisionary works in family and genus levels.

***Leiostracus demerarensis* (L. Pfeiffer, 1861), endemic to South America, is to date known to occur in Guyana, Suriname, French Guiana, and northern Brazil. It is one of the species to be used in this study and was recently transferred from the genus *Bostryx* to *Leiostracus* with the help of genetic data (Salvador et al., 2020).**

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***Semicassis granulata granulata* (Born, 1778) form *cicatricosa* (Gmelin, 1791), under coral in 85 feet of water, West Palm Beach, FL (28.5 mm).**

Is *Semicassis cicatricosa* (Gmelin, 1791) [Tonnoidea: Tonnidae: Cassinae] a valid biotaxon?

Harry Lee

Elucidating the status of this western Atlantic bonnet shell is like peeling an onion. There are layers upon layers of complexities, and as each one is removed, it can serve as a tender morsel of the process of taxonomy or nomenclature, which the mind can savor.

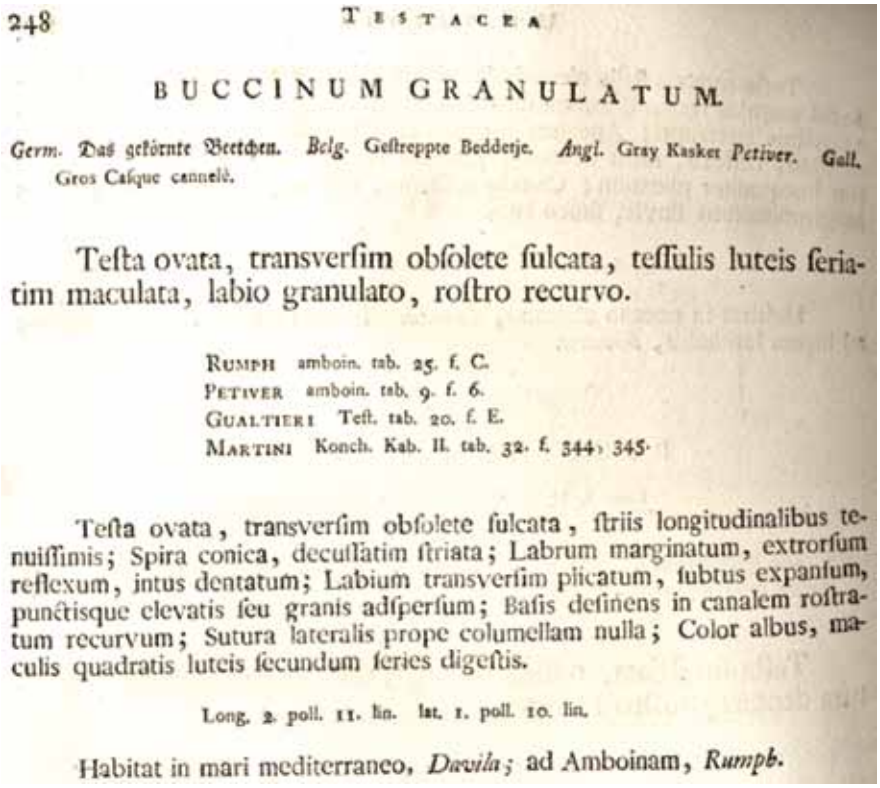
Its placement at the family-level might be considered the onion's outer husk. As indicated in the above title, the current assignment is superfamily Tonnoidea, family Tonnidae, subfamily Cassinae. This hierarchy has appeared in a variety of iterations and spellings over the years and may well seem a bit strange to veteran collectors and curators. Yet it is the reasoned result of a succession of nomenclatorial events.

Tonnidae (as Doliidae) and Cassidae both date from Latreille (1825: 196, 194 respectively), so neither has immediate claim to priority. First, let's deal with Doliidae. Suter (1913) placed *Dolium* Lamarck, 1801, in synonymy with *Tonna* Brünnich, 1772, and although he made no reference to any relevant family-level taxon, as a consequence of his action both *Tonna* and Tonnidae were in prevailing usage through the Twentieth Century and beyond. On that basis, Bouchet and Rocroi (2005: 172) invoked the provisions of Article 40.2 of the *International Code of Zoological Nomenclature* (ICZN, 1999) for the conservation of Tonnidae and suppression of the synonymous Doliidae. Earlier, Wenz (1941: 1045), acting as first reviser, had declared "Tonnacea," later converted to "Tonnoidea," in compliance with Article 29.2 of the *Code* ICZN, 1999, and thus Tonnidae, superordinate to Cassidae. We now have the basis for "Tonnoidea: Tonnidae" in the title. Confusing? Yes, but by the rules.

Just under the onion's flaky husk is another tough layer. The author's clear intentions notwithstanding, Latreille's "Cassidae" was not the proper formation of a family name based on the genus *Cassis* Scopoli, 1777. Article 29.3.1 of the Code (ICZN, 1999) mandates that the stem of the type genus "is found by deleting the case ending of the appropriate genitive singular," in this instance leading to "Cassid-" from "Cassidis." So why not simply emend Cassidae to Cassididae? This remedy, while reasoned, runs

afoul of that old troublemaker, homonymy. It happens that Linnaeus (1758: 362) named a genus of beetles *Cassida*, and Gyllenhal (1813: 434) based a family-level name, Cassidites, later emended to Cassidinae, on the Linnaean genus. Thus Cassididae Latreille, 1825, or any other family-level name based on the same stem by any author after 1813, is unavailable for the purposes of taxonomic nomenclature under the provisions of the Principle of Homonymy (ICZN, 1999: 53.1, 55.5). Since Cassidae Latreille, 1825, was in widespread use and not a homonym, the ICZN was petitioned to forgive its fraudulent etymology and conserve it by exercise of its plenary powers. This exception was granted (Melville, 1974), and the family-level taxon, Cassoidea, Cassidae, Cassinae, is now available, but as noted above, it is subordinate to Tonnoidea, Tonnidae, Tonninae, when the former is considered synonymous at the same taxonomic rank. Thus we have arrived at "Cassinae" in the title.

The bulb is now stripped of its outermost layers, and we may begin to delve into the more comestible parts. The genus *Semicassis* Mørch, 1852, is based on *Cassis japonica* Reeve, 1848, by the subsequent designation [SD] of Harris, 1897. Abbott (1968: 125, 128) considered *Phalium bisulcatum* Schubert and Wagner, 1829, to be a senior synonym of the Reeve name. Although it was treated as a subgenus of *Phalium* Link, 1807 [Type Species (TS): *Buccinum glaucum* Linnaeus, 1758 SD Dall, 1909] by Abbott (1968: 125), modern authors, *e.g.*, Malacolog 4.1.1, Kreipl, 1997, have afforded this circumtropical group full generic rank. *Tylocassis* Woodring, 1928 [TS *Buccinum inflatum* Shaw, 1811 (= *B. granulatu*m Born, 1778 *fide* Abbott, 1968) by original designation (OD)] is treated as a synonym, not a subgenus, of *Semicassis* by Kreipl (1997: 48). Thus we have reached the taxon *Semicassis granulata* (Born, 1778) and the innermost layers of this pungent, tantalizing herb.



248 TESTACEA

BUCCINUM GRANULATUM.

Germ. Das gekörnte Beetchen. *Belg.* Geſtreppte Bedderje. *Angl.* Gray Kasket *Petiver.* *Gall.* Gros Caſque cannelé.

Teſta ovata, transverſim obſolete ſulcata, teſſulis luteis ſeriatim maculata, labio granulato, roſtro recurvo.

RUMPH amboin. tab. 25. f. C.
PETIVER amboin. tab. 9. f. 6.
GUALTIERI Teſt. tab. 20. f. E.
MARTINI Konch. Kab. II. tab. 32. f. 344, 345.

Teſta ovata, transverſim obſolete ſulcata, ſtriis longitudinalibus tenuiſſimis; Spira conica, decuſſatim ſtriata; Labrum marginatum, extrorſum reflexum, intus dentatum; Labium transverſim plicatum, ſubtus expanſum, punctisque elevatis ſeu granis adſperſum; Baſis deſinens in canalem roſtratum recurvum; Sutura lateralis prope columellam nulla; Color albus, maculis quadratis luteis ſecundum ſeries digeſtis.

Long. 2. poll. 11. lin. lat. 1. poll. 10. lin.

Habitat in mari mediterraneo, *Davila;* ad Amboinam, *Rumph.*

Fig. 1 *Buccinum granulatum* (the Scotch bonnet) as described (Born, 1778: 239-240 and repeated in Born, 1780: 248.

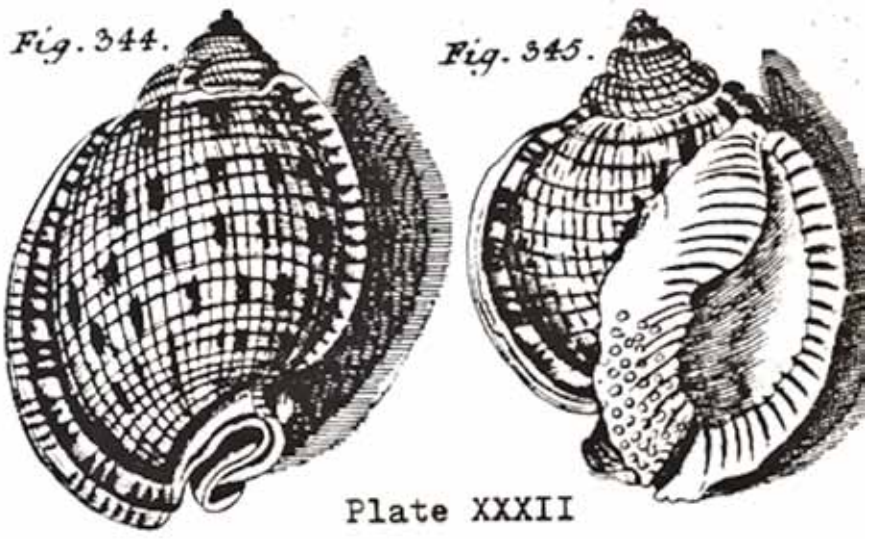


Fig. 2 The *Buccinum granulatum* type was restricted to Martini (1773: plate 32, figs. 344, 345.

The Austrian conchologist Ignatius von Born (1742-1791) laid a straightforward foundation for the nominal species *Buccinum granulatum*, widely-known as the Scotch bonnet. It was described (Born, 1778: 239-240; repeated in Born, 1780: 248: **Fig. 1**) rather precisely, and four illustrations were cited. Of these, the type was restricted to Martini (1773: plate 32, figs. 344, 345; **Fig. 2**) by Clench (1944: 6; citing Born, 1780 *vice* 1778). Since Born had placed the species in the Mediterranean and Amboina, Clench (*Idem*) designated Puerto Plata, Dominican Republic, as the type locality. While it is generally accepted that there are two allopatric subspecies

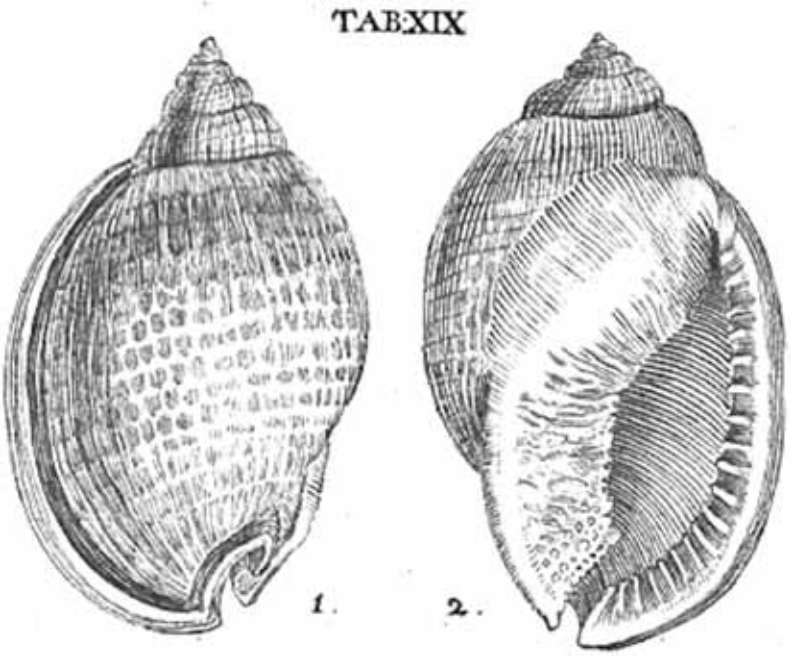
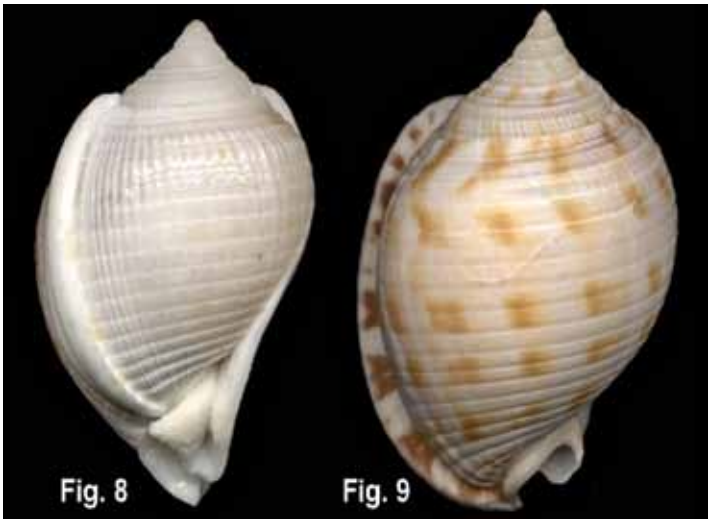


Fig. 3 The Meuschen, 1778, cited figure for [*Buccinum*] *cicatricosum*, published two years later by Gronovius, 1781 – thus *Buccinum cicatricosum* Meuschen in Gronovius, 1781. All of Meuschen were eventually declared unavailable because of inconsistent application of binominal nomenclature.

beside the nominotypical Born taxon, the taxonomic status of a smooth western Atlantic morph, which we may call *Semicassis cicatricosa* (Gmelin, 1791) for the purposes of argument, is controversial. Although the majority of authors seem to regard this as a mere morph of the Scotch bonnet, others, e.g. Gibson-Smith and Gibson-Smith (1981), de Jong and Coomans (1988: 67), and Rosenberg (2009), treat it as a separate taxon at the species level. In support of the three preceding authorities, I shall proceed in satanic advocacy, attempt a proper analysis of *S. cicatricosa* (Gmelin, 1791), and strip the onion to its core.

The first notice of the topical shell was contemporary with Born's description of *S. granulatum*. Frederich Christian Meuschen (1719-1811), is a fairly obscure figure in the history of conchology, but to say his work, the *Museum Gronovianum* ..., is simply rare and obscure does disservice to what may be the most recondite of all published conchological works. It is not mentioned in Dillwyn (1817) or Dance (1986), and is not among the 60,000 items listed in the British Museum's library (Woodward *et. al*., 1903-1940). Nonetheless, the book has been digitized, is now in the public domain, and provides the passage: "1158 [Buccinum] cicatricosum Pokdaalige Huid. Gr. Z. III n. 1350 & Tab. II. fig. 1. 2, L. sp. o. Een stuk." (Meuschen, 1778: 115). Since the only indication, the cited illustration, was not published until about two years later (Gronovius, 1781a, b), this is a *nomen nudum* and thus, by this fact alone, unavailable for the purposes of taxonomic nomenclature (ICZN, 1999: Articles 12.1, 12.2). The Gronovius figures [our **Fig. 3**] can be found at the top of "TAB XIX," which plate is also labelled "Fasc. III Tab. II" at its bottom *teste* R.I. Johnson (pers. comm. 27 November, 2010). Authors, *e.g.*, Meuschen (1778: 115), Gmelin (1791: 1475), Dillwyn (1817: 597), and Clench (1944: 8), agree on the figure citation while variously locating the companion text, *i.e.*, "no. 1350," "p. 303," or "v." When considered along with the binomen again provided by Meuschen (1781a, b), *Buccinum cicatricosum* Meuschen *in* Gronovius, 1781a, b, appears to be an available name for our straw man. After initial acceptance, however, (ICZN, 1910: Opinion 20, 48-50) of the most important work of this second obscure Dutch naturalist, Laurens Theodore Gronow (1730-1777 or 1778), his *Zoophylacii* .... (Gronovius, 1763, 1764, and 1781a, b),[1] were subsequently declared unavailable for the purposes of taxonomic nomenclature (ICZN, 1925: Opinion 89, 27-33; 1950; 1954b; 1958). Quite familiar with the 1781 Gronovius work (since he was its editor and wrote its index), Meuschen (1787: 392; species no. 1290) later reported: "*C[asque] Cicatricosa*, ventricosa, anfractibus nodosis, testa maculis quadritis impressus, Linn. [1767] 453. [alpha]. s. o. *Gronov. Zooph. III*. 19. 1. 2. *Petiv. Mus*, 7. 4. (4. specim. 772"[1] in his catalogue of the shell collection of yet another Dutchman, Abraham Pauluszoon Gevers (1712-1780). Déjà vu, this appears to be a validly proposed binomen with a description and unambiguous figure citation, and it was treated as an available name by some authors, *e.g.*, Dall (1923) and Clench (1944: 8). Nonetheless, all of Meuschen's works have been officially declared, or otherwise treated as, unavailable because of inconsistent application of binominal nomenclature (ICZN, 1954a, 1958, 1999: Article 11.4; Winckworth, 1926). Recourse to the Gronovius and Meuschen works having been denied, one must credit Gmelin (1791: 3475-6), as the first to validate the binomen *Buccinum cicatricosum.* Although

[1] The *Zoophylacii* have provided a challenge to bibliographers, and I have incorporated the research of Myers (1949), Higgins (1950), and Wheeler (1956) into the Gronovius citations above. Dieter Schierenberg provided some additional perspectives (see URL at the end of the Gronovius 1781b citation).



Figs. 4-10 are *Semicassis* specimens from the author's collection, shown here to illustrate some key morphological characteristics assigned to *S. cicatricosa* and *S. granulata.* For a complete explanation of what is shown in these images, see the text below.

he cited India as the "habitat," the consensus synonym, *B. recurvirostrum* Gmelin, 1791 (p. 3477), was placed in the Barbados. On that basis Clench (1944: 9), designated the latter as the type locality for *B. cicatricosum* Meuschen, 1787 [ergo Gmelin]. The Gmelin description is brief and not exactly diagnostic, but his (only) other indication was the Gronovius figures discussed above! Their reproduction here is considered central to the identity of the straw man, *Semicassis cicatricosa* (Gmelin, 1791), and it is consistent with the interpretation of every work consulted.

So how does *S. cicatricosa* differ from its closest relative, *S. granulata*? I have two specimens from NE Florida [**Fig. 4**; **Fig. 5**], three from Bimini, and one from Cuba which I would assign to *S. cicatricosa* without hesitation. Like the various figures in the literature, *S. cicatricosa* is relatively smooth with a predominance of close-set axial ridges which may, as on the dorsal convexity of the specimen in the type figure, give way to a malleated texture as in **Figs. 5** and **6**. The shell in **Fig 5** also shows rather regular enlargement of the some axial ribs on the spire and body whorl, where about a dozen discrete ridges run varying distances across the apical aspect before beginning to fade well above the periphery (form *peristephes* Pilsbry and McGinty, 1939). These ridges may be narrowly scalloped by up to four otherwise subtle and widely-spaced spiral cords crossing the more prominent portion of the ridges. This certainly contrasts sharply with the reticulated sculpture of the body whorl on the type figure of the Born species [**Fig. 2**], but the fact is that only a few of the approximately 75 Scotch bonnets examined by me have that even checkerboard sculpture. Most of them actually exhibit broad, flat spiral cords separated by deep narrow grooves which clearly dominate the axial sculpture [**Fig. 7**, **Fig. 8**]. Sculpture on the spire consists of very fine, discrete, close-set cords which on the body whorl become more widely spaced and granular as they are interrupted by the spiral grooves. On a substantial number of specimens the axial sculpture undergoes distinct obsolescence on the body whorl [**Fig. 9**], which is definitely a tendency toward the sculpture of *S. cicatricosa*. Now it's time to come clean, I took some liberties here: **Figs. 6** and **8** are different aspects of the body whorl of the same shell; see **Fig. 10**! This Scotch bonnet is wearing two hats, changing abruptly at a mid body whorl varix from typical (S. *granulata*) sculpture to that of *S. cicatricosa*. Given the variability evident in this series

of specimens, I think the onion has been laid bare, and Dr. Abbott's unitarian concept can be safely applied. Scotch bonnets can come in a spectrum of textures from "granulate" to smooth, but they're all members of the same species *Semicassis granulata* (Born, 1778).

Abbott (1968: 158) reported examining shells intermediate between *S. granulata* and *S. cicatricosa*, which fact induced his synonymy of the two, however, he never produced a figure of such an intermediate, and I don't recall seeing one depicted elsewhere in the literature.

Acknowledgements: The writer thanks Richard I. Johnson (Chestnut Hill, MA) for help navigating the bibliographic arcana of Gronovius and Meuschen. Charlotte Lloyd and Bill Frank lent specimens for reference, and Mr. Frank provided valuable image-editing and other editorial assistance.

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Teil 7 1507-1639 November, 1944 + i-xii
(the latter, of course, contained the chronology)

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